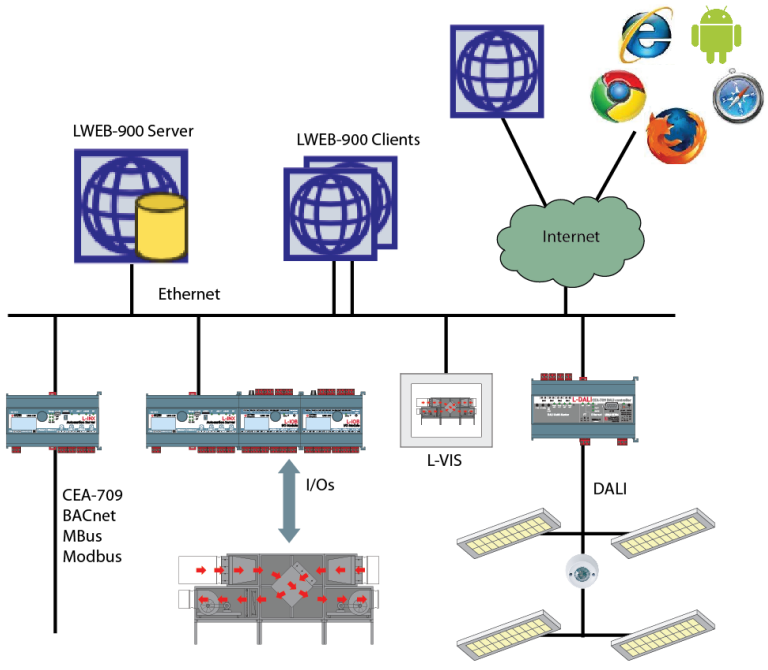
LWEB-900

Building Management System

User Manual

Delta IBT (Europe) GmbH



Contact

Delta Intelligent Building Technologies (Europe) GmbH
Blumengasse 35
1170 Vienna
AUSTRIA/EUROPE
support@loytec.com
https://www.loytec.com

Version 4.6.4

Document № 88081412

DELTA IBT (EUROPE) MAKES AND YOU RECEIVE NO WARRANTIES OR CONDITIONS, EXPRESS, IMPLIED, STATUTORY OR IN ANY COMMUNICATION WITH YOU, AND DELTA IBT (EUROPE) SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS PRODUCT IS NOT DESIGNED OR INTENDED FOR USE IN EQUIPMENT INTENDED FOR SURGICAL IMPLANT INTO THE BODY OR OTHER APPLICATIONS INTENDED TO SUPPORT OR SUSTAIN LIFE, FOR USE IN FLIGHT CONTROL OR ENGINE CONTROL EQUIPMENT WITHIN AN AIRCRAFT, OR FOR ANY OTHER APPLICATION IN WHICH IN THE FAILURE OF SUCH PRODUCT COULD CREATE A SITUATION IN WHICH PERSONAL INJURY OR DEATH MAY OCCUR. DELTA IBT (EUROPE) MAKES NO REPRESENTATION AND OFFERS NO WARRANTY OF ANY KIND REGARDING OF ANY THIRDPARTY COMPONENTS MENTIONED IN THIS MANUAL.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of DELTA IBT (EUROPE) .

LC3020™, L-Chip™, L-Core™, L-DALI™, L-GATE™, L-INX™, L-IOB™, LIOB-Connect™, LIOB-FT™, L-IP™, LPA™, L-Proxy™, L-Switch™, L-Term™, L-VIS™, L-WEB™, L-ZIBI™ and ORION™ stack are trademarks of Delta Intelligent Building Technologies (Europe) GmbH.

LonTalk®, LONWORKS®, Neuron®, LONMARK®, LonMaker®, *i*.LON®, and LNS® are trademarks of Echelon Corporation registered in the United States and other countries.

Contents

1 Introduction 11

1.1 Overview 11

1.2 Operating and Monitoring 12

1.3 Device Configuration 13

1.4 Global Connections 13

1.5 Parameter View 13

1.6 Alarming 13

1.7 Scheduling 13

1.8 Trending 14

1.9 Reporting 14

1.10 Integration of Web Cams 14

1.11 Multi-Site 15

1.12 Multi-User System 15

1.13 Event Log 15

1.14 Licensing 15

1.15 Supported Devices 15

1.16 Scope 15

2 What's New in LWEB-900 16

2.1 New in LWEB-900 4.6.4 16

2.2 New in LWEB-900 4.6.0 16

2.3 New in LWEB-900 4.4.0 17

2.4 New in LWEB-900 4.2.0 18

2.5 New in LWEB-900 4.0.0 19

2.6 New in LWEB-900 3.0.0 22

2.7 New in LWEB-900 2.2.0 28

2.8 New in LWEB-900 2.1.0 29

2.9 New in LWEB-900 2.0.0 33

2.10 New in LWEB-900 1.3.0 39

3 Installation 43

3.1 Software Installation 43

3.2 Product Activation 43

3.3 Firewall Configuration 46

4 System Tray Icon 47

5 LWEB-900 Server 48

5.1 Manage Projects 48

5.2 Password Protection ... 50
5.3 Network Settings ... 50
5.4 Certificate Management ... 51
5.5 Proxy Settings ... 55
5.6 Backup/Restore ... 55
5.6.1 Manual Backup ... 55
5.6.2 Scheduled Backup ... 56
5.6.3 Restore ... 57
5.7 Send messages to connected clients ... 59
5.8 Database Engines ... 59
5.9 Database maintenance and migration ... 61
5.10 Communication Statistics ... 61
6 LWEB-900 Client ... 63
6.1 Login ... 63
6.1.1 Default user ... 64
6.1.2 Kiosk Mode ... 65
6.1.3 Command Line Options ... 65
6.2 User Interface Overview ... 65
6.3 Navigation View ... 67
6.4 Object List View ... 69
6.5 BACnet Configuration ... 73
6.6 Add Devices ... 78
6.7 Configure LOYTEC Devices ... 86
6.8 Identification Key ... 88
6.9 Advanced Search and Search View ... 92
6.10 Watch View ... 94
6.11 Graphical View ... 97
6.11.1 Operate Graphical View ... 98
6.11.2 Configure Graphical View ... 100
6.11.3 Graphical View Templates ... 104
6.11.4 Graphical Views in LWEB-900 Server and in LOYTEC device ... 105
6.12 Parameter View ... 107
6.12.1 Operate Parameter View ... 107
6.12.2 Configure Parameter View ... 109
6.12.3 Parameter View Templates ... 111
6.13 Web View ... 112
6.14 Alarming ... 114
6.14.1 Alarm View ... 114
6.14.2 System Alarms ... 119

6.14.3 Alarm Notification 121
6.14.4 Alarm Log 124
6.15 Scheduling 126
6.15.1 Device Schedulers 126
6.15.2 LWEB-900 Server Schedulers 126
6.15.3 Master Scheduler View 128
6.16 Trending 142
6.16.1 Trend Log Size Limitation 143
6.16.2 Device Trend Logs 144
6.16.3 LWEB-900 Server Trend Logs 146
6.16.4 Trend Log View 149
6.16.5 Trend Chart View 153
6.17 Reporting 159
6.17.1 Report View 159
6.17.2 Configure Reports 160
6.17.3 Trigger a report manually 168
6.17.4 Report Templates 169
6.17.5 Alarm Report 178
6.18 E-Mail Notification 180
6.19 Event View 181
6.20 Global Connections 185
6.21 File Objects 189
6.22 Device Management View 192
6.22.1 Device Overview 194
6.22.2 Firmware Update 195
6.22.3 Device Configuration 201
6.22.4 Program Files 205
6.22.5 LWEB-800/802 files 209
6.22.6 Backup and Restore 212
6.22.7 File Selection Dialog 216
6.22.8 Manage Files 217
6.23 Perspectives 218
6.24 Device Communication Profiles 220
6.25 System Registers 223
6.26 Offline Mode 223
6.27 User Management 224
6.28 Access Rights 229
6.29 L-Studio Projects 232
6.30 Video Integration 234

6.30.1 Add Cameras ... 234
6.30.2 Camera Live View ... 236
6.30.3 Camera Playback View ... 238
6.30.4 Trigger Video Recording by Alarm ... 238
6.30.5 Camera Data Points ... 239
6.30.6 Add camera to graphical view ... 239
6.30.7 WebRTC ... 239
6.31 Multi-Site ... 241
6.32 VPN ... 244
6.33 Scripting ... 254
6.33.1 Nodejs scripts ... 254
6.33.2 Node-RED Server ... 256
7 WEB Access ... 259
7.1 Navigation Menu and System Menu ... 261
7.2 Global Settings ... 262
7.3 Project Settings ... 263
7.4 Error Handling ... 265
7.5 Statistics ... 265
7.6 System Log ... 265
8 Interfaces ... 266
8.1 Trend Log CSV File ... 266
8.2 Alarm Log CSV File ... 267
8.3 Identification Key CSV File ... 267
8.4 Database Interface ... 268
8.4.1 Datalog Configuration Table (DatalogConfig) ... 268
8.4.2 Log Information Table (LogInfo) ... 268
8.4.3 Log Item Information Table (LogItemInfo) ... 269
8.4.4 Trend Log Table (TrendLog) ... 270
8.4.5 Alarm Log Table (AlarmLog) ... 270
8.5 Report Template ... 272
8.5.1 Report Template XML file ... 272
8.5.2 Microsoft Report File Definition ... 276
8.5.3 Image File ... 277
9 Troubleshooting ... 278
9.1 Technical Support ... 278
9.2 Bug Reports ... 278
10 Specifications ... 280
10.1 System requirements ... 280
11 References ... 281

12 Revision History.....282

Abbreviations

100Base-T	100 Mbps Ethernet network with RJ-45 plug
Aggregation	Collection of several CEA-709 packets into a single CEA-852 packet
APDU	Application Protocol Data Unit
AST	Alarming, Scheduling, Trending
BACnet	Building Automation and Control Network
BOOTP	Bootstrap Protocol, RFC 1497
CA	Certification Authority
CAT	Composite Automation Type
CEA-709	Protocol standard for LONWORKS networks
CEA-852	Protocol standard for tunneling CEA-709 packets over IP channels
CN	Control Network
COV	change-of-value
CR	Channel Routing
CS	Configuration Server that manages CEA-852 IP devices
DA	Data Access (Web service)
DHCP	Dynamic Host Configuration Protocol, RFC 2131, RFC 2132
DIF, DIFE	Data Information Field, Data Information Field Extension
DL	Data Logger (Web service)
DNS	Domain Name Server, RFC 1034
DST	Daylight Saving Time
GMT	Greenwich Mean Time
HDD	Heating Degree Days
IP	Internet Protocol
IP-852	logical IP channel that tunnels CEA-709 packets according CEA-852
LSD Tool	LOYTEC System Diagnostics Tool
MAC	Media Access Control
MD5	Message Digest 5, a secure hash function, see Internet RFC 1321
M-Bus	Meter-Bus (Standards EN 13757-2, EN 13757-3)
MS/TP	Master/Slave Token Passing (this is a BACnet data link layer)
NAT	Network Address Translation, see Internet RFC 1631
NV	Network Variable
OPC	Open Process Control
PLC	Programmable Logic Controller
RNI	Remote Network Interface
RSTP	Rapid Spanning Tree Protocol (Standard IEEE 802.1D-2004)
RTT	Round-Trip Time
RTU	Remote Terminal Unit
SCPT	Standard Configuration Property Type
SHA	Secure Hash Algorithm

SL ..... Send List
SMTP ..... Simple Mail Transfer Protocol
SNTP ..... Simple Network Time Protocol
SSH..... Secure Shell
SSL ..... Secure Socket Layer
STP ..... Spanning Tree Protocol (Standard IEEE 802.1D)
TLS..... Transport Layer Security
UCPT..... User-defined Configuration Property Type
UI..... User Interface
UTC..... Universal Time Coordinated
VIF, VIFE..... Value Information Field, Value Information Field Extension
XML ..... eXtensible Markup Language

1 Introduction

1.1 Overview

LWEB-900 is an innovative and comprehensive solution for building management. The software covers the whole sequence of activities, from installation of the building management system through configuring the devices, all the way to daily operation of the facilities. Thus, a common user interface is available at all phases of the project.

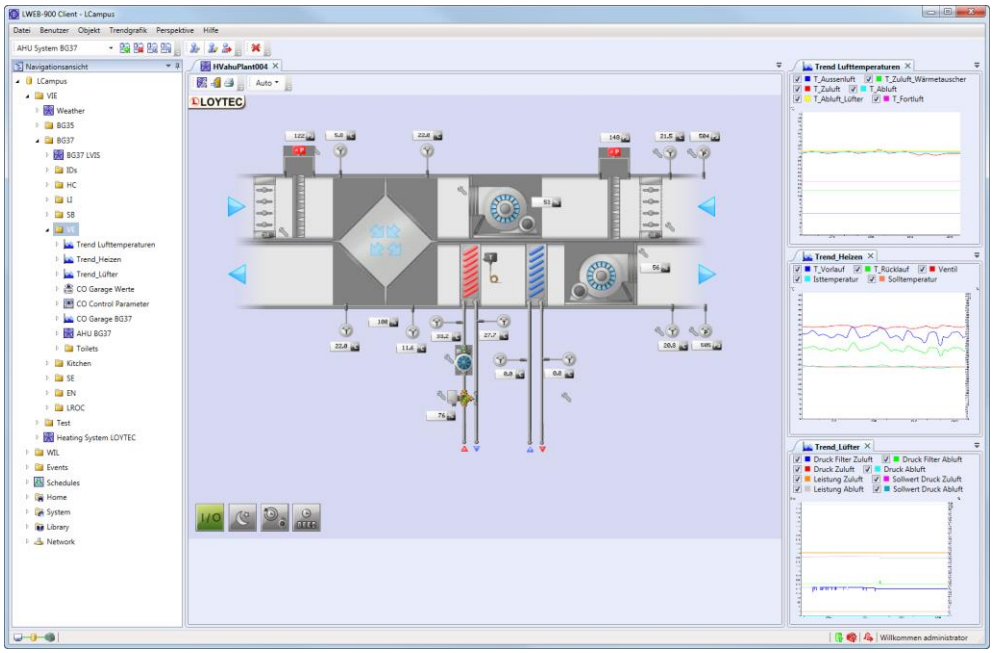


Figure 1: LWEB-900 Client User Interface

The central component is the LWEB-900 Server, which stores all configuration data in a database and communicates with the devices of the building management system in real time. The LWEB-900 Client is the user interface of the building management system. When a user starts the client, he has to log on to the server before receiving access. Client and server exchange data using web services only. Due to this system architecture, remote access is easily possible through firewalls and NAT routers. In addition, differences between the various field bus technologies (CEA-709, BACnet, DALI, MBus, Modbus, KNX, etc.) are compensated and the user is presented with a consolidated view of the separate systems.

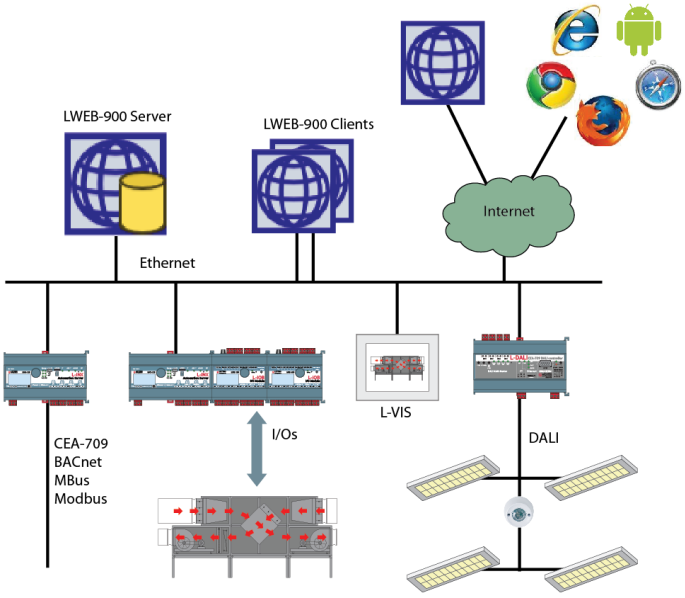


Figure 2: LWEB-900 System Architecture

To operate and monitor the building technical equipment a standard web browser can be used. In this way it is possible to quickly check the status of the building automation system while travelling. It makes no difference, whether a smart phone, tablet, or PC is used. Compared to the LWEB-900 Client, the functionality of the web application is limited to the daily operation of the building and does not include the functionality to install and configure the system.



Figure 3: Graphical View on a Mobile Device

1.2 Operating and Monitoring

In LWEB-900, all areas of a building are visualized and operated using installation schematics. Each schematic can consist of a large number of dynamic display elements which reflect the current status of the facilities. These display elements also include complex elements like alarms, trend logs and schedules.

The configuration software to design the graphical representation of the installation is built directly into LWEB-900. It allows users to easily create dynamic graphics without requiring any programming knowledge.

1.3 Device Configuration

LWEB-900 manages and configures all LOYTEC devices based on a central database. The set-up of the devices can be changed very comfortably because the required configuration software is built directly into LWEB-900. It is also easily possible to update the firmware of all devices and to perform backups.

1.4 Global Connections

With LWEB-900 it is easy to connect data points of different LOYTEC devices. For this purpose, a global connection can simply be created and drag&drop can be used to add input and output data points. LWEB-900 configures all devices which are part of the global connection accordingly. After the connection has been configured, the devices exchange data directly over TCP/IP.

1.5 Parameter View

The parameter view allows configuring operational parameters, which are distributed over multiple devices, efficiently. For example, parameters for room temperature control, light control, or sunblind control can be organized in different parameter views. Each parameter view is a matrix where each cell represents a parameter. Parameters can be organized freely in the matrix depending on space layout and function. In this way, it is possible to e.g. adjust the running periods of sunblinds across many rooms with a few mouse clicks and write the new values reliably into the corresponding automation devices.

1.6 Alarming

With LWEB-900, alarms from different sources can be visualized and managed in a uniform manner. For example, an L-DALI device can generate alarms in case of a ballast failure or if the emergency light test fails. On the other hand, a L-INX device controls the air handling unit and triggers an alarm if the V-belt is torn or if the air filter is dirty. In LWEB-900, these alarms are presented in a common view and the user can acknowledge or disable them.

When an alarm occurs, one or multiple receivers can be notified via e-mail. A scheduler can be used to control who is notified about alarms at a specific date and time. If the alarm is not acknowledged within a configurable amount of time, an alternative action can be triggered.

1.7 Scheduling

Schedules can be either executed in LOYTEC devices or directly in the LWEB-900 Server. To optimize the reliability of the system, create schedulers at the same location as the corresponding control logic. For example, an occupancy scheduler should be executed by the L-INX automation controller which primarily uses this information, whereas a scheduler determining which people are notified about alarms should be executed by the LWEB-900 Server.

LWEB-900 offers the unique possibility of organizing schedules in a hierarchical way, independently of where they are executed. The resulting tree structure permits defining entries which apply to all schedulers or only a subset. For example, a standard occupancy schedule can be defined for a whole building. This global schedule can be modified for certain areas of the building. The area specific entries can in turn be supplemented by room specific entries.

After the schedule hierarchy has been defined, LWEB-900 calculates the resulting configurations. If a scheduler is executed by in a LOYTEC device, LWEB-900 downloads the configuration.

1.8 Trending

LOYTEC devices can record the value of data points over time. However, the memory available on a device is limited. LWEB-900 overcomes this restriction by reading out the trend data from the devices periodically and storing everything in the database.

A user can also create ad-hoc trend logs directly in LWEB-900. This is the fastest way to create a trend log. One simply selects a data point and activates trending using the context menu. LWEB-900 periodically polls the data point value from the device and stores the value in the database.

Trend logs can be viewed either as tables or as charts. Especially for trend charts, a large number of customization options are available.

1.9 Reporting

LWEB-900 can create reports based on trend logs. Reports can be used, for example, to document the energy consumption in a building. The generation of a report can be triggered in one of the following ways:

- Periodically: Reports can be generated daily, weekly, monthly, or yearly.
- Event: The change of a data point value can trigger a report.
- Manually: A report can be triggered manually by the user.

Reports can be generated in PDF, Excel, or Word format. They can be automatically distributed via e-mail.

1.10 Integration of Web Cams

LWEB-900 can integrate web cams supporting the ONVIF standard. The local subnet scanning feature detects cameras automatically and reduces configuration effort significantly. The live image of a camera can be added to graphical views. LWEB-900 automatically detects the capabilities of a camera and maps events (e.g. motion detection, people counter information) and commands (e.g. PTZ control) to data points. LWEB-900 does not record videos itself but can command a camera to start recording when an alarm occurs.

1.11 Multi-Site

This feature allows accessing multiple LWEB-900 Servers located at different sites with a single LWEB-900 Client. It is possible to create a common graphical view showing data from the different servers. Devices, alarms, and users can be managed across the sites. To enable this feature the LWEB-900-MS license needs to be installed on each LWEB-900 Server.

1.12 Multi-User System

LWEB-900 provides a separate work environment for each user. A user has to log on to the system and is presented with a perspective tailored to his individual requirements. A perspective defines which windows are open and how they are arranged. In this way, a user can define separate perspectives which are optimized for different tasks and quickly switch between them.

LWEB-900 uses access control lists to define which operations a user can perform on a certain object (e.g. folder, data point, graphical view, parameter view, trend chart). To speed up the access right configuration, access control lists can be inherited from parent to child objects.

1.13 Event Log

All events are logged by LWEB-900 in the database. Events include alarms, alarm acknowledgements, log-in and log-out of users, change of operational parameter, change of device configuration, system messages, etc. The event log view offers a large variety of filters to efficiently analyze all activities in LWEB-900.

1.14 Licensing

The license limits the number of devices which can be managed by LWEB-900. Different license options are available, starting with 10 devices up to an unlimited number of devices. The license also restricts the maximum number of concurrent LWEB-900 Clients and LWEB-802/803 Clients (access for end user via web browser or Windows application). The standard license includes 5 LWEB-900 Clients and 20 LWEB-802/803 Clients.

1.15 Supported Devices

The LWEB-900 Server supports LOYTEC devices exchanging data using web services. Devices from other manufacturers can be integrated if they support BACnet.

1.16 Scope

This document covers the LWEB-900 software. The LOYTEC devices and their configuration software are beyond the scope of this manual. Please refer to the device specific user manuals for additional information.

2 What's New in LWEB-900

2.1 New in LWEB-900 4.6.4

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

Device management

Support for the following LOYTEC devices has been added:

- LPAD-4
- LOYBT-DRV-0900-TW, LOYBT-DRV-0600-TW, LOYBT-DRV-0400-TW

For LOYTEC Bluetooth devices, the UUID is now displayed in the device details of the Device Management View.

Competence partner license

The LWEB-900-CP license is intended exclusively for engineering purposes and must not be used for live projects. The validity of the license has been limited to 3 days. The 3-day validity period can be restarted by rebooting the PC.

2.2 New in LWEB-900 4.6.0

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

Support two factor authentication

Two factor authentication adds an extra layer of security to your accounts. You can enable the **Two-factor authentication** option individually for each user in the **User Management** dialog. Refer to section 6.27, sub-section "Configure two factor authentication" for more details.

Support secure L-STUDIO project

LWEB-900 can now import L-Studio projects created in secure mode. Refer to section 6.29.

Support username for devices admin and operator roles

LWEB-900 allow now to configure the username for the admin and operator roles of the LOYTEC devices. See section 6.6.

Certificate Management for BACnet/SC devices

LWEB-900 supports the installation of certificates required for BACnet/SC communication on LOYTEC devices. For this purpose, it uses the Certificate Authority Requirements Interchange File (CARI) format, as defined in ANSI/ASHRAE Standard 135-2020 Addendum cs. Refer to section 6.5, sub-section "Certificate Management for BACnet/SC devices" for details.

Trigger device backup before full LWEB-900 backup

LWEB-900 provides an option to backup all devices in the project before the backup of the server starts. This option is only available for full backups. See section 5.6

Use priority color for alarm messages

LWEB-900 provides an option to color the message body of an alarm notification using the colors defined for each priority range in the **Project Properties → Alarming** panel. See section 6.14.3.

2.3 New in LWEB-900 4.4.0

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

.NET 8.0

LWEB-900 Server and Client have been migrated from .NET Framework 4.7.2 to .NET 8.0. This upgrade brings improved performance, security, and long-term support.
It also ensures better compatibility with modern platforms and technologies.

Firmware update of LOY-BT devices

It is now possible to update the firmware of LOYTEC LOY-BT devices attached to a LOYTEC controller.

WebRTC

LWEB-900 now supports WebRTC for camera access. Cameras configured in the LWEB-900 Server can be accessed directly from any web browser, the LWEB-900 Client, LWEB-80x/LWEB-APP, as well as LVIS and LPAD devices.

HTTPS and HSTS

HTTPS is now enabled by default in the LWEB-900 Server and cannot be disabled anymore. HSTS (HTTP Strict Transport Security) can be enabled to ensure clients use only HTTPS with this LWEB-900 Server. HSTS requires HTTP to be disabled.

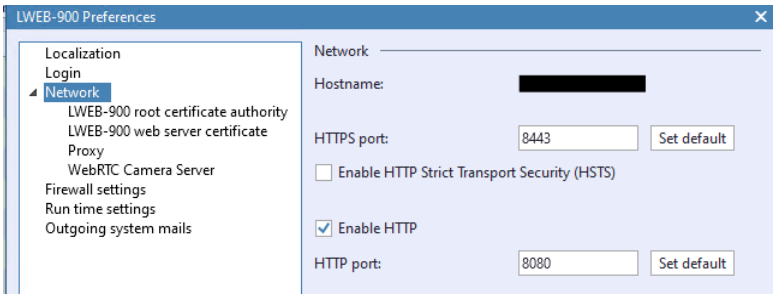


Figure 4: HTTPS and HTTP settings

Alarm Priority Ranges

Alarms can now be categorized into ranges according to their priority. Each range can be assigned a name, color, and sound. Priority names and colors are displayed in the Alarm View and Alarm Log View, and can also be used in the new Alarm Reports. The configuration of alarm priority ranges is available in the project properties under Alarming settings.

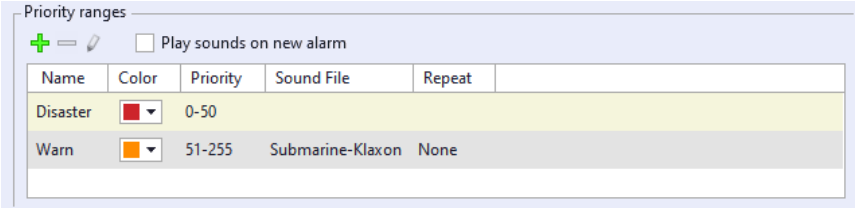


Figure 5: Alarm priority ranges

Alarm Reports

It is now possible to generate Alarm reports in LWEB-900. Two different alarm report templates are currently available: Alarm Count and Alarm State. Both templates provide clear information about alarms that occurred during a specific period for a specific Alarm Priority range. Refer to section 6.17.5 for details.

2.4 New in LWEB-900 4.2.0

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

Let's Encrypt

It is now possible to configure the LWEB-900 Server to obtain and use a certificate signed by Let's Encrypt. Certificates issued by Let's Encrypt are automatically trusted by most devices. Refer to section 5.4 for details.

iCalendar

LWEB-900 now supports iCalendar, allowing schedules and events to be imported in the standard .ics format. This makes it easy to integrate existing calendar into your LWEB-900 project.

Chart View display mode

It is now possible to change the display mode of a TrendLog in a ChartView. You can choose between Standard, Area Fill, Stacked, or Dots. In addition, Bands are available, which require a dedicated Band Color Map setting

2.5 New in LWEB-900 4.0.0

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

VPN support

LWEB-900 can configure a virtual private network (VPN) consisting of LOYTEC devices and LWEB-900 clients. Each LOYTEC device establishes a VPN tunnel to the VPN server configured by LWEB-900. Refer to section 6.32 for details.

Support sending SMS notifications

LWEB-900 can send alarm notifications as SMS. This feature uses a LOYTEC device with a connected LTE-800 interface as an SMS gateway. The configuration of the SMS gateway and the definition of the phone numbers is done in the project properties: Select **Properties** from the context menu of the project node in the navigation view and switch to the **SMS Notification** tab.

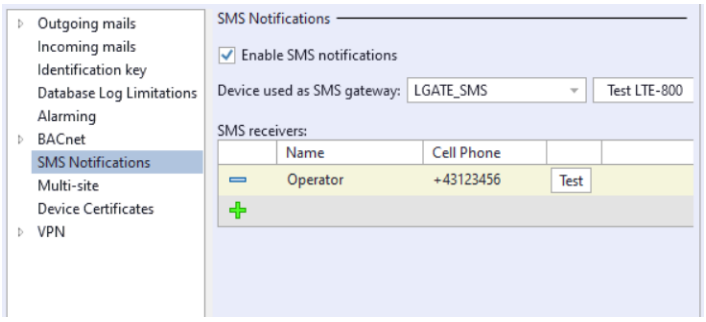


Figure 6: SMS Configuration

See section 6.14.3 for details about alarm notification.

Notes

Note objects are special file objects that contain formatted text. They can be edited directly in LWEB-900. Note objects can be created in the **Library/Files** folder by selecting the menu entry **New → New Note** from the context menu.

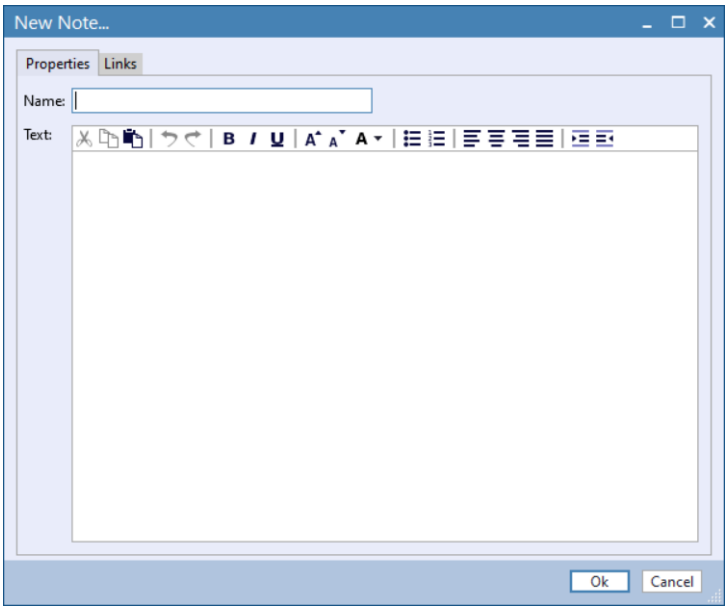


Figure 7: New Note

Refer to section 6.21 for more information about file objects.

Change device password

LWEB-900 allows changing the password for one or multiple devices. Select the devices or a folder containing the devices and choose **Device Configuration → Change Device Password…** from the context menu. The radio buttons allow you to change either the **Admin** password or the **Operator** password.

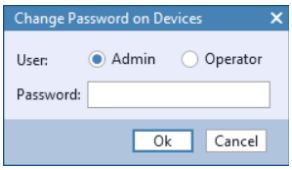


Figure 8: Change Password on Device

The device password can also be changed from the device management view.

Firewall configuration

If you want to access the LWEB-900 Server with an LWEB-900 Client from a remote PC, you need to add the following firewall rule for inbound traffic on the server:

- Protocol: TCP
- Port: Specify the port configured in the LWEB-900 Server preferences (**File → Preferences**, **Network** tab). If you have enabled secure connection, configure the HTTPS port (default 8443) else configure the HTTP port (default 8080).

If you are using BACnet, Node-Red, or VPN you have to add additional rules to your firewall. Select **File → Preferences**, **Firewall settings** for a list of all Ports used by the LWEB-900 server and the projects. If you are using the Windows firewall, you can let the LWEB-900 server manage the necessary rules.

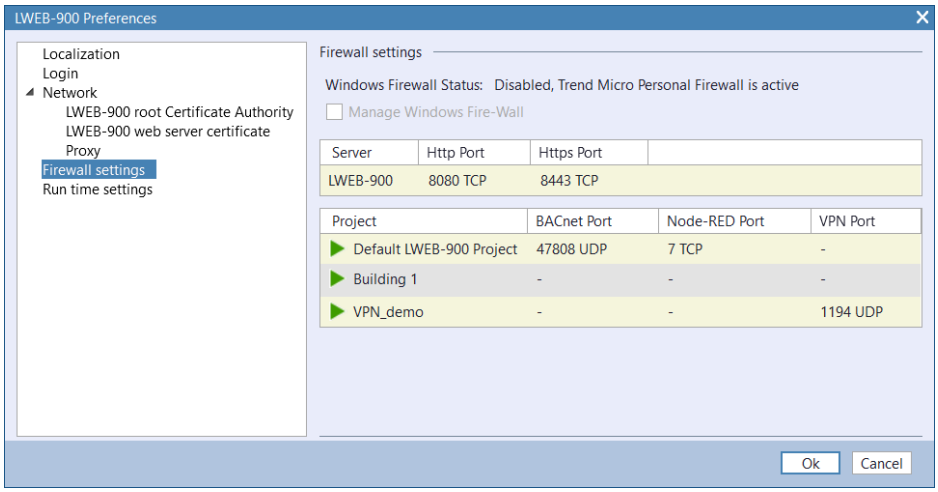


Figure 9: Firewall Settings

Firmware update of LOYTEC DALI devices

It is now possible to update the firmware of LOYTEC DALI devices attached to a LOYTEC controller.

Backup

It is now possible to specify a network folder as backup location. You need to provide user name and password for access to the network folder.

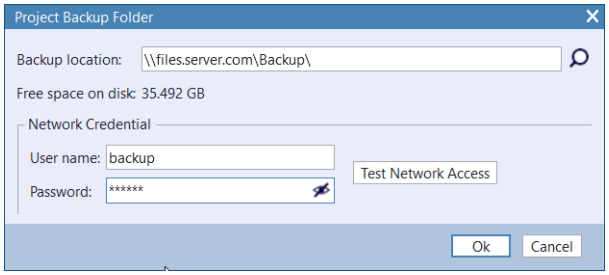


Figure 10: Backup to Network Folder

Export project

The export of a project is similar to a backup. The difference is that no sensitive data is included per default.

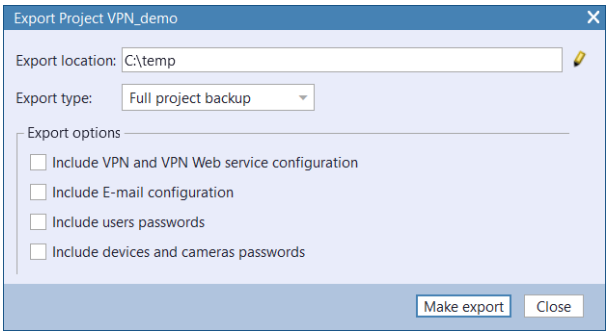


Figure 11: Export Project

Master Scheduler

The complete master schedule configuration can be exported to a file:

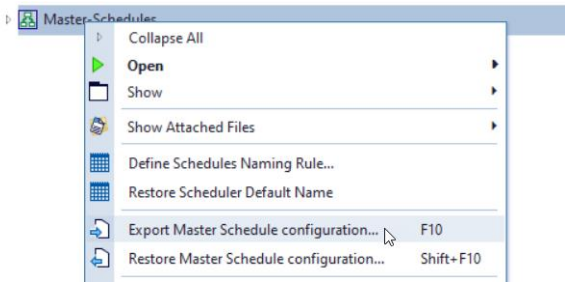


Figure 12: Export Master Scheduler Configuration

Individual calendar patterns can be imported from the exported master scheduler configuration:

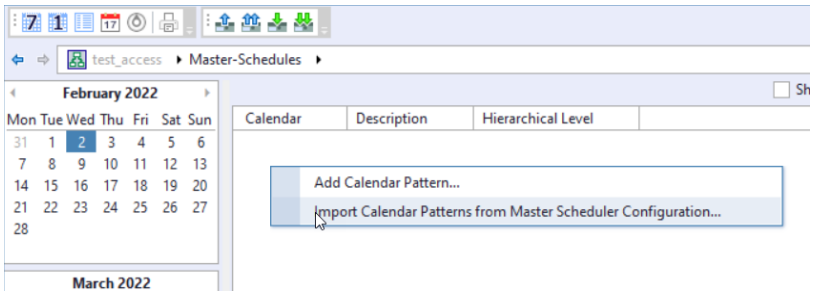


Figure 13: Import Calendar Patterns from Master Scheduler Configuration

Node-RED

The following improvements have been implemented to the Node-RED server:

- It is now possible to subscribe to alarm servers.
- Data points can be dragged and dropped to the data point path of “ReadDP” and “WriteDP” nodes.

2.6 New in LWEB-900 3.0.0

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

Video integration

LWEB-900 can integrate Vivotek cameras and web cams supporting the ONVIF standard. The possibility to scan the local subnet to detect cameras reduces the configuration effort. The live image of a camera can be added to graphical views. LWEB-900 automatically detects the capabilities of a camera and maps events (e.g. motion detection, people counter information) and commands (e.g. PTZ control) to data points. LWEB-900 does not record video itself but can command a camera to start recording if an alarm occurs. Section 6.30 describes how to use this new feature.

Multi-Site

This feature allows accessing multiple LWEB-900 Servers located at different sites with a single LWEB-900 Client. It is possible to create a common graphical view showing data from the different servers. Devices, alarms, and users can be managed across the sites. To enable this feature the LWEB-900-MS license needs to be installed on each LWEB-900 Server. Refer to Section 6.31 for details.

M&V report

A new type of report has been implemented: M&V (Measurement and Verification) reports allow quantifying savings delivered by an energy conservation measure.

Discover LOYTEC devices

LOYTEC devices can now be discovered automatically instead of adding them manually. Select the folder **Network/Devices** or a subfolder and choose **New → Discover devices** from the context menu.

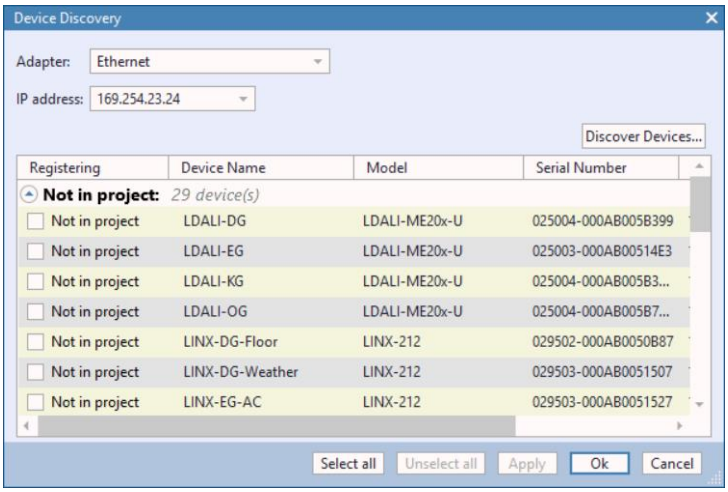


Figure 14: Discover LOYTEC devices

Send messages to connected LWEB-900 Clients

It is now possible to send a message from the LWEB-900 Server UI to connected clients:

- Send message to specific projects: Select the projects and choose **Send Message to Project** from the context menu.
- Send message to all projects: Select **File → Send Message To All Running Projects** from the menu.

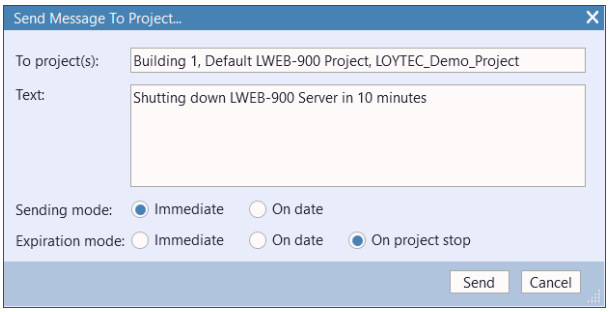


Figure 15: Send Message to Projects

Create an alarm condition

It is now possible to define alarm conditions for LWEB-900 data points (data points inside the **System** folder or data points of cameras). To create the alarm condition, right-click on the datapoint and select **Create Alarm Conditions** from the context menu. The alarm is reported to the LWEB-900 alarm server.

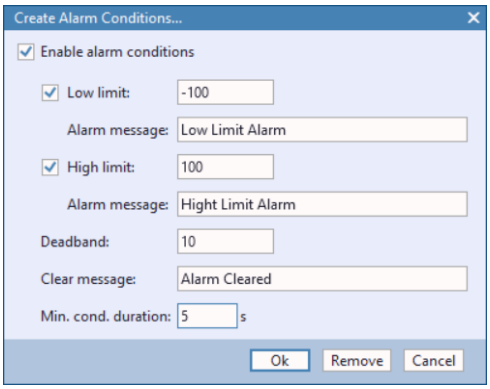


Figure 16: Create Alarm Condition

Alarm acknowledgment

In the project properties, a list of predefined alarm acknowledgement comments can be configured.

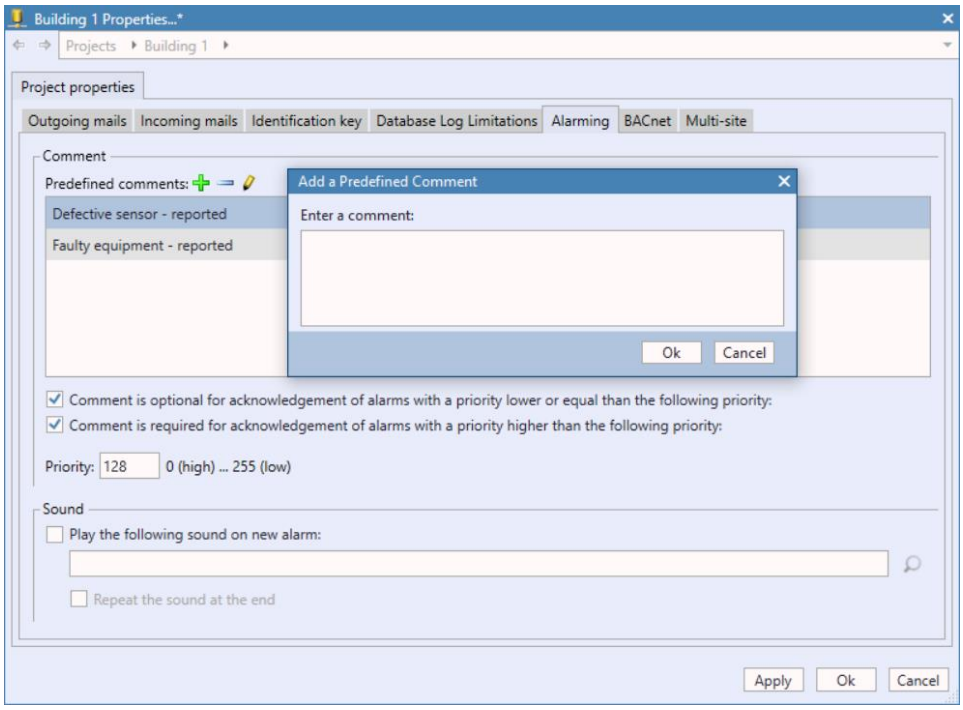


Figure 17: Predefined Alarm Acknowledge Comments

Alarm notification

The alarm notifier offers better control over alarm transitions: you can now separately specify if you want to send a notification if the alarm is triggered (**Alarmed**), acknowledged (**Acked**), or cleared (**Cleared**).

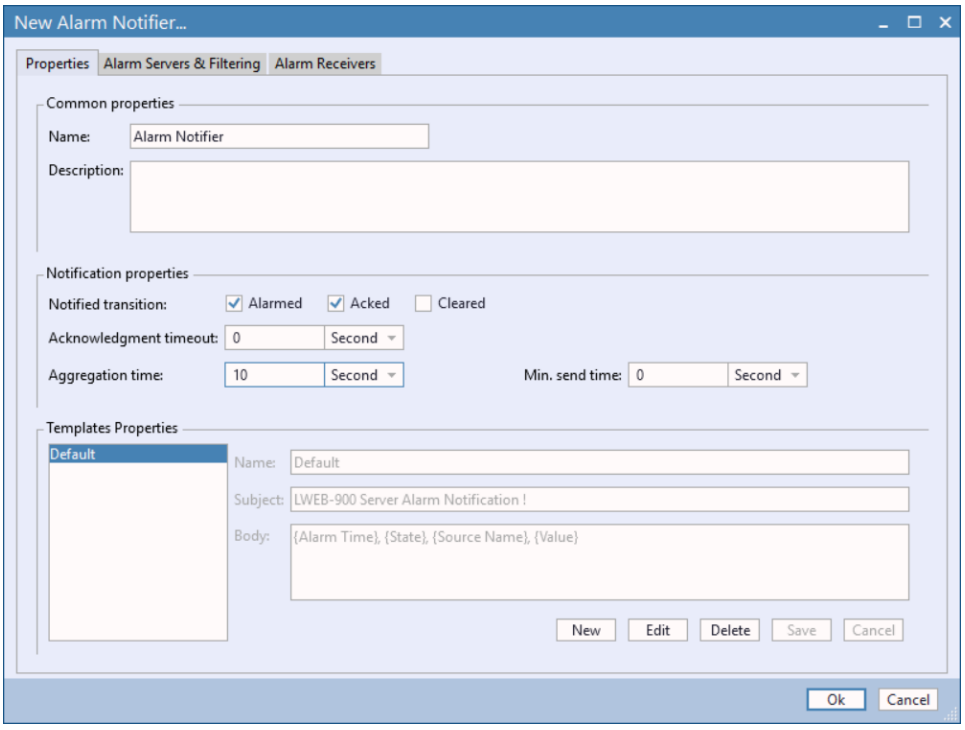


Figure 18: Alarm Notifier

You can include values of any data point in the alarm message. Right click in the template body and select **Additional DP Value** from the context menu.

Project backup

It is now possible to create a project backup not only in the LWEB-900 Server UI but also in the LWEB-900 Client UI. In the LWEB-900 Client, select **File → Backup project** from the menu.

New user interface

The user interface of the LWEB-900 Client and Server was improved. It is now possible to magnify/shrink views by double-clicking on their title bar. To reduce the memory usage, views are automatically unloaded if they are in background for more than 15 minutes and the memory consumption is more than 900 MB.

Execute tasks in background

Tasks that can take a long time (e.g. firmware update of multiple devices) can be executed in the background while you continue with other work.

Localization

The LWEB-900 user interface has been localized in Spanish.

Security

A number of changes have been implemented to improve security:

- Support TLS 1.2 protocols for the HTTPS communication with the LWEB-900 Server was implemented.
- Check if default admin password is used and propose to change it
- An icon indicating secure/insecure connections has been added to the drop-down list of project connections in the login dialog.
- The security level of each connected client is displayed in the LWEB-900 Server statistics dialog.
- When creating a new certificate, the lifetime can be configured.
- Support for multi domain/IP certificate has been added.

Navigation view and object list view

The navigation and object list view now display the folder description in parenthesis next to the folder name. This is especially useful for L-IOB and L-DALI devices.



Figure 19: Folder Description

It is now possible to rename objects quickly using the F2 key.

Master Device Manager

A number of improvements have been implemented in the device management:

- Automatically backup device configuration before any firmware update
- Check firmware compatibility prior to restoring device configuration from backup
- In firmware selection dialog, display highest/most recent versions first
- Added information about version of firmware available on LOYTEC web-site
- Added columns showing last device backup and remote configuration status
- Added possibility to filter devices by their type
- Improved sorting of devices
- Remember sort order and column widths

Graphical view

A new file format for graphical views has been implemented. The lweb3 file format allows the client application to load only resources that are currently displayed. Therefore, graphical views with a large number of pages are possible.

Parameter view

A number of improvements have been implemented for the parameter view:

- Support structured parameters
- Multiple parameter view templates can be imported in one step
- If no values are available in the database (new parameter view), the default parameter values from the device configuration are displayed.
- Allow to multi-select cells and reset their row/column name
- Speed-up scrolling of view content

Web browser view

It is now possible to define a user name and password in the properties of the web browser view.

User management dialog

A number of improvements have been implemented in the user management dialog:

- Allow sorting users and groups
- Automatically scroll user list to newly created user
- Allow to delete LDAP users which are member of a Windows group

L-Studio support

The import of L-Studio projects has been improved:

- Speed-up detection of changes and overall import process
- It is now possible to abort the import of an L-Studio project
- Added possibility to create L-Studio graphical view folders from within the folder selection dialog
- Added option to ignore changes made in L-Studio about device communication properties

Graphical views imported from L-Studio can now be copied as server or device graphical views.

LWEB-900 Server data points

Two new system registers have been added to track the resource usage of the LWEB-900 Server process: **LWEB-900 Server CPU Load** and **LWEB-900 Server Memory Usage**

User registers in the folder System/User Registers support the type String.

2.7 New in LWEB-900 2.2.0

This section describes the major changes and new features. For a full list of changes, refer to the Readme file.

Parameter View

In the previous version of LWEB-900 the parameter view could contain only data points of LOYTEC devices which were marked as parameters in the device configuration software. The new parameter view in LWEB-900 version 2.2.0 can contain any data point of LOYTEC devices or BACnet properties of third party devices.

The workflow to create and edit multiple parameter views from templates was improved: You can select multiple parameter view templates and drag them to a folder in the navigation view to instantiate them. It is also possible to select multiple parameter view instances and edit their properties together.

Master Device Manager

The master device management view was reworked completely:

- It is now possible to configure which columns are displayed in the device list.
- Multiple master device management views can be saved as objects in the navigation view.
- The device backup schedules have been moved from the master device manager to the folder “System/Backup Schedules”.
- Support for firmware update of L-STAT devices has been added.
- Firmware ZIP archives which support multiple firmware files are supported.

Object Properties

Instead of displaying properties of objects (e.g. properties of chart views) in modal dialogs, they are now displayed in separate views. This allows opening multiple properties views side-by-side and copying values between them.

Object List view

The object list view is no longer split into multiple pages. Instead the object list view is an endless list and objects are loaded only when needed.

Filter

Several views (e.g. alarm view, event view, master device manager view) support custom filters. It is now possible to save and edit multiple custom filters.

Project management

The upgrade procedure for old LWEB-900 versions has been improved. Because the upgrade can take a long time for large data bases, detailed progress information has been added. Before the upgrade is performed, a backup is performed automatically.

Trending

A possibility to add corrections for trend log values has been implemented. This feature is useful when trending energy consumption and the energy meter needs to be replaced. The new energy meter will start with a counter value which is different from the last value of the replaced meter. To correct the value, right click on the first value of the new energy counter in the trend log view and add a log correction. In the trend log view, you can display both the raw values of the energy counter and the corrected values. Chart views, graphical views, and reports use the corrected values.

The custom filter for trend log views has been improved. It is now possible to filter by log item.

Chart view templates

Chart view templates are useful if you need to create multiple chart views with identical settings but which display different trend logs. They can be created in the folder "Library/Chart View Templates". The concept is similar to graphical view templates.

2.8 New in LWEB-900 2.1.0

This section describes the major changes and new features. For a full list of changes refer to the Readme file.

File objects

LWEB-900 allows you to store files on the server and to link them to other objects or to alarms. File objects can be added below the folder "Library/Files". Files can be organized in user defined folders. Refer to Section 6.21 for details.

Windows authenticated users

LWEB-900 can now connect to an Active Directory server which performs the user authentication. Refer to Section 6.27 for details.

BACnet custom objects

The BACnet standard defines standard objects and their properties. However, many BACnet vendors extend those standard objects with custom properties. Other vendors define new object types with a complete new set of properties. When LWEB-900 scans a BACnet device and its objects, it gathers all available information and creates a new object type definition if it does not yet exist. All object types can be modified using the **Types & Properties** editor. To access the object type definitions, select **Properties** from the context menu of the project node in the navigation view, switch to the **BACnet** tab, and select **Types & Properties**.

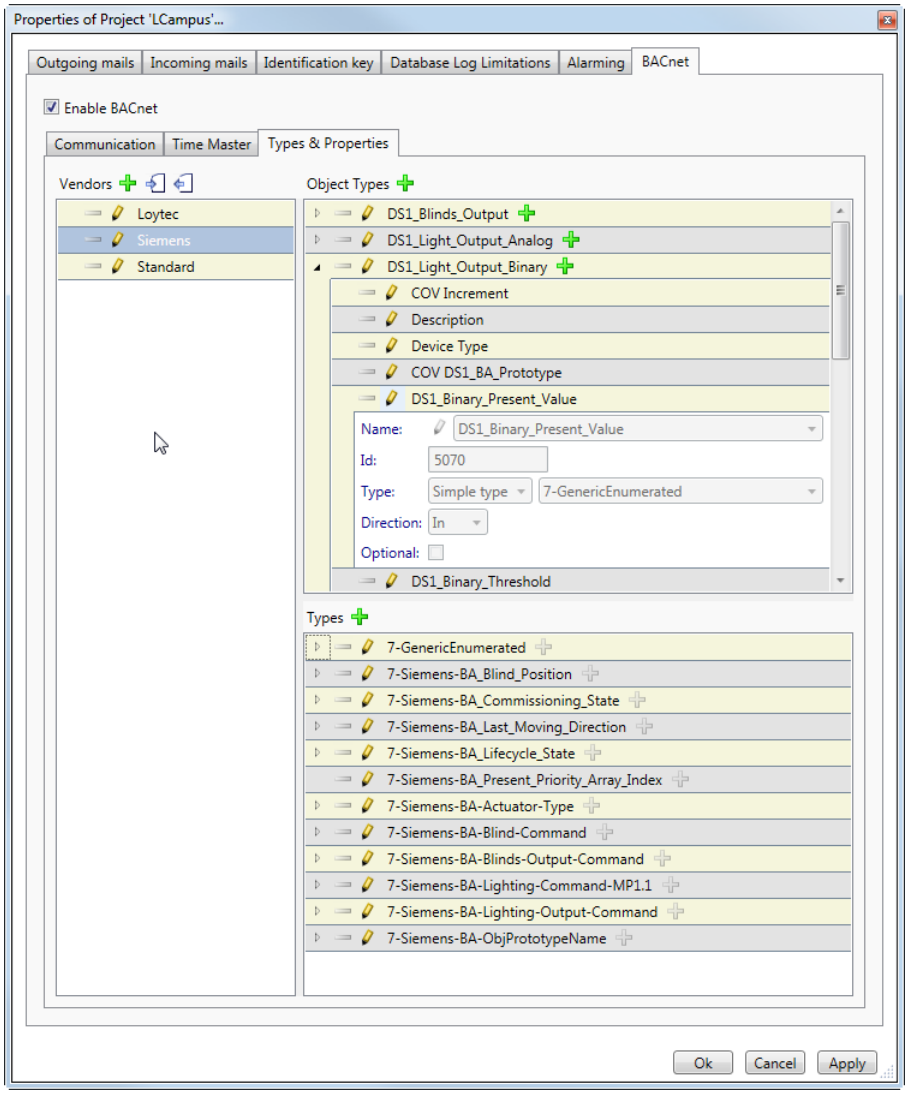


Figure 20: Types & Properties Editor

Favorites

Each user has his own **Favorites** folder in the navigation view. You can drag and drop any view into the **Favorites** folder to speed up access to frequently used views. The **Favorites** folder can be organized using sub-folders.

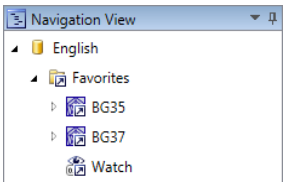


Figure 21: Favorites

Client Notification Alarm Receiver

The alarm notifier can now be configured to display a pop-up message when an alarm occurs. Figure 22 shows an example. Refer to Section 6.14.3 for details.

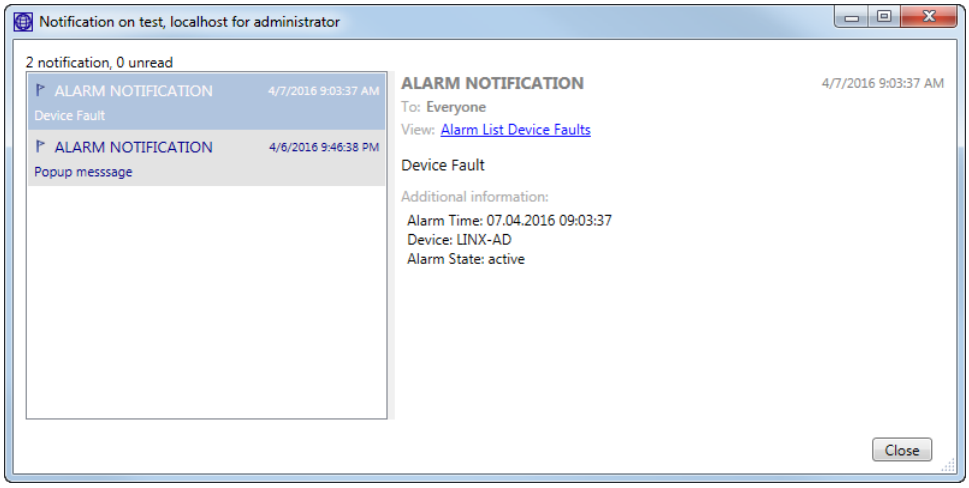


Figure 22: Alarm Notification Pop-Up

Parameter view improvements

The parameter view can now check if parameter values are different on the device and in LWEB-900. It highlights these differences and allows resolving the conflicts.

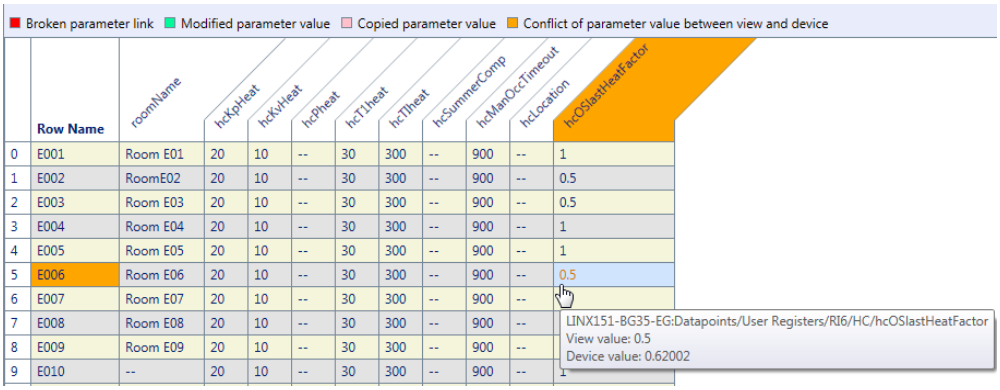


Figure 23: Parameter Merge

A parameter view can be based on a template. Use parameter view templates to create multiple parameter views with the same parameter names but different paths. The parameter view template defines the parameter view columns and specifies a search pattern for each column. Refer to Section 6.12.3 for more details.

Chart view improvements

Several improvements have been implemented for the chart view. The chart view does no longer require a size configuration in pixels. Instead it automatically adjusts to the available view size. A new option to scale the range of the y-axis automatically depending on the displayed values is available.

Reporting improvements

A number of improvements have been made to reports:

- It is now possible to configure the colors used in the report for the trend logs.
- A new build-in report template has been added. The generic report template contains one data group. It allows specifying what charts and tables are used to display data.
- New parameters have been added to existing templates to make them even more flexible. It is now possible to decide which part of the reports should be visible and which should be hidden. It is also possible to add a company logo to the reports.
- The dialog to select a report template has been improved. It now displays a preview of the report templates.
- When triggering a report manually, it is now possible to specify if an e-mail should be sent to the configured e-mail receivers or not.

Limit number of parallel file transfers

The device communication profile (see Section 6.24) has a new configuration option to limit the maximum number of parallel file transfers. Files need to be transferred to/from a device for firmware upgrades, backup, restore, parameter download/upload, global connections download/upload, etc. The new **WLAN** device communication profile has been added. The number of concurrent file transfers has been set to 1 for this profile to limit the traffic on wireless networks.

Communication statistics

The LWEB-900 server UI provides detailed communication statistics. To display the statistics select the menu **File → Statistics**. The following information is provided:

- **OPC Server**: To provide data updates to clients, the LWEB-900 Server acts as OPC XML-DA server. This tab displays the statistics for the communication between LWEB-900 Server and clients.
- **OPC Client**: To get data updates from the devices, the LWEB-900 Server acts as OPC XML-DA client. This tab displays the statistics for the communication between LWEB-900 Server and devices.
- **Connected Clients**: This tab displays the clients which are currently connected to the LWEB-900 Server.

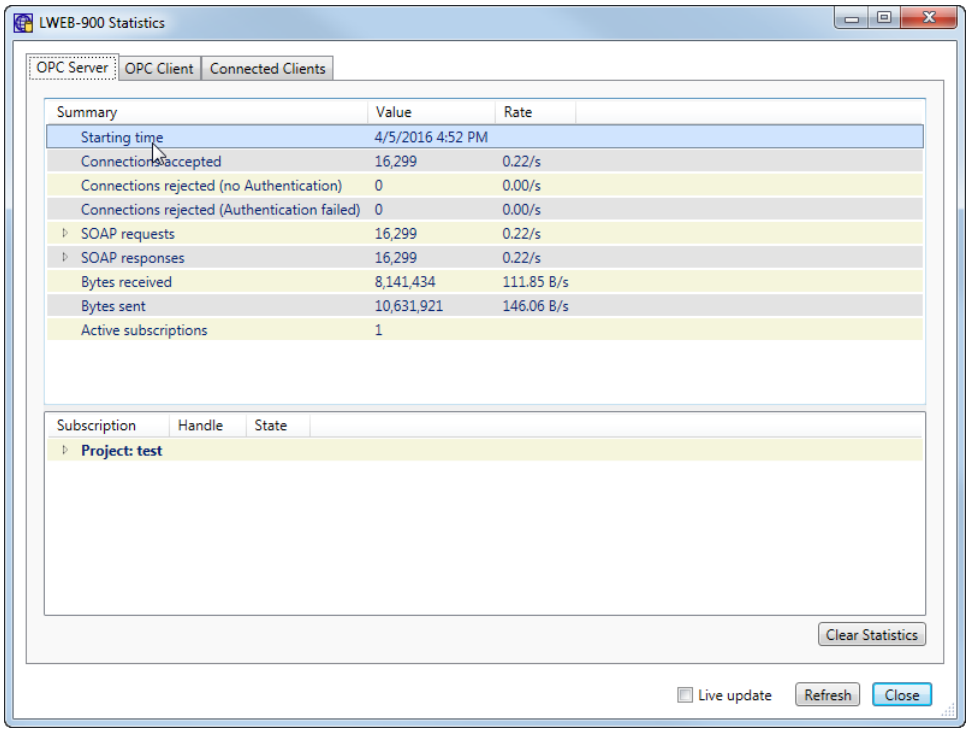


Figure 24: Communication Statistics

Certificate management

The certification management for secure communication has been improved and has moved to a separate tab in the LWEB-900 Server UI preferences. LWEB-900 now supports the SHA-2 hash algorithm.

Licensing

The licensing now also takes the number of connected clients into account. The license restricts the maximum number of concurrent LWEB-900 Clients and LWEB-802/803 Clients (access for end user via web browser or Windows application). The standard license includes 5 LWEB-900 Clients and 20 LWEB-802/803 Clients.

Device management

The following new LOYTEC devices are now supported: LDALI-3E102-U, LDALI-3E104-U, LDALI-ME204-U, LDALI-ME201-U, LDALI-3E101-U, LROC-101, LROC-400, LROC-401, LROC-402, LIOB-AIR2, LIOB-AIR13, LIOB-586

The master device manager can now import .zip archives containing the firmware for multiple devices.

2.9 New in LWEB-900 2.0.0

This section describes the major changes and new features. For a full list of changes refer to the Readme file.

BACnet

LWEB-900 implements the BACnet communication protocol. The BACnet technology offers a standardized interface to devices from other manufacturers. LWEB-900 supports the following BACnet functionality:

- Scan BACnet network to find BACnet devices and their objects.
- Monitor and modify the value of all BACnet object types, including all required and optional properties.
- Display and acknowledge BACnet alarms in alarm view.
- Configure BACnet scheduler and calendar objects using the master schedule configurator.
- Display BACnet trend logs in list view, chart view, or report.
- Distribute time into the BACnet network as BACnet time master.
- Reset BACnet devices.
- Backup and restore the configuration of BACnet devices.

Refer to Section 6.5 for details.

Print

The toolbar of the different LWEB-900 views allows printing the current content.



Figure 25: Print LWEB-900 Client View

Kiosk mode

The LWEB-900 Client now supports a kiosk mode with the following properties:

- LWEB-900 Client is displayed in full screen mode
- The Windows task bar is not visible

Default user

LWEB-900 allows defining a default user which has no password and no auto-logout. If no username and password is specified in the login dialog, the LWEB-900 Client logs in the default user. If a standard user logs out (auto-logout or manual logout), the default user is automatically logged in.

LWEB-900 Client command line options

Using the LWEB-900 Client command line options it is now possible to start the LWEB-900 Client automatically (see Section 6.1.3).

Navigation view

The navigation view now displays all objects. For example, data points which were previously visible only in an object list view are now displayed also in the navigation view. A single click on an object in the navigation view no longer switches the context of the active view in the document area. Use the bread crumb navigation bar instead. It is also possible to drag a folder from the navigation view to the bread crumb navigation bar.

Display values for all data points

LWEB-900 can now display the values of all data points. Only OPC data points and BACnet properties are refreshed automatically. Use the refresh button to update the values of other data points.

Reorder objects in object list view and watch view

Objects in the object list view and watch view can be reordered using drag-and-drop.

Search

The search dialog has been improved. It allows now to search for all object types. In addition it is possible to combine search parameters using AND, OR, and NOT operators. Refer to Section 6.9 for details.

Identification key

The identification key can be assigned based on data point names or descriptions (see Section 6.8). The identification key can be displayed as a column in the event view (see Section 6.19).

Graphical views

Using a **Show page** action, it is possible to create buttons in a graphical view which link to other views. Figure 26 shows how to drag a view and drop it on the action object in the tree view of the L-VIS Configurator.

Note *The **Show page** action works inside the LWEB-900 Client. When using a web browser to display a graphical view, only links to other graphical views or chart views are supported.*

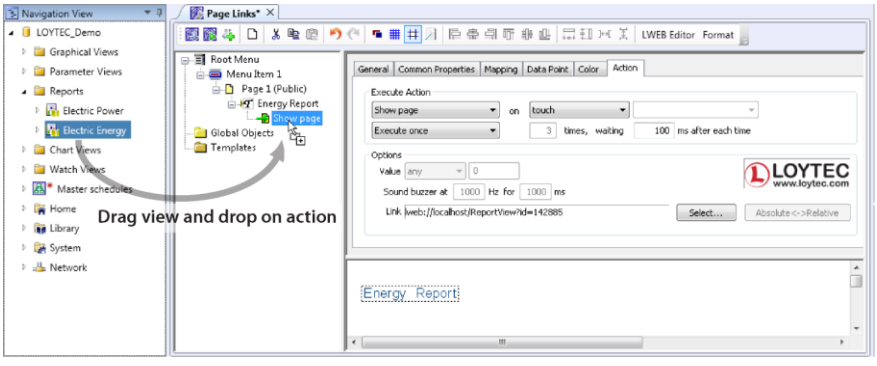


Figure 26: Show Page Action

Alarming

The project settings contain a new **Alarming** tab which allows configuring that users have to enter a comment when acknowledging alarms with a priority higher than a certain value.

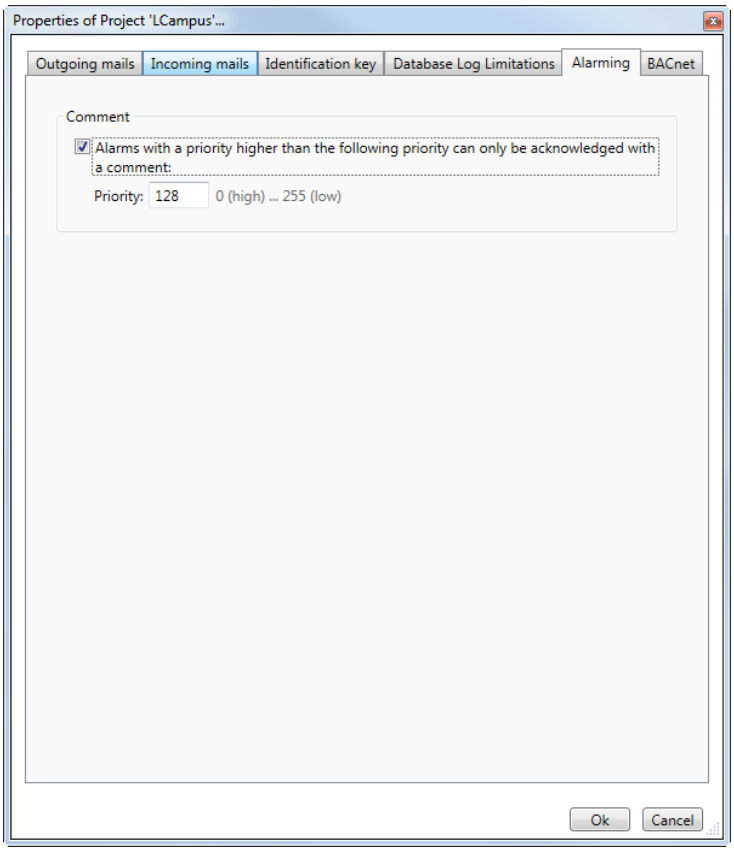


Figure 27: Alarming Configuration

The subject of alarm notification e-mails is now freely configurable. Two new timing parameters have been added to the alarm notifier object:

- **Aggregation time**: This parameter defines the time period in which LWEB-900 collects alarm notifications before it sends an e-mail. All alarm notifications occurring during this time are included in the e-mail. Use this setting to receive related alarm notifications in a single e-mail.

- **Min. send time**: This parameter defines the minimum time that elapses between two e-mail notifications. If alarm notifications occur more often, they are postponed and sent after the minimum send time. Use this setting to limit the e-mail transmission rate.

Master scheduler

The configuration of the default preset has been changed. The master schedule configurator now uses the new features of the current LOYTEC device firmware to set a default preset instead of using a default event with low priority.

Trending

The properties of chart views allow configuring a scale factor for data records. The data records are multiplied with this factor before displaying them. Example: To convert Wh into kWh enter, configure the scale factor 0.001.

A server trend log can be temporarily disabled using the **Disable Trend Log** option in the context menu. When the trend log is disabled, the LWEB-900 Server does not record the attached data points. A disabled trend log can be enabled with the **Enable Trend Log** menu entry.

To search for specific records in the trend log view, click on the **Filter Log Data** button in the toolbar. The filter dialog allows you to combine multiple conditions with **AND** and **OR** operators. The example in Figure 28 finds all data records of the data point "nvoHCroomTemp" with a value less than 20.

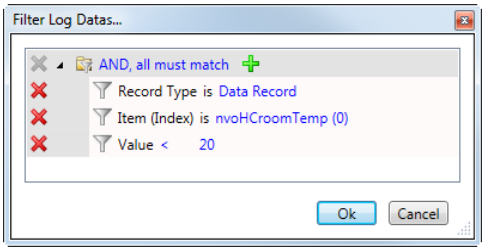


Figure 28: Trend Log Filter

Reporting

The new energy signature report template gives a quick overview of the energy performance of a building. It shows the correlation between energy consumption and heating degree days. Heating degree days (HDD) are calculated from the outside temperature and are a measure of how much the outside air temperature was below a certain base temperature.

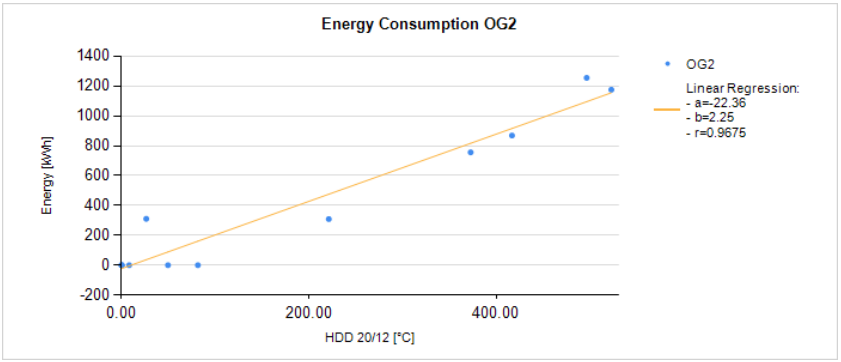


Figure 29: Energy Signature

The stacked column chart report template has been updated to include a pie chart.

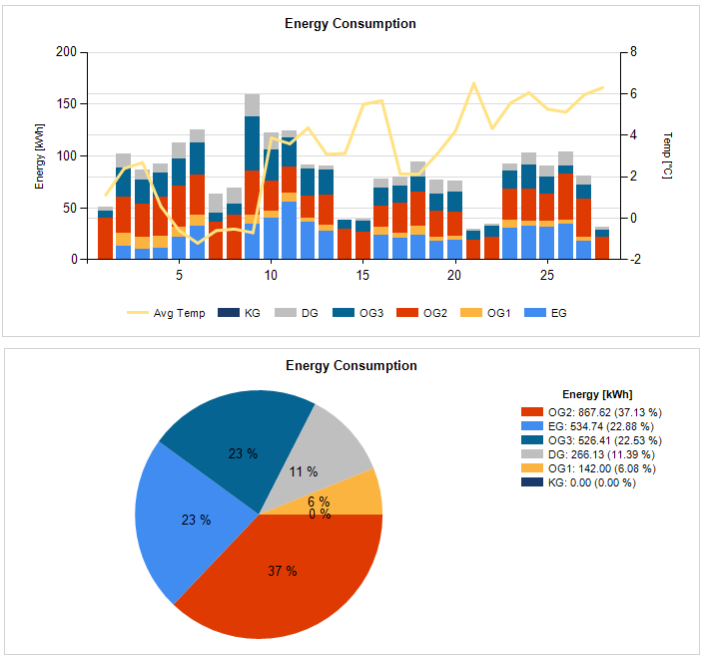


Figure 30: Stacked Column Chart

L-Studio support

LWEB-900 can import L-Studio projects (see Section 6.29).

Localization

The LWEB-900 user interface was localized in French and Chinese. It now supports the following languages:

- English
- German
- French
- Chinese (Traditional)

Client user interface

Most LWEB-900 views have a toolbar and bread crumbs navigation. You can hide those bars using the context menu of the tab.

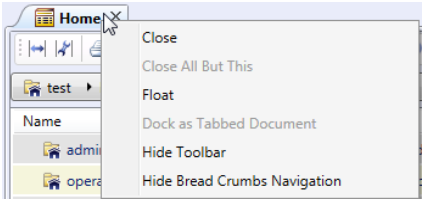


Figure 31: Hide Toolbar and Bread Crumbs Navigation

Web access

The LWEB-900 web access can now display chart views in addition to graphical views. The dialog to select the view was improved to shows the tree structure of the LWEB-900 project.

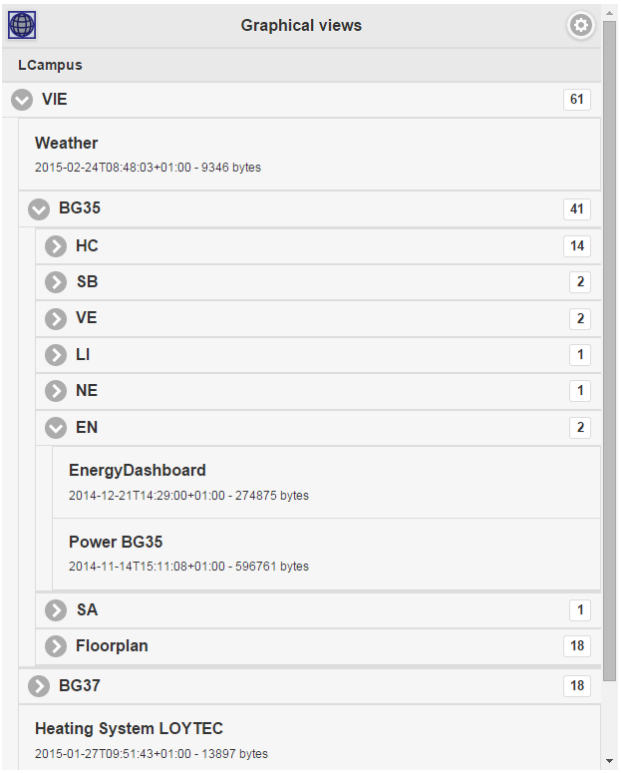


Figure 32: Graphical View List

2.10 New in LWEB-900 1.3.0

This section describes the major changes and new features. For a full list of changes refer to the Readme file.

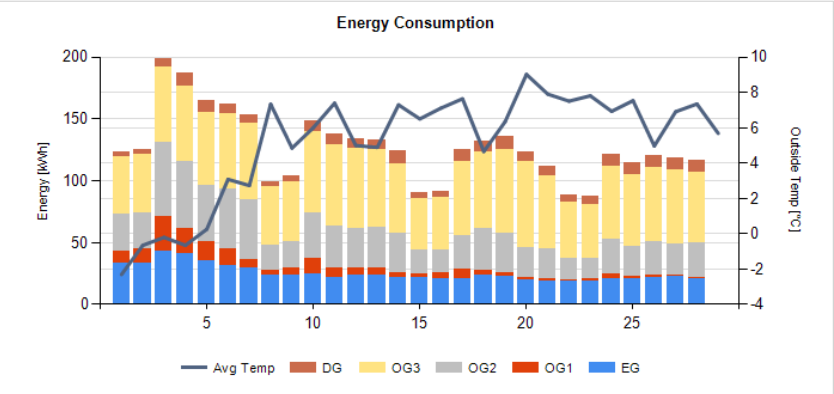
Reporting

LWEB-900 can now create reports based on trend logs. Reports can be used, for example, to document the energy consumption in a building. Figure 33 shows an example report. Refer to Section 6.17 for details.

Heating Energy Report Month

Description:
Heating energy consumption for LOYTEC office BG35

Period: 2/1/2014 12:00 AM to 3/1/2014 12:00 AM	**Generated:** 3/1/2014 4:00 AM	**Page:** 1 / 1



	Energy [kWh]						Outside Temp [°C]
Timestamp	EG	OG1	OG2	OG3	DG	Total	Avg Temp
2/1/2014	33.32	9.78	29.47	46.54	3.97	123.08	-2.30
2/2/2014	33.14	11.92	29.07	47.24	3.98	125.35	-0.65
2/3/2014	42.56	28.50	60.29	60.14	7.16	198.65	-0.20
2/4/2014	41.41	20.39	53.49	61.10	10.46	186.85	-0.65
2/5/2014	34.85	16.25	45.38	58.78	9.89	165.15	0.26
2/6/2014	31.79	12.98	48.70	60.92	7.39	161.78	3.09
2/7/2014	29.34	6.75	48.05	62.02	7.04	153.21	2.74

Figure 33: Example Report

LWEB-900 Server Schedulers

It is now possible to create schedulers which are executed by the LWEB-900 Server. They should be used to schedule LWEB-900 Server user registers which trigger a report or enable an alarm receiver. Refer to Section 6.15 for details.

Alarming

A number of features have been added to alarm management in LWEB-900:

- It is now possible to configure the priority of LWEB-900 system alarms.
- A custom filter can be configured for alarm notifiers.
- It is now possible to specify an enable data point for alarm receivers. By using a user register which is controlled by a scheduler it is possible to configure different receivers based on a time table.
- A column for the identification key of the data point which triggered the alarm has been added to the alarm view. The identification key can also be added as a place holder in an alarm notification template.

Create L-VIS project from LWEB-900 Server graphical view

It is now possible to simply copy an LWEB-900 graphical view to an L-VIS device. Refer to Section 6.11.4 for details.

Allow wildcards in search expressions

You can now use the percent sign (%) as a wild card character in the search string. It matches zero or more characters. For example, the search string “nvi%Fb” finds all data points which have names starting with “nvi” and ending with “Fb”.

Hide folders to which a user has no access

The new option **Show objects on which the user has no read access** has been added to the user configuration dialog. If this checkbox is enabled, the user sees objects (e.g. folders) to which he has no read access. They are displayed with a lock icon. If this option is disabled, those objects are not visible in the navigation and object list view.

Import and export Identification key schema

It is now possible to export the identification key schema from one LWEB-900 project and import it in a different LWEB-900 project.

Data point details

A double-click on a data point displays detailed information about the data point (see Figure 34). The **Links** section shows where the data point is used. Click on a link to open the corresponding view.

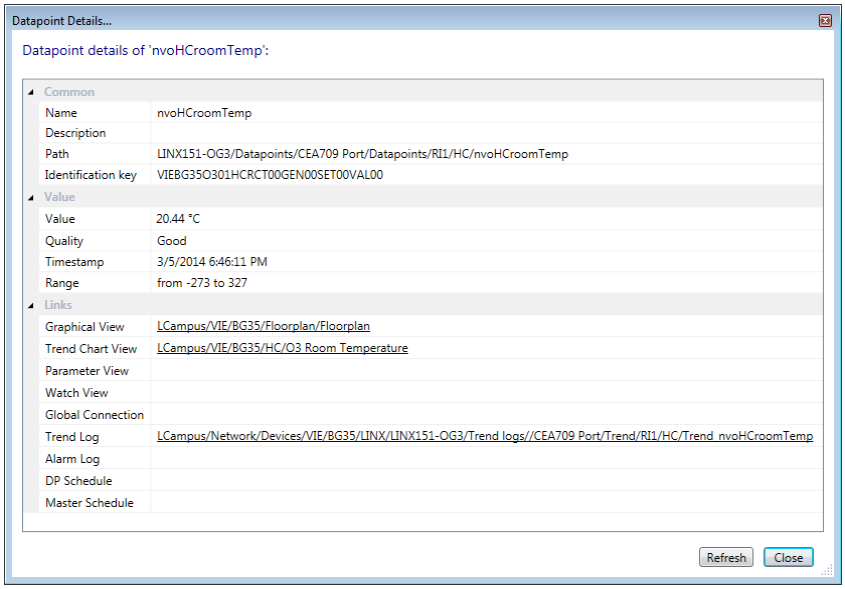


Figure 34: Data Point Details

Chart view improvements

A number of improvements have been made to the chart view:

- Support a secondary y-axis.
- Dynamic scaling of y-axis.
- Support configuration of line width for trend curves.
- Allow to display chart view description as header of the trend graph.

- Improve trend zooming: If cursor is active, zoom relative to current cursor position else relative to center.

- Support linear interpolation for trend log charts.

- Support limit lines: It is now possible to display limit lines in the trend graph. A horizontal line with the configured color and value is drawn across the entire graph.

Manage files in master device manager

A new dialog was added to the master device manager which displays all files imported or uploaded from LOYTEC devices. This dialog allows removing unused files quickly. Refer to Section 6.22.8 for details.

3 Installation

3.1 Software Installation

The LWEB-900 software can be downloaded from the LOYTEC Web site https://www.loytec.com. The LWEB-900 setup file includes the LWEB-803 installer as a prerequisite. LWEB-803 is used by LWEB-900 as an add-in to display graphical views and chart views. After the LWEB-803 setup finishes, the LWEB-900 installation is started. When asked for the type of installation, there are two options to choose from (see Figure 35). Select **LWEB-900 Server and Client** to install both server and client on the same PC. Select **LWEB-900 Client** to install the client only. This option is useful, if the server is installed on a different PC.

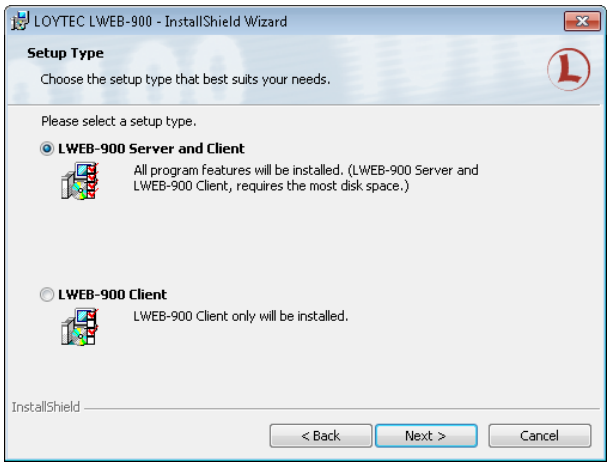


Figure 35: LWEB-900 Installation Options

3.2 Product Activation

After LWEB-900 has been installed, the server has to be activated:

1. Start the LWEB-900 Server user interface by selecting Windows **Start → Programs → LOYTEC LWEB-900 → LWEB-900 Server**.

2. Select **Help → Register…** to open the registration dialog (see Figure 36).

3. Select the required license from the **Select feature** drop-down list. The following kinds of licenses are available for the LWEB-900 Server:

a. LWEB-900: License for 10 LOYTEC devices. If this number is insufficient, one or more extension licenses (LWEB-900-ADD10 or LWEB-900-ADDMAX) can be added later. The license supports 5 LWEB-900 Clients and 20 LWEB-802/803 Clients.

b. LWEB-900-MAX: License for unlimited number of LOYTEC devices. The license supports 5 LWEB-900 Clients and 20 LWEB-802/803 Clients

c. LWEB-900-ADD10: One or multiple LWEB-900-ADD10 licenses can be added to the LWEB-900 license to increase the number of supported devices. Each license adds 10 devices.

d. LWEB-900-ADDMAX: The LWEB-900-ADDMAX license can be added to the LWEB-900 license to support an unlimited number of LOYTEC devices. The combination of LWEB-900 and LWEB-900-ADDMAX licenses is equivalent to the LWEB-900-MAX license.

e. LWEB-900-CL-5: The LWEB-900-CL-5 license can be added to the LWEB-900 or LWEB-900-MAX license to increase the number of concurrent LWEB-900 Clients. Each license adds 5 LWEB-900 clients.

f. LWEB-900-80x-50: The LWEB-900-80x-50 license can be added to the LWEB-900 or LWEB-900-MAX license to increase the number of concurrent LWEB-802/803 Clients. Each license adds 50 LWEB-802/803 Clients.

g. LWEB-900-80x-100: The LWEB-900-80x-100 license can be added to the LWEB-900 or LWEB-900-MAX license to increase the number of concurrent LWEB-802/803 Clients. Each license adds 100 LWEB-802/803 Clients.

h. LWEB-900-80x-MAX: The LWEB-900-80x-50 license can be added to the LWEB-900 or LWEB-900-MAX license to support an unlimited number of concurrent LWEB-802/803 Clients.

i. LWEB-900-DEMO: The demo license has the same features as the LWEB-900 license but will work only for 30 days.

j. LWEB-900-CP: LWEB-900 license for LOYTEC competence partners. This license is intended exclusively for engineering purposes and must not be used for live projects. The license is valid for 3 days. The 3-day validity period can be restarted by rebooting the PC.

k. LWEB-900-MS: This license is required for each LWEB-900 Server that contains projects using the Multi-Site feature (refer to Section 6.31).

l. LWEB-900-VPN-BASE: To enable the VPN function, the LWEB-900-VPN-BASE license needs to be installed. Each active LWEB-900 project for which VPN is enabled requires a separate LWEB-900-VPN-BASE license.

m. LWEB-900-VPN-MNT: LOYTEC devices are added to the VPN using the VPN web services, which require the LWEB-900-VPN-MNT license. The VPN maintenance license is valid for all projects on the server but is limited to the duration of one year. The VPN will continue to operate after the LWEB-900-VPN-MNT license has expired but it will not be possible to add devices to the VPN using the web services.

4. If you have already purchased the license, enter your serial number (shipped with the LWEB-900 product). If you have not yet purchased the license, click on the **Not purchased yet** button. No serial number is required for the demo license.

5. Click on **Request activation file by e-mail** to request the activation file. Alternatively, write an e-mail to sales@loytec.com with both the **Target ID** and the **Serial Number** in the subject.

6. You will receive a LOYTEC activation file, which you import by clicking on **Add activation file...**.

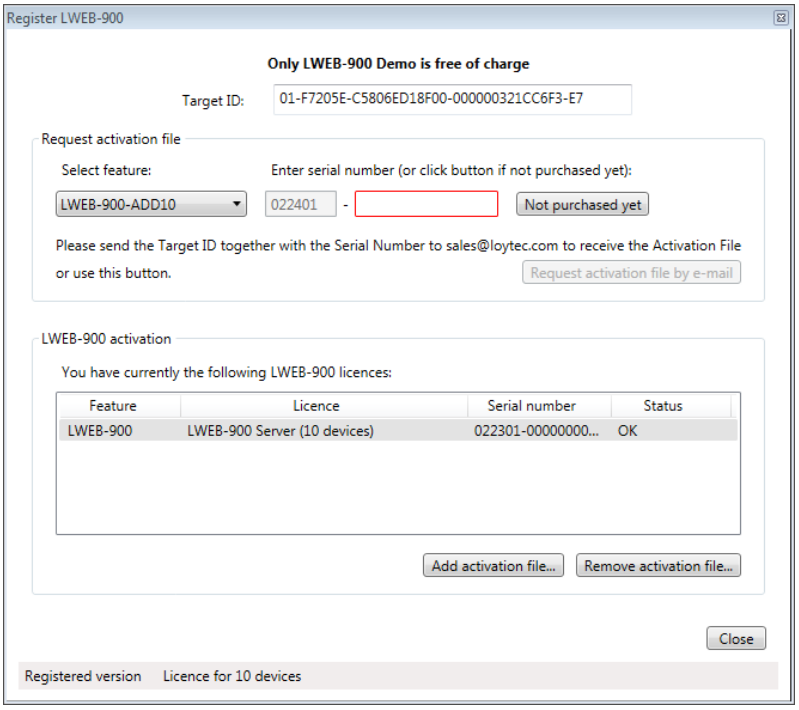


Figure 36: LWEB-900 Registration

The activation files determine the maximum number of devices which can be added in LWEB-900. Exceptions are the following devices which do not add to the total count:

- L-IOB devices attached to other LOYTEC devices
- L-IP devices
- Cameras

The LWEB-900 Server user interface displays the limit determined by the activation files and how many devices are currently used for each project (see Figure 37). Only projects which have the status **Running** count for the total limit.

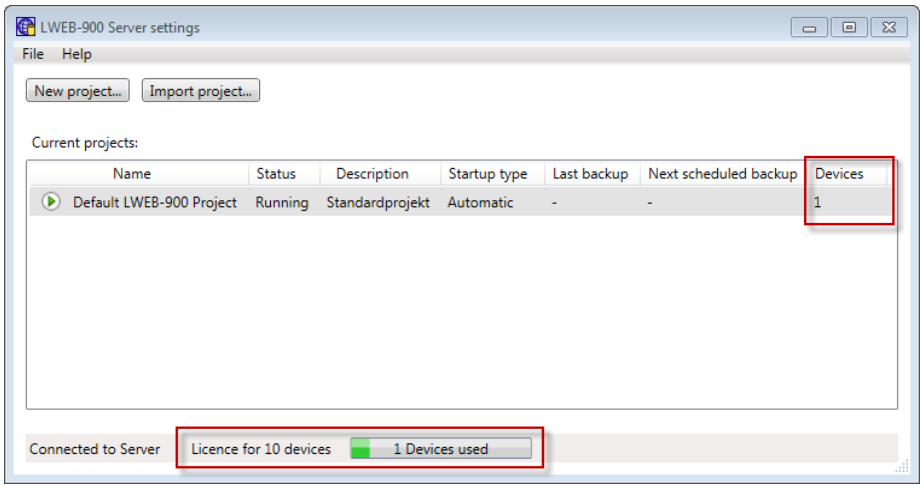


Figure 37: LWEB-900 Device License

3.3 Firewall Configuration

If you want to access the LWEB-900 Server with an LWEB-900 Client from a remote PC, you need to add the following firewall rule for inbound traffic on the server:

- Protocol: TCP
- Port: Specify the port configured in the LWEB-900 Server preferences (**File → Preferences**, **Network** tab). If you have enabled secure connection, configure the HTTPS port (default 8443) else configure the HTTP port (default 8080).

If you are using BACnet, Node-Red, or VPN you have to add additional rules to your firewall. Select **File → Preferences**, **Firewall settings** for a list of all Ports used by the LWEB-900 server and the projects. If you are using the Windows firewall, you can let the LWEB-900 server manage the rules.

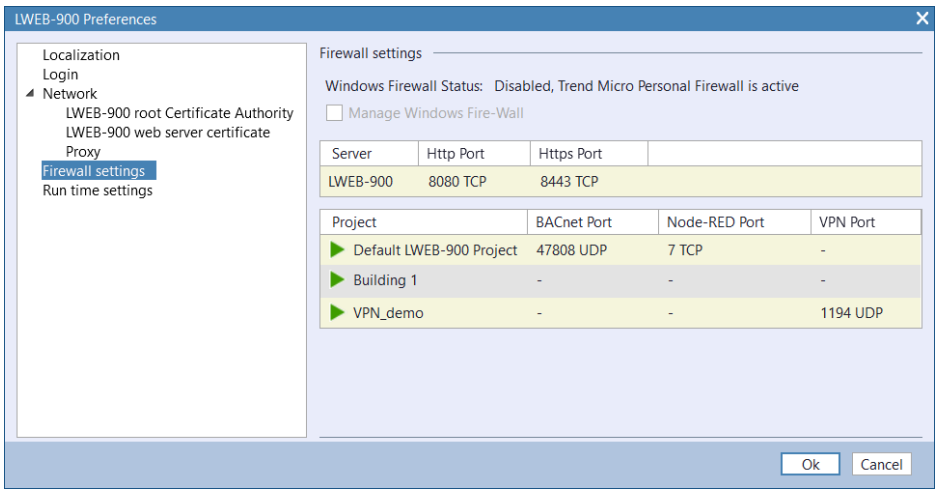


Figure 38: Firewall Settings

4 System Tray Icon

The status of the LWEB-900 Server is indicated by a system tray icon (see Figure 39). The systray icon is not present, if only the LWEB-900 Client is installed on the PC.



Figure 39: LWEB-900 System Tray Icon

The color of the systray icon reflects the status of the LWEB-900 Server (refer to Table 1). Moving the mouse pointer over the systray icon displays detailed information in a tooltip.

Color	Condition
Green	LWEB-900 Server is running without errors and warnings
Red	Fatal error (e.g. database error)
Orange	One or more LOYTEC devices are not responding
Grey	No LWEB-900 project is running

Table 1: LWEB-900 System Tray Icon Color

The context menu of the systray icon allows starting the LWEB-900 Server user interface and the LWEB-900 Client. A double-click on the systray icon opens the LWEB-900 Client.

5 LWEB-900 Server

The LWEB-900 Server runs as a service which is started automatically when the PC boots. The user interface for the service is shown in Figure 40. It can be started from the Windows start menu (**Start → Programs → LOYTEC LWEB-900 → LWEB-900 Server**) or from the context menu of the LWEB-900 system tray icon.

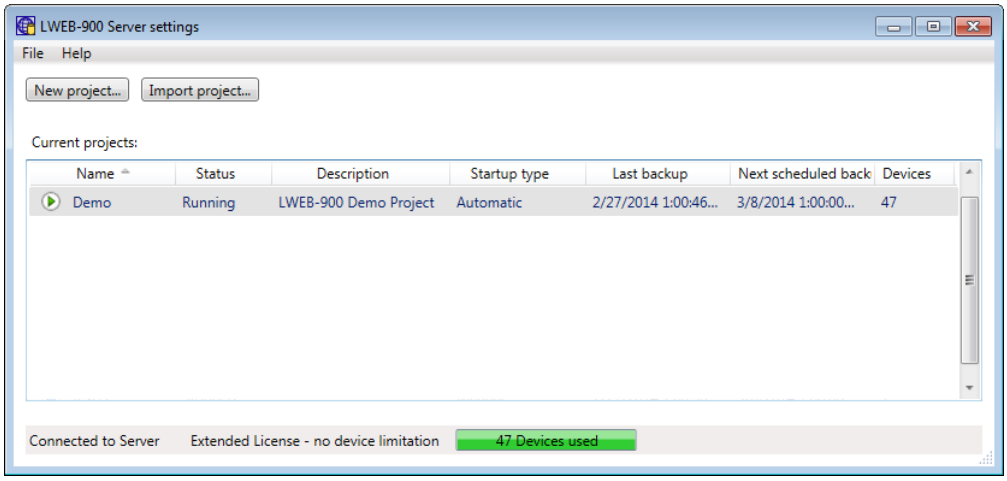


Figure 40: LWEB-900 Server User Interface

5.1 Manage Projects

When starting the LWEB-900 Server user interface for the first time, you will notice, that a project with the name “Default LWEB-900 Project” has already been created. You can edit the project by selecting **Edit project…** from the context menu. The project properties are displayed and can be edited as shown in Figure 41.

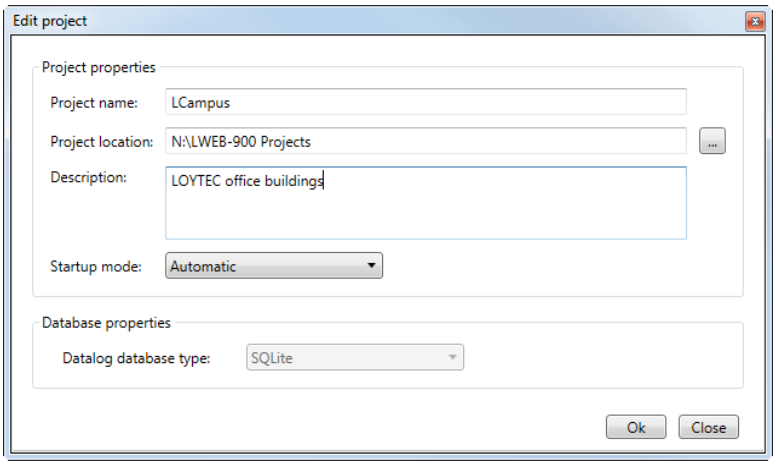


Figure 41: Edit LWEB-900 Project

- **Project name**: The project name has to be specified when connecting with the LWEB-900 Client.
- **Project location**: Folder in which project related data is stored.
- **Description**: Project description.
- **Startup mode**: The startup mode determines if the project is started automatically when the PC boots:
  - **Automatic**: The project is started automatically when the PC boots. This is the default setting.
  - **Manual**: The project has to be started manually.
- **Database type**: LWEB-900 supports different database engines (refer to Section 5.7).

The LWEB-900 Server can manage multiple independent projects. A new project can be added by clicking on the **Add project…** button. A project can be removed by selecting **Remove project…** from the context menu. A double-click on the project starts the LWEB-900 Client.

Each project can be in the state **running** or **stopped**. After a reboot of the PC, the project state is determined by startup mode. The project state can be changed using the context menu of the project. To be able to connect with the LWEB-900 Client, the project has to be **running**. A running project can be in online or offline mode. In offline mode, the LWEB-900 Server does not communicate with the devices (see Figure 42).

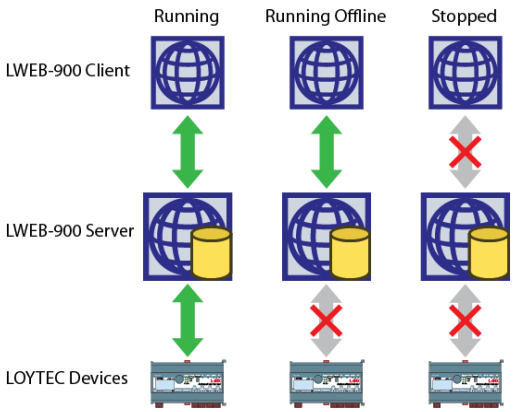


Figure 42: LWEB-900 Project Status

5.2 Password Protection

Per default the LWEB-900 Server user interface is not protected by a password. The password protection can be activated in the **Login** Tab of the menu **File → Preferences** (see Figure 43).

Note *Do not confuse the server login with the client login. The LWEB-900 Server user interface can be started on the server PC only and is used to manage multiple projects. The LWEB-900 Client can be started on a remote PC and connects to a specific project. The user name and password specified in the client login is part of the project.*

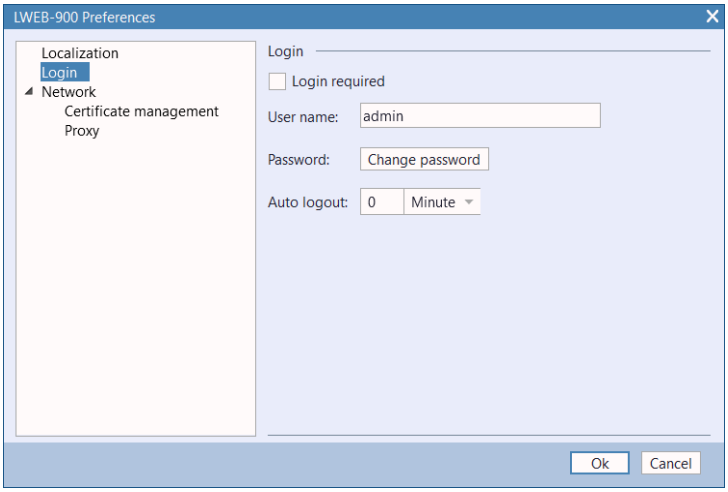


Figure 43: LWEB-900 Server, Activate Login

5.3 Network Settings

The LWEB-900 Server provides web services for the LWEB-900 Client. The communication parameters are defined in the **Network** tab of the **File → Preferences** menu.

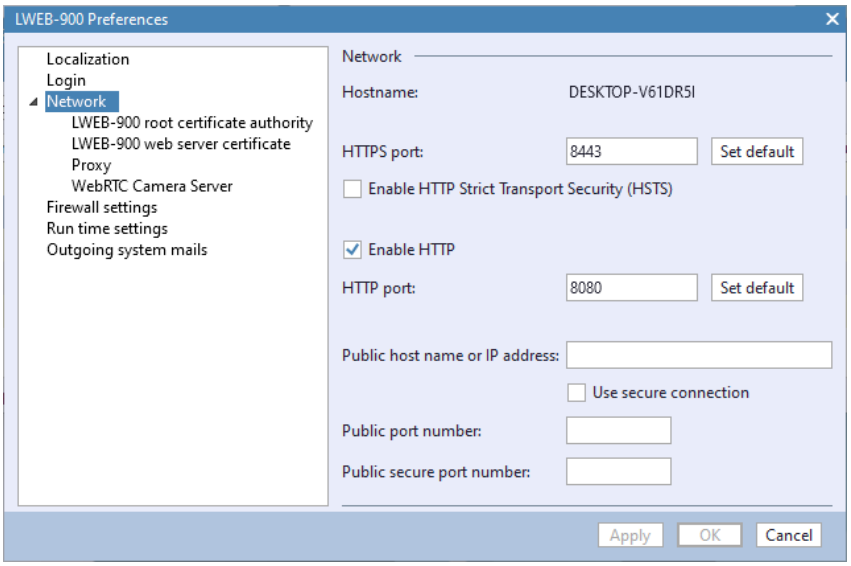


Figure 44: LWEB-900 Server Network Settings

- **HTTPS port**: Port used for SSL (Secure Sockets Layer) communication.
- **Enable HTTP Strict Transport Security**: Force user to connect with HTTPS even when they enter HTTP. Require HTTP to be disabled
- **Enable HTTP:** Allow a client to connect to the LWEB-900 server using HTTP.
- **HTTP port:** Server port used for HTTP communication between client and server.
- **Public host name or IP address**: The public hostname or IP address to access this LWEB-900 Server from the Internet or from outside your local network.
- **Use secure connection**: Use Public port or Public secure port
- **Public port**: The public port to access this LWEB-900 Server from the Internet or from outside your local network.
- **Public secure port**: The public secure port to access this LWEB-900 Server from the Internet or from outside your local network with a secure connection

5.4 Certificate Management

Certificates are part of Secure Socket Layer (SSL) encryption. The LWEB-900 Server provides its own root certificate authority and requires a web server certificate. The web server certificate enables the user to confirm the identity of the LWEB 900 Server. The **LWEB-900 web server certificate** tab allows you to create a certificate signed by your LWEB-900 Server root certificate authority, import a certificate, generate a certificate request to be sent to a certification authority or use Let’s Encrypt to automatically obtain a certificate.

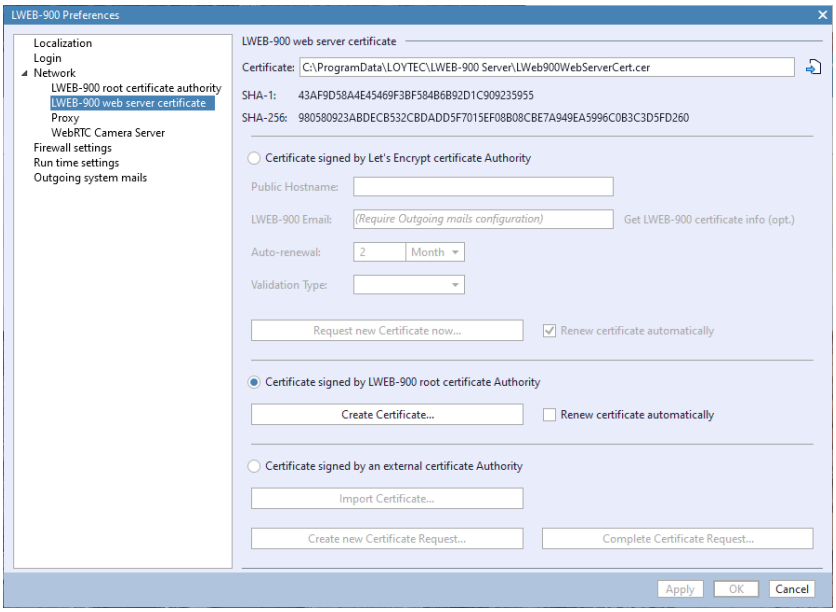


Figure 45: LWEB-900 Server Certificate Management

Enable secure connection using a self-signed certificate

1. Start the LWEB-900 Server UI and select the **Network** tab of the **File → Preferences** menu.

2. Select the **LWEB-900 web server certificate** tab and click on the radio button Certificate signed by LWEB-900 root certificate Authority and click on the button **Create Certificate**.

3. Additionally, select the **Renew certificate automatically** checkbox to allow the LWEB-900 Server to automatically generate a new web server certificate.

When you connect with the LWEB-900 Client to the LWEB-900 Server for the first time, a warning will be displayed because the certificate was not issued by a trusted certification authority (see Figure 46). If you set the checkbox **Do not show this warning again**, the certificate will be accepted without warning in the future.

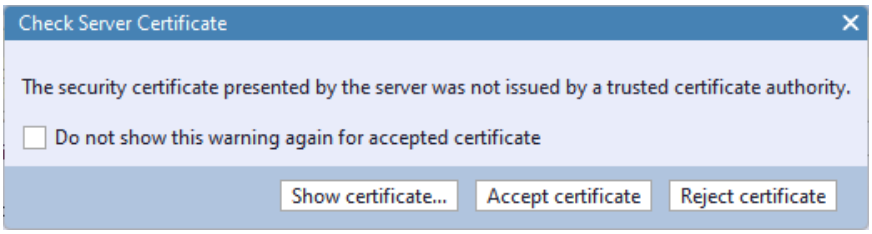


Figure 46: Server Certificate Warning

It is also possible to install the LWEB-900 root certificate authority when connected to the server by opening the Project properties – Device certificates tab.

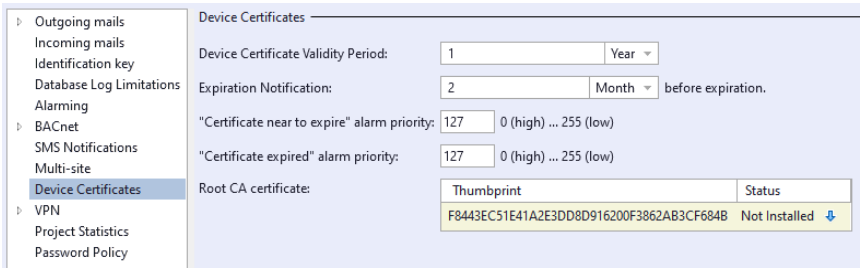


Figure 47: Root CA Certificate installation

Enable secure connection using a certificate issued by a public certification authority

1. Start the LWEB-900 Server UI and select the **Network** tab of the **File → Preferences** menu.

2. Select the **LWEB-900 web server certificate** tab and click on the radio button Certificate signed by an external certificate Authority

3. Click on the button **Create new Certificate Request**.

4. In the certificate request dialog fill out the following data:

   - **Common Name**: The name through which LWEB-900 Server will be accessed (usually the fully-qualified domain name).
   - **Organization**: The legally registered name of your organization/company.
   - **Organizational unit**: The name of your department within the organization.
   - **City/Locality**: The city in which your organization is located.
   - **State/Province**: The state in which your organization is located.
   - **Country/Region**: Enter your two-digit country code (e.g. AT: Austria, DE Germany, US United States).
   - **Lifetime**: Enter the certificate validity period (e.g: 1 Year)
   - **Other IPs/Domain Names**: Enter all the different IP addresses or hostnames that may be used to access this LWEB-900 Server.
   - **Bit Length**: In the drop-down box, select a bit length for the RSA encryption algorithm.

5. Specify the path where the certification request should be set or use the browser button (…) and press **OK**.

6. Send the request to a public certification authority (CA).

After you received a response from the public certification authority, perform the following actions to install the certificate:

1. Start the LWEB-900 Server UI and select the **LWEB-900 web server certificate** tab of the **File → Preferences** menu.

2. Click on the **Complete Certificate Request** button.

3. Select the certificate signed by your certification authority and click on **Install Certificate**.

Enable secure connection using a certificate issued by Let's Encrypt

LWEB-900 Server is able to automatically obtain a certificate signed by Let's Encrypt. Let's Encrypt is a Certificate Authority that provides free TLS certificates.

To obtain a certificate signed by Let's Encrypt, you must have a valid and unique hostname. The certificate can be obtained automatically using either TLS or HTTP validation. Ensure that the required port is available and that port forwarding is configured on your router. If TLS or HTTP validation cannot be used, DNS validation is also available, but it requires manually uploading a DNS TXT record to your DNS provider.

1. Start the LWEB-900 Server UI and select the **Network** tab of the **File → Preferences** menu.

2. Select the **LWEB-900 web server certificate** tab and click on the radio button **Certificate signed by Let's Encrypt Certificate Authority**

3. In the certificate request dialog fill out the following data:

- **Public hostname**: The name through which LWEB-900 Server will be accessed (usually the fully-qualified domain name).

- **LWEB-900 Email**: The LWEB-900 Server will send an email to this address anytime a new certificate is obtained or an error occurred during obtention. This is optional and requires "Outgoing system mails" to be configured.

- **Auto-renewal**: How often should be a new certificate generated. By default, this is every 2 months. The minimum value is 1 day and the maximum is 3 months.

- **Validation Type**: Select the challenge type you want to use to let Let's Encrypt verify you are the owner of the hostname you entered. HTTP, TLS and DNS are available. HTTP require the port 80 to be free and TLS the port 443. DNS do not require any port configuration but will require you to manually upload a DNS TXT-record to your DNS provider.

4. Click on Apply to obtain the certificate.

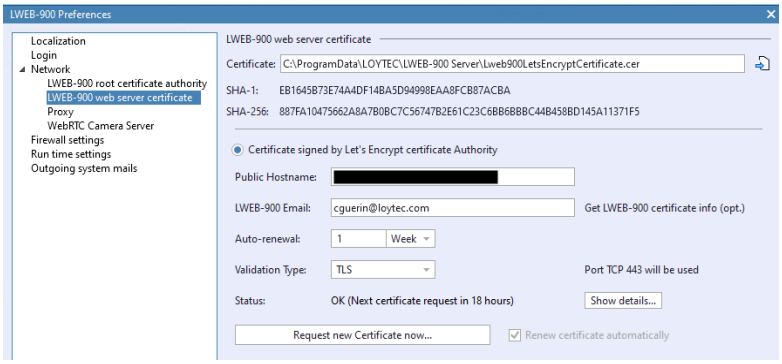


Figure 48: Let's Encrypt settings

5.5 Proxy Settings

Per default the LWEB-900 Server does not use a proxy as show in Figure 49. If the radio button **Automatically detect settings** is enabled, the LWEB-900 Server uses the proxy settings of the user which runs the LWEB-900 service (usually the local system account).

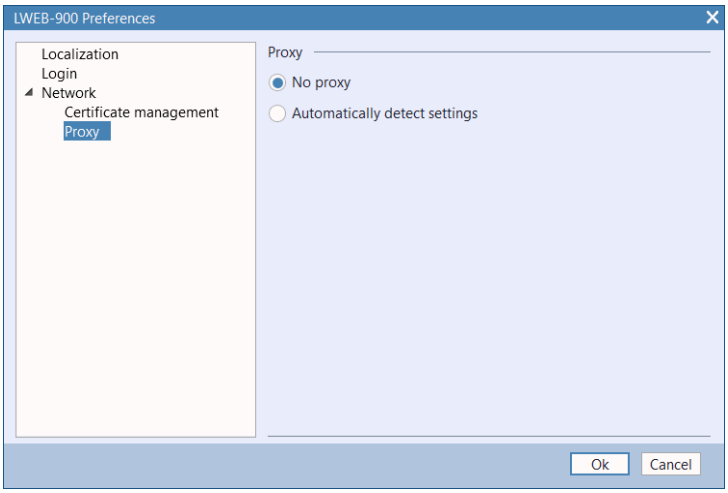


Figure 49: LWEB-900 Server Proxy Settings

5.6 Backup/Restore

5.6.1 Manual Backup

To create a system backup including the LWEB-900 Server configuration and all LWEB-900 projects, select **File → System backup**.

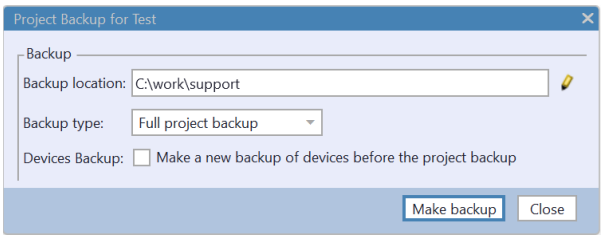


Figure 50: System Backup

- **Backup location:** Folder in which the backup file will be stored
- **Backup type:** This drop-down field specifies the contents of the backup. A **Full system backup** contains all data. A **Configuration system backup** contains configuration data, but no historic data other than the event log (no alarm logs and no trend logs). Therefore the file size of this type of backup will be much smaller.
- **Device Backup:** When this checkbox is enabled, LWEB-900 performs a backup of all devices in the project before the backup process starts. This option is only available for full backups.

It is also possible to backup only a specific project. This is useful to e.g. transfer a project from one LWEB-900 Server to another. To execute a project backup, right click on the project and select **Backup project…** from the context menu. Refer to Table 2 for a description of the different backup types.

Type	Sub-Type	Contents
System	Full system backup	Configuration of LWEB-900 server Configuration of all LWEB-900 projects Historic data of all LWEB-900 projects
	Configuration system backup	Configuration of LWEB-900 server Configuration of all LWEB-900 projects
Project	Full project backup	Configuration of selected LWEB-900 project Historic data of selected LWEB-900 project
	Configuration project backup	Configuration of selected LWEB-900 project
	Backup datalogs	Historic data of selected LWEB-900 project

Table 2: Backup Types

5.6.2 Scheduled Backup

Periodic backup schedules can be defined in the menu **File → Scheduled backups** (see Figure 51).

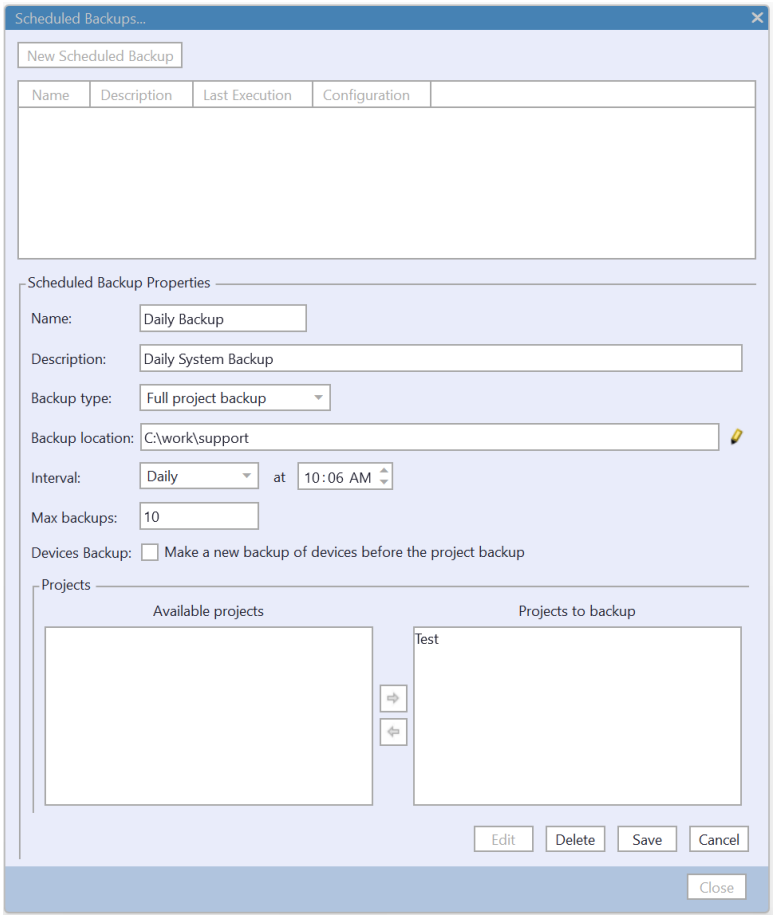


Figure 51: Scheduled Backups

- **Name:** Name of the backup schedule.
- **Description:** Description of the backup schedule.
- **Backup type:** This drop-down field specifies the contents of the backup (refer to Table 2).

- **Backup location:** Folder in which the backup files will be stored.
- **Interval:** Definition of the backup schedule. Note, that the times of the last and the next scheduled backup are displayed in the project list (see Figure 52).
- **Max backups:** Maximum number of stored backups. When this number is exceeded the oldest backup file is removed.
- **Device Backup:** When this checkbox is enabled, LWEB-900 performs a backup of all devices in the project before the backup process starts. This option is only available for full backups.
- **Projects:** This section defines which projects will be included in the backup. System backups contain all projects and this section is therefore disabled. For project backups, move one or more projects from the list **Available projects** to the list **Projects to backup**.

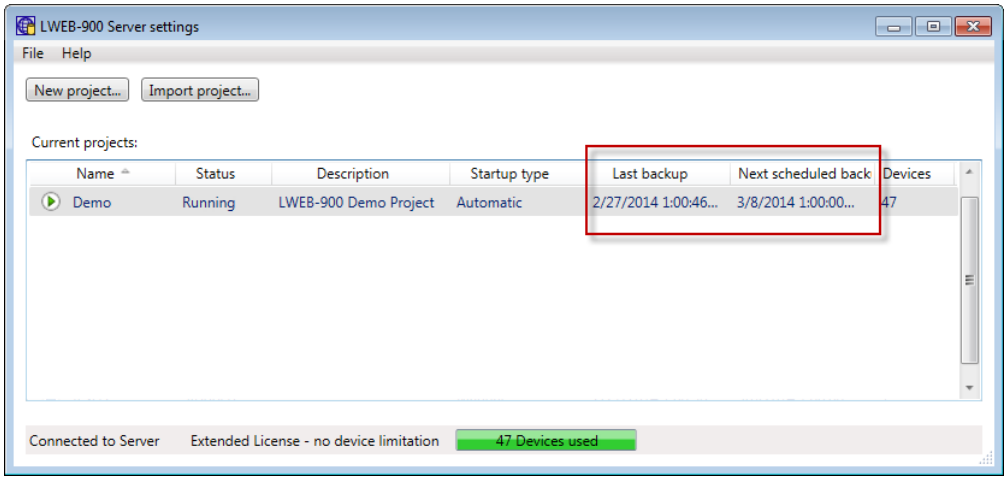


Figure 52: Last Backup and Next Scheduled Backup

5.6.3 Restore

The LWEB-900 Server offers different ways to restore a backup:

- Restore System: To restore a complete LWEB-900 Server configuration with all projects, select **File → Restore system** from the menu. The complete system can be restored only from a system backup.
- Restore Project: To restore a single project without affecting other projects on the server, right click on the project and select **Restore project…** from the context menu. A project can be restored from a system backup or from a project backup.
- Import Project: To create a new LWEB-900 project from a backup, click on the button **Import project** above the project list. A project can be imported from a system backup or from a project backup.

Figure 53 shows the dialog to restore the LWEB-900 system. The dialogs to restore or import a single project are similar.

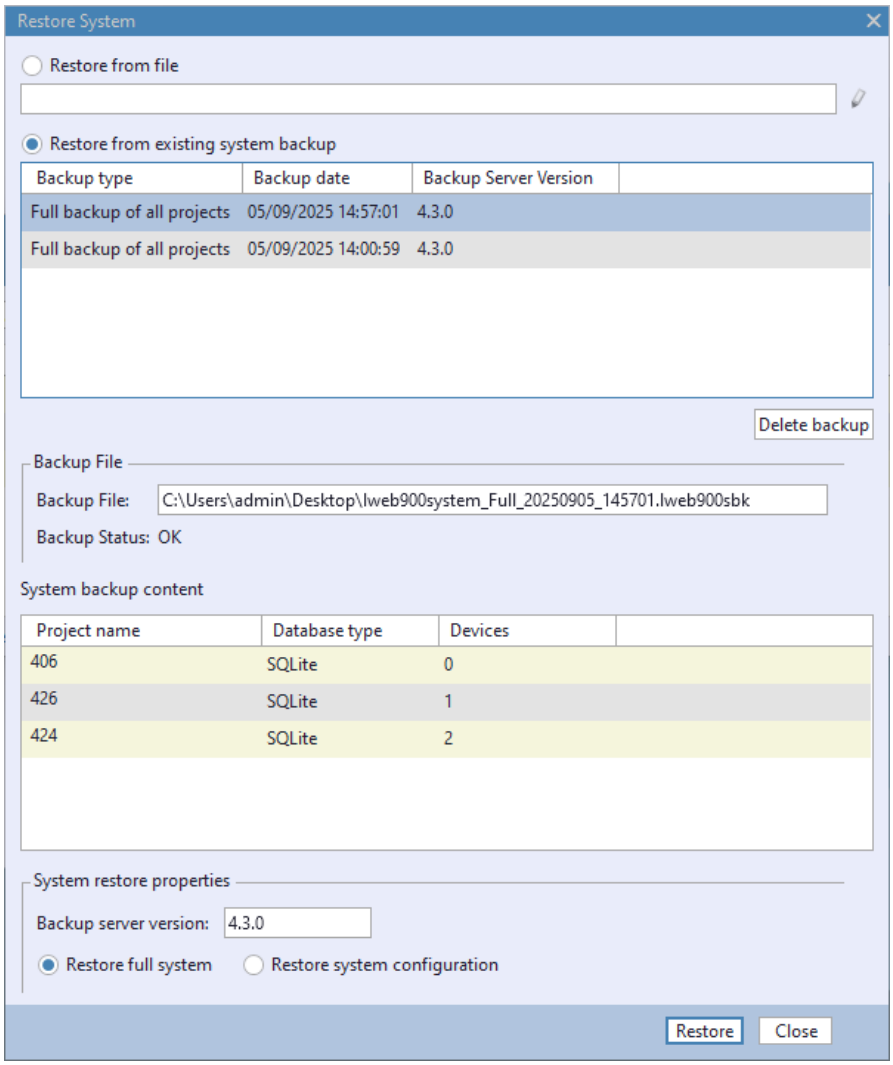


Figure 53: Restore System Backup

- **Restore from file:** Select this option to restore a backup created by a different LWEB-900 Server.
- **Restore from existing system backup:** All system backups performed by the LWEB-900 Server are displayed in the list. Select one of the available backups.
- **Delete backup:** To free up space on the hard drive, select one of the available backups and click on the **Delete backup** button.
- **System backup content:** The projects contained in the selected backup are listed.
- **Type of system restore:** Use the radio button to define which part of the backup to restore.
    - **Restore full system:** Restore everything contained in the backup.
    - **Restore system configuration**: Restores the system configuration, but no historic data (alarm log, trend log, event log). This option is useful, if you want to restore an old configuration but keep the latest log data.

5.7 Send messages to connected clients

It is possible to send a message from the LWEB-900 Server UI to connected clients:

- Send message to specific projects: Select the projects and choose **Send Message to Project** from the context menu.
- Send message to all projects: Select **File → Send Message To All Running Projects** from the menu.

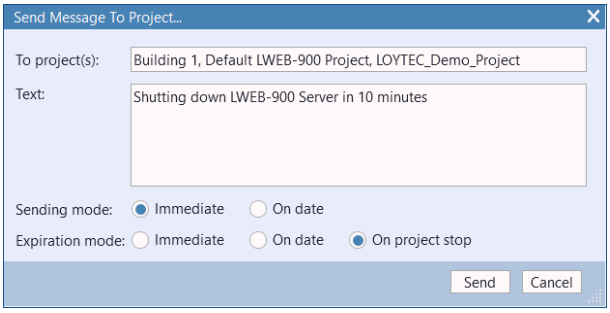


Figure 54: Send Message to Projects

5.8 Database Engines

LWEB-900 supports different database engines:

- SQLite
- Microsoft SQL Server
- MySQL

When creating a new project, the database engine is selected. Per default SQLite is selected as shown in Figure 55. SQLite is a light-weight database implementation which is included in LWEB-900.

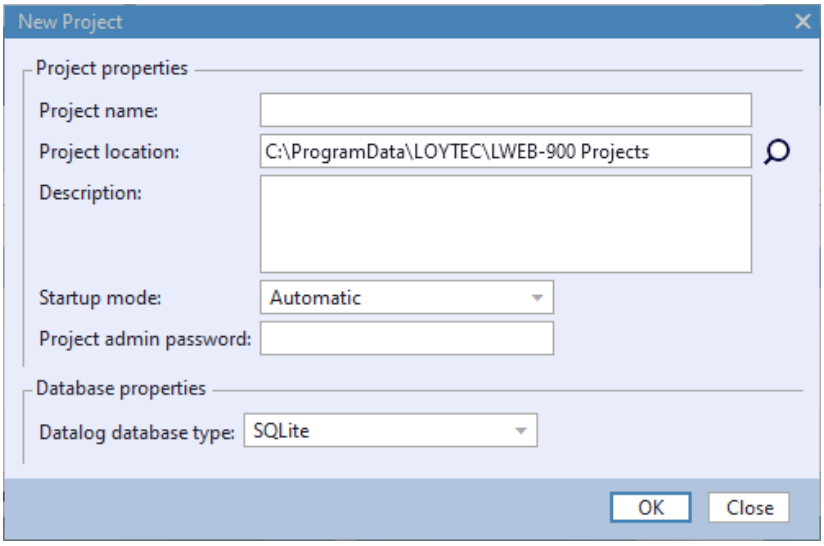


Figure 55: New SQLite Project

If you want to use a Microsoft SQL or MySQL server (not included in LWEB-900), you can select the appropriate database type in the **New Project** dialog and configure the connection parameters shown in Figure 56.

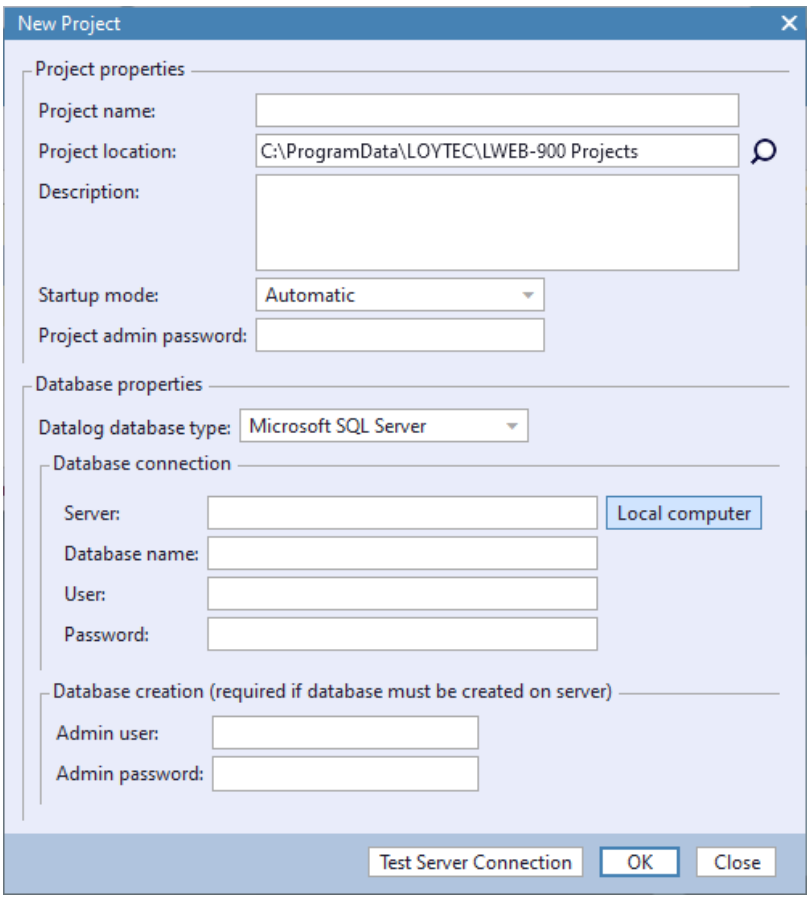


Figure 56: New Microsoft SQL Server Project

- **Server:** Database server (e.g. ".\SQLSERVER" for Microsoft SQL Server or IP address of the MySQL server).
- **Database**: Name of the database which will be created for LWEB-900.
- **User**: Name of the user that will be created to access the database.
- **Password:** Password for the created user.
- **Confirm password:** Password confirmation to ensure that the password was entered correctly.
- **Admin user:** Admin user for database server (e.g. "sa" for Microsoft SQL Server or "root" for MySQL server); necessary to create the database.
- **Admin Password:** Password for admin user; necessary to create the database.

5.9 Database maintenance and migration

You can execute some maintenance on a project by selecting **Project Maintenance …** from the context menu. The possible actions are:

- **Cleanup project database:** this will check the use of object names in the database, fix eventual inconsistent object paths and remove unused data (names, datapoint types and units). This operation has to be applied for example when you observe inconsistencies in some result searches of datapoints, or in some OPC paths of datapoints in graphical views.

- **Cleanup and defragment project database:** in addition to the cleanup operation, this will reorganize the content of the file and discard empty space remaining after deletion of records. This operation can be applied from time to time to reduce the size of the project file.

- **Defragment datalog database:** similar to the defragment of the project database, but for the datalog database.

- **Migrate datalog database:** this option allows you to migrate the existing datalog database to a new database of a different type. For example, you can migrate from SQLite to MySQL or Microsoft SQL Server. The settings of the new database depend on the type selected. Before the migration, LWEB-900 will propose you to make a backup of the existing database.

NOTE: if the project is currently running, it will be temporary stopped during any maintenance operation.

5.10 Communication Statistics

To display communication statistics select the menu File → Statistics. The following information is provided:

- **OPC Server**: To provide data updates to clients, the LWEB-900 Server acts as OPC XML-DA server. This tab displays the statistics for the communication between LWEB-900 Server and clients.

- **OPC Client**: To get data updates from the devices, the LWEB-900 Server acts as OPC XML-DA client. This tab displays the statistics for the communication between LWEB-900 Server and devices.

- **Connected Clients**: This tab displays the clients which are currently connected to the LWEB-900 Server.

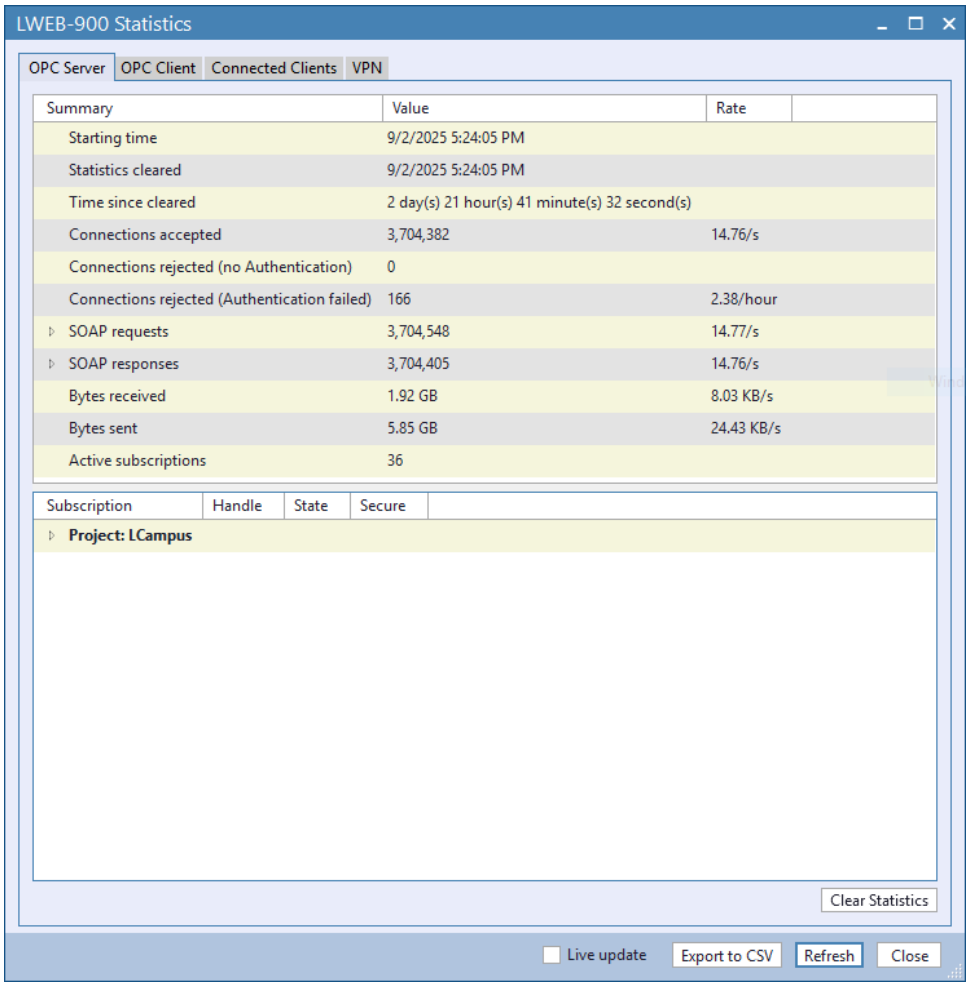


Figure 57: Communication Statistics

6 LWEB-900 Client

The LWEB-900 Client is the primary user interface for the server. It can be started on the same PC as the server or on a remote PC. Multiple clients can access the server concurrently.

6.1 Login

When the LWEB-900 Client is started, the login dialog is displayed (see Figure 58).

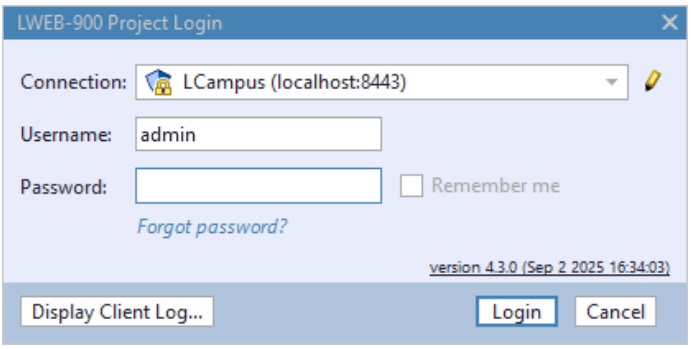


Figure 58: LWEB-900 Client Login

The **Connection** drop-down list allows to choose between different LWEB-900 projects. To open the **Manage Project Connections** dialog, click on the **Edit** button (see Figure 59).

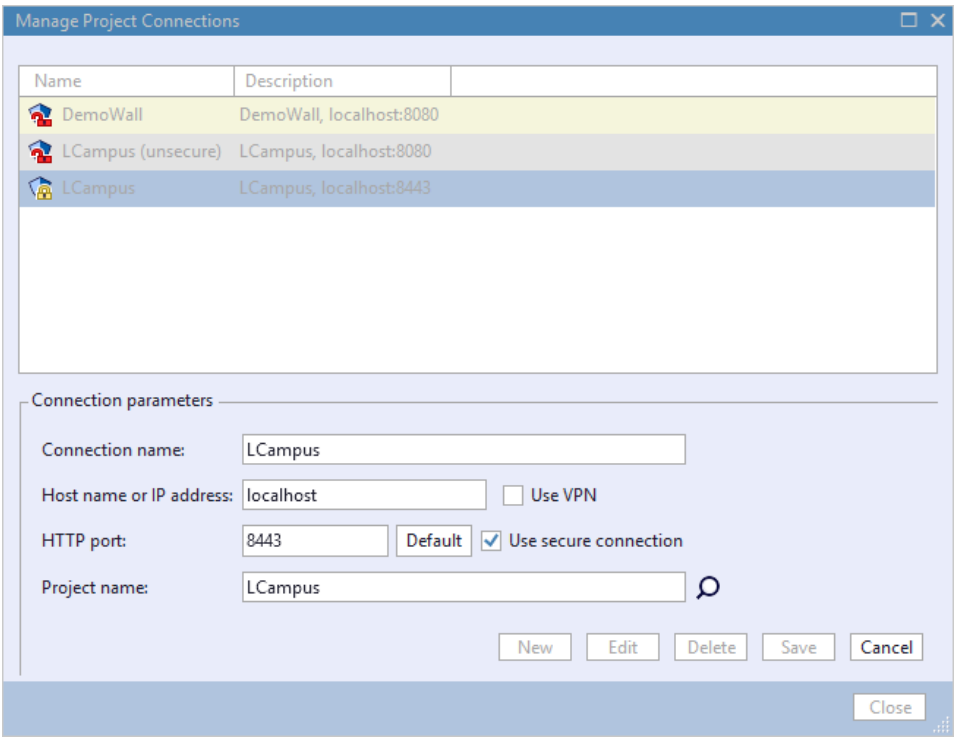


Figure 59: Manage Project Connections

- **Connection name:** The name entered in this text field, will appear in the connection drop-down list of the login dialog.
- **Host name or IP address:** Host name or IP address of the LWEB-900 Server.
- **Use secure connection:** Activate this checkbox to connect to the LWEB-900 Server using SSL (Secure Socket Layer).
- **Port:** Port of the LWEB-900 Server (see Section 5.3).
- **Project name:** Name of the project. To obtain a list of projects, press on the search button. If the server is protected by a password (see Section 5.2), the server user name and password are requested.

Each LWEB-900 project has its own set of users and access rights (see Sections 6.27 and 6.28). A new project has an administrator user with the following default credentials:

- Username: admin
- Password: loytec4u

6.1.1 Default user

LWEB-900 allows defining a default user (see Section 6.27 for user management). The default user has the following special properties:

- The default user has no password.
- If user name and password are left empty in the login dialog, the LWEB-900 client logs in the default user.
- If the current user logs out (auto-logout or manual logout), the default user is automatically logged in.

- Only the admin user can define/remove the default user.

6.1.2 Kiosk Mode

The LWEB-900 Client can be started in kiosk mode using the command line option "Kiosk". The admin user can switch between kiosk and normal mode using the keyboard combination Ctrl+Enter. For other users the ability to switch between kiosk mode and normal mode can be enabled as part of the user properties (Section 6.27 for user management).

The kiosk mode has the following features:

- LWEB-900 Client is displayed in full screen mode
- The Windows task bar is not visible

6.1.3 Command Line Options

Using the LWEB-900 client command line options it is possible to start the LWEB-900 client automatically.

Option	Description
Connection=<connection name>	Name of a predefined connection. The connection defines host, port, project and connection method (HTTP/HTTPS)
Host=<host name or IP address>	Host name or IP address of the LWEB-900 Server
Port=<port>	Port of the LWEB-900 Server
Project=<project name>	Project name
SslEnabled	Use secure connection (HTTPS) to LWEB-900 Server
SslPort=<port>	Secure Port of the LWEB-900 Server
Username= <user name>	User name for automatic login. To login the default user, do not specify a user name.
Password=<password>	Password for automatic login. To login the default user, do not specify a password.
Perspective=<perspective name>	Name of the perspective which will be loaded after login. If no perspective is specified, the previous view layout will be restored.
Kiosk	Start LWEB-900 Client in kiosk mode

Table 3: LWEB-900 Client Command Line Options

6.2 User Interface Overview

The LWEB-900 Client user interface is highly customizable. You can arrange views inside the workspace in the layout that best suits your working style. An example is shown in Figure 60.

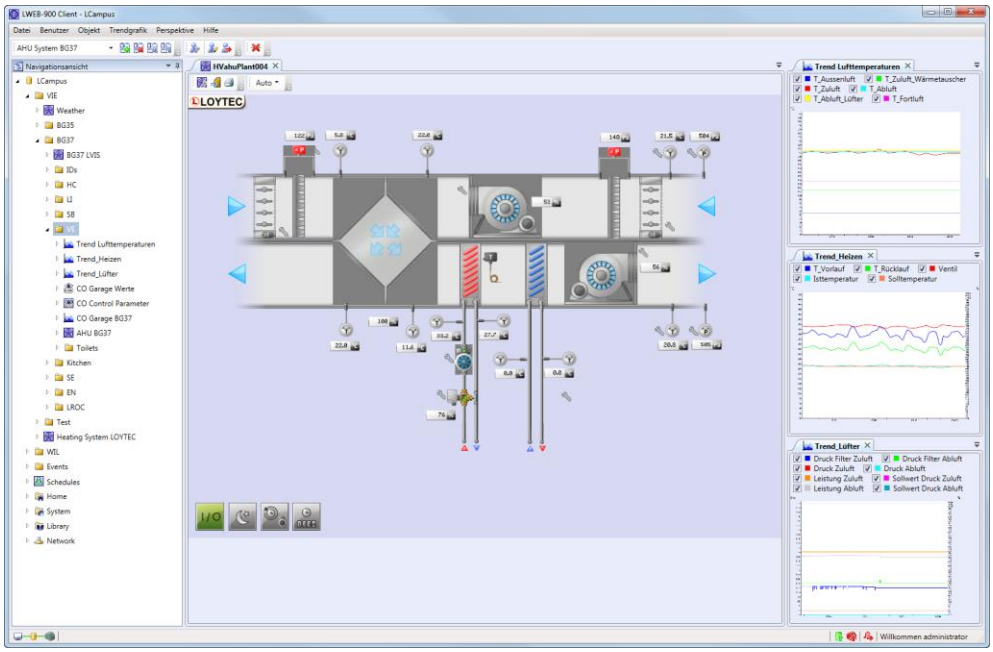


Figure 60: LWEB-900 Client User Interface

A pane displays one or multiple views. To magnify/shrink a view, double-click on the caption bar.

If a pane contains multiple views, they are displayed as tabs. To move the entire pane, grab the caption bar and drag it. To move only a single view from a pane, grab the tab and drag it.

While dragging a pane, docking indicators are displayed to make it easy to choose the destination. You can drop the pane over a docking indicator (see Figure 61) or leave it floating in a separate window above the application window. Floating windows are very useful if you have a secondary monitor.

Another very useful feature that allows conserving space on your monitor is auto-hiding of panes. To control this feature there is a pinup button in the upper right corner of each pane. If you unpin it, the pane will automatically hide when it loses focus.

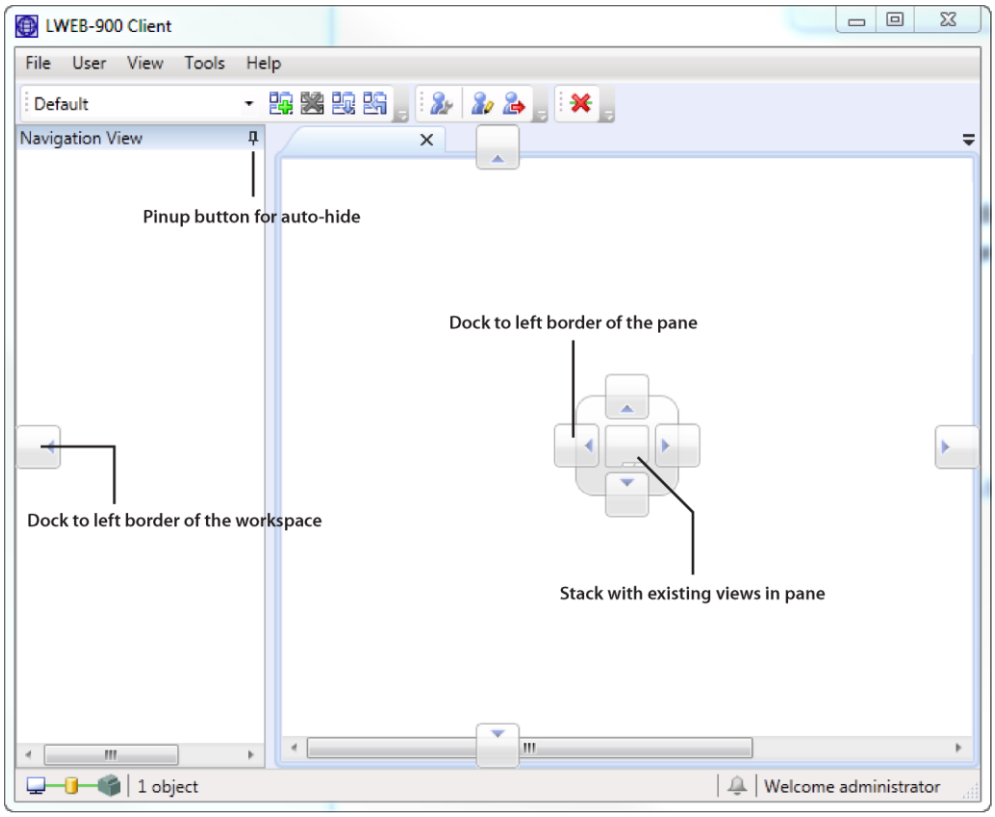


Figure 61: Docking Indicators

Most LWEB-900 views have a toolbar and bread crumbs navigation. You can hide those bars using the context menu of the tab.

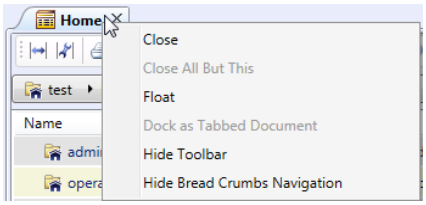


Figure 62: Hide Toolbar and Bread Crumbs Navigation

6.3 Navigation View

The navigation view displays the contents of the LWEB-900 project in a tree view. Figure 63 shows the navigation view of a new project.

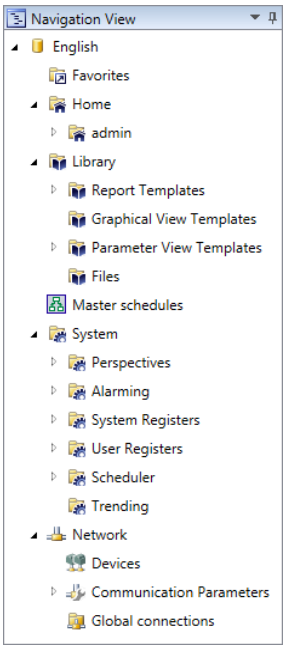


Figure 63: Navigation View for New Project

- **Favorites**: Each user has his own **Favorites** folder. You can drag and drop any view into the **Favorites** folder to speed up access to frequently used views. The **Favorites** folder can be organized using sub-folders.

- **Home**: This folder contains a sub-folder for each user. When adding a new user (refer to Section 6.27), a corresponding user folder is created automatically.

    - **admin**: A new project contains an admin user per default.

- **Library**: This folder can contain templates for graphical views (refer to Section 6.11, parameter views (refer to Section 6.12), and reports (refer to Section 6.17). Those templates can be instantiated multiple times. It also contains file objects which can be linked to other objects or alarms (refer to Section 6.21).

- **System**: This folder contains LWEB-900 system items.

    - **Perspectives**: Views are organized in the application window in an arrangement called a perspective. These perspectives can be made available for other users by placing them in the **System/Perspectives** folder. Refer to Section 6.23 for details.

    - **Alarming**: This folder contains the LWEB-900 alarm server and alarm log. LWEB-900 monitors all devices and creates an alarm if a device is not responding (refer to Section 6.14).

    - **System Registers**: This folder contains data points which describe the status of the LWEB-900 Server. Refer to Section 6.25 for details.

    - **User Registers**: This folder contains user defined LWEB-900 registers. They can be used in combination with LWEB-900 schedulers. Refer to Section 6.15 for details.

    - **Scheduler**: This folder contains schedulers which are executed by the LWEB-900 Server. Refer to Section 6.15 for details.

- **Trending**: This folder contains LWEB-900 Server trend logs. Refer to Section 6.16 for details.

- **Network**: This folder contains items related to the building automation network.
  - **Devices**: This folder contains all devices. Refer to Section 6.5 for details.
  - **Communication Parameters**: This folder contains settings for the communication between the LWEB-900 Server and the devices. Refer to Section 6.24 for details.
  - **Global Connections**: This folder contains connections between input and output data points of LOYTEC devices. After the connections have been configured by LWEB-900, the devices exchange data directly over TCP/IP. Refer to Section 6.20 for details.

6.4 Object List View

The object list view shows all items in a folder (see Figure 64).

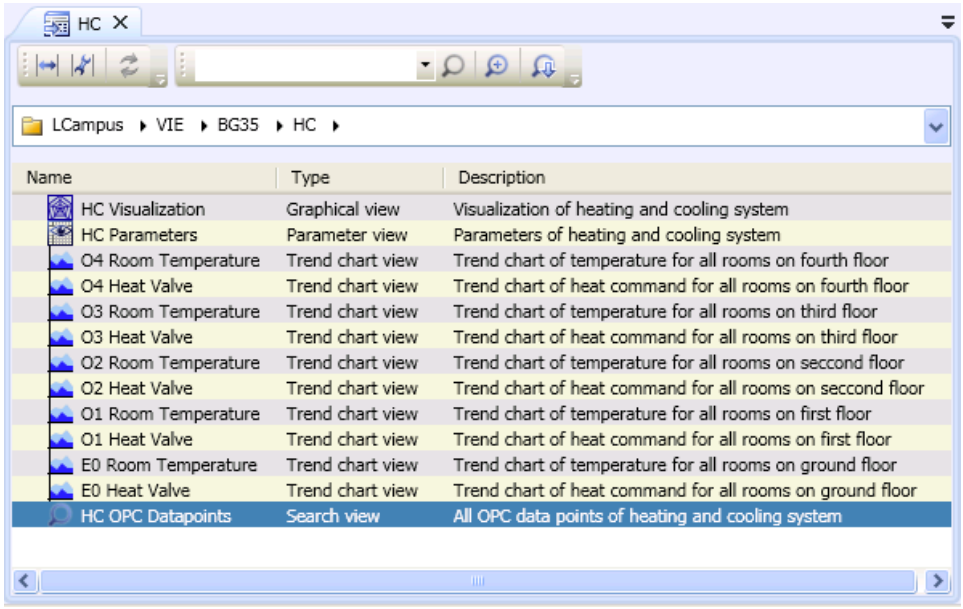


Figure 64: Object List View

To open a new object list view, double click on a folder in the navigation view or select **Open → Open in new object list view** from the context menu. Use the breadcrumb navigation bar as shown in Figure 65 to navigate in the object list view. You can also drag folders from the navigation view and drop them on the bread crumb navigation bar.

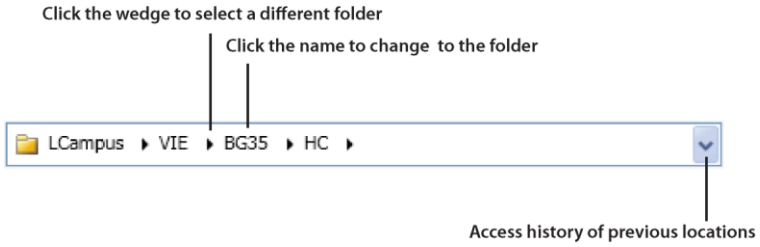


Figure 65: Breadcrumb Navigation Bar

Configure Columns

The columns of the object list view can be customized. Per default the **Name**, **Type**, and **Description** columns are displayed. To add columns or to change the column order, click on the **Configure columns** toolbar button.

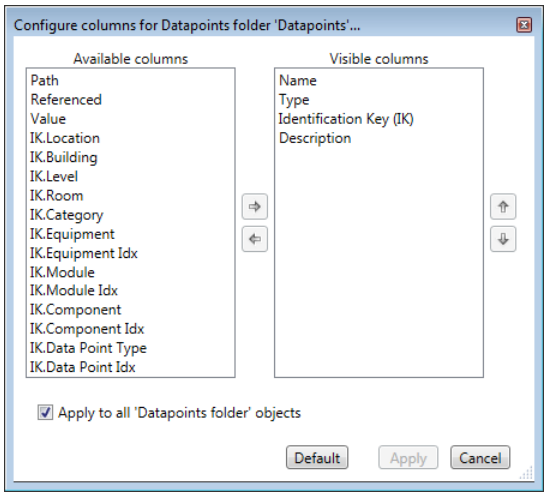


Figure 66: Configure Columns

The column configuration is stored for each folder separately. To change the column configuration for the current folder only, deactivate the **Apply to all 'Datapoints folder' objects** checkbox and click the **Apply** button. To save the configuration for all data point folders, activate the checkbox and press the **Apply** button.

Column	Description
Name	Name of object
Type	Object type
Description	Object description
Path	Complete path
Referenced	If the object is a link, this column displays the referenced object
Value	If the object is a data point, this column displays the value
Object ID	Unique identifier for the object
Referenced ID	If the object is a link, this column displays the unique identifier of the referenced object
Identification Key (IK)	Refer to Section 6.8
IK.<field name>	The identification key consists of user defined fields. Each field can be displayed as a separate column

Table 4: Object List View Columns

Note — *If the **Value** column is displayed, LWEB-900 does not refresh the values automatically. Click on the **Refresh values** toolbar button to update the object list view. If you want to see periodic updates, drag the data point into a watch view.*

Sorting

If no sort order is defined, objects in the object list view can be reordered using drag and drop.

You can sort the list of objects by clicking one of the column headings – **Name** or **Type**, for example. The first click sorts the objects in ascending order, the second click in descending order, and the third click removes the sort order.

To sort by a second column, hold down the [Shift] key and click the column heading that represents the secondary sort group.

Search

To find objects, type the name or part of the name in the search box (see Figure 67). The search includes the folder and all its subfolders. To access additional search options, click on the **Advanced search** button. Refer to Section 6.9 for details.



Figure 67: Search Tool Bar

Show Related Objects

Objects can be related to each other. In the example shown in Figure 68, the selected data point is linked with the following views:

- Graphical view: The data point is member of the data point interface of the graphical view.
- Trend Chart View: The data point is recorded by a trend log displayed in the chart view.
- Watch View: The data point is shown in the watch view.
- Trend Log: The data point is recorded by the trend log.

Click on the link in the context menu to open the related view.

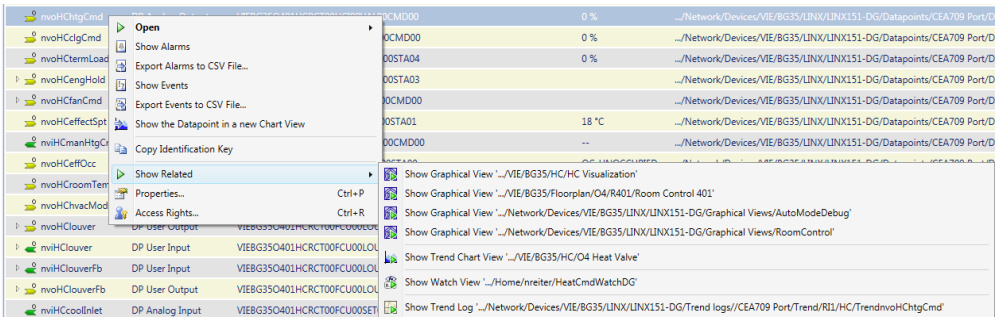


Figure 68: Show Related Objects

Data Point Details

A double-click on a data point displays detailed information about the data point (see Figure 69). The **Links** section shows where the data point is used. Click on a link to open the corresponding view.

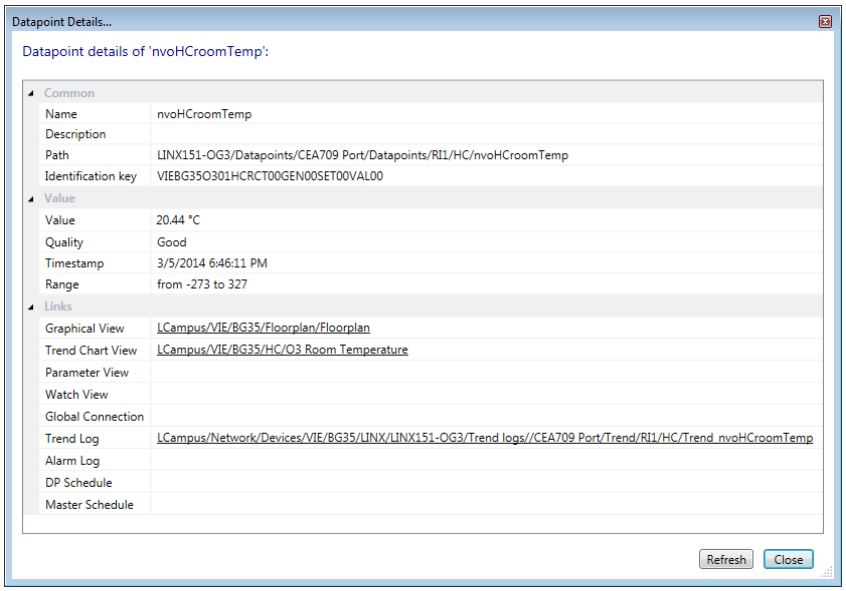


Figure 69: Data Point Details

Print

Use the print button in the toolbar to print the object list view. The print dialog allows adjusting the page margins and the font size.

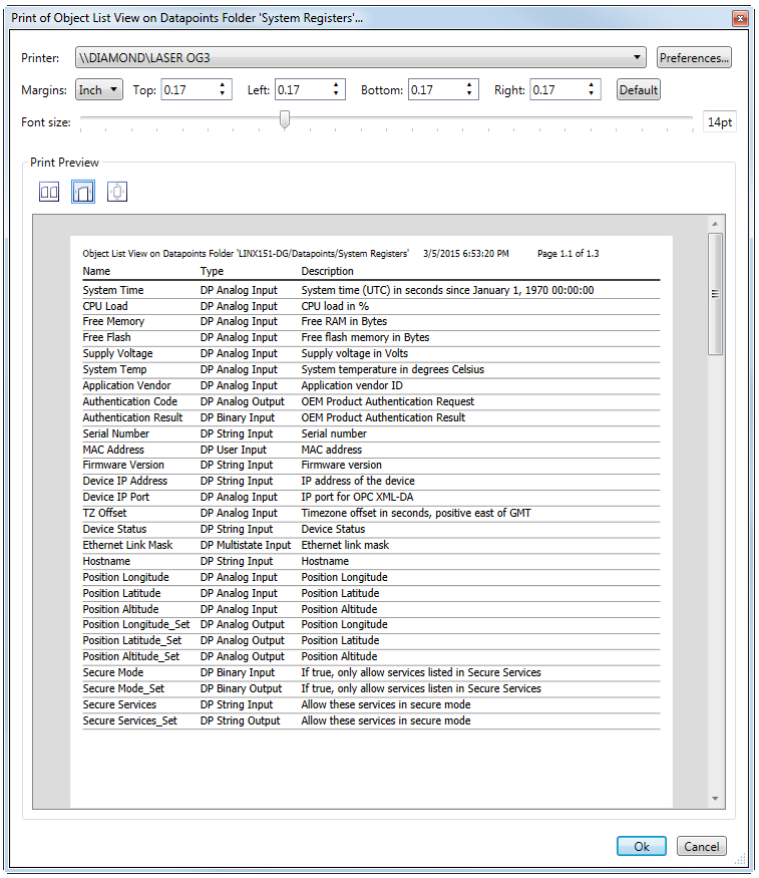


Figure 70: Print Object List View

6.5 BACnet Configuration

The BACnet technology offers a standardized interface to devices from other manufacturers. LWEB-900 supports the following BACnet functionality:

- Scan BACnet network to find BACnet devices and their objects.
- Monitor and modify the value of all BACnet object types, including all required and optional properties.
- Display and acknowledge BACnet alarms in alarm view.
- Configure BACnet scheduler and calendar objects using the master schedule configurator.
- Display BACnet trend logs in list view, chart view, or report.
- Distribute time into the BACnet network as BACnet time master.
- Reset BACnet devices.
- Backup and restore the configuration of BACnet devices.

Activate BACnet communication

1. Select **Properties** from the context menu of the project node in the navigation view and switch to the **BACnet** tab.
2. Active the **Enable BACnet** checkbox.
3. Select the **Network Adaptor** which the BACnet stack will use.
4. Configure the **BACnet/IP address** and **BACnet/IP port**. If the BACnet/IP network uses a non-default UDP port number other than 47808/0xBAC0, enter this port in the BACnet/IP port field. Press the **Default** button for switching back to the default setting.
5. The **BACnet Instance Number** corresponds to the instance number of the BACnet device object for the LWEB-900 project. It must be a unique ID on the BACnet internetwork.
6. Configure the APDU parameters:
   - **APDU timeout**: Time the LWEB-900 Server waits for an answer before retrying or giving up on a request.
   - **APDU segment timeout**: Timeout allowed between segments.
   - **APDU retries**: The number of times the LWEB-900 Server will try to re-send a packet before giving up on a request.
   - **APDU length accepted**: The maximal size of an APDU (Application Protocol Data Unit) accepted by the LWEB-900 Server. The typical values for this property are:
     - 480 if at least one BACnet MS/TP device is part of the BACnet network.
     - 1024 if the BACnet network contains only BACnet/IP devices and L-WEB 900 is connected via a VPN to the IP network.
     - 1476 if the BACnet network contains only BACnet/IP devices and L-WEB 900 is connected to a local IP network.

7. Configure the default value for **write priority**. LWEB-900 allows writing commandable properties using one of the following methods (see Figure 72):

   - Use default priority: Directly set the value of the commandable property.
   - Use a specific priority: Change an entry in the corresponding priority array.

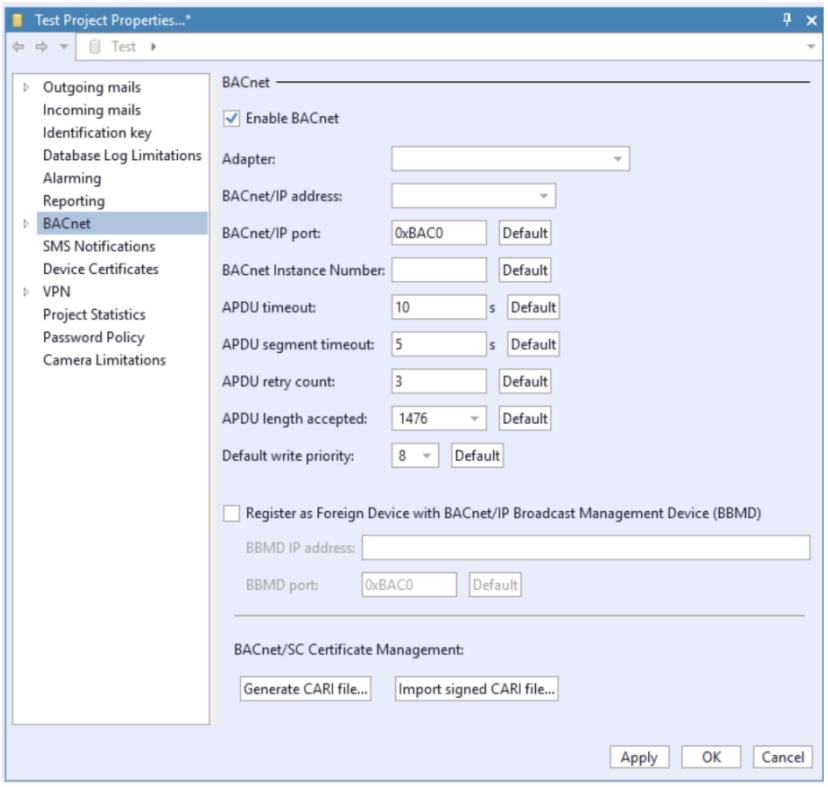


Figure 71: BACnet Configuration

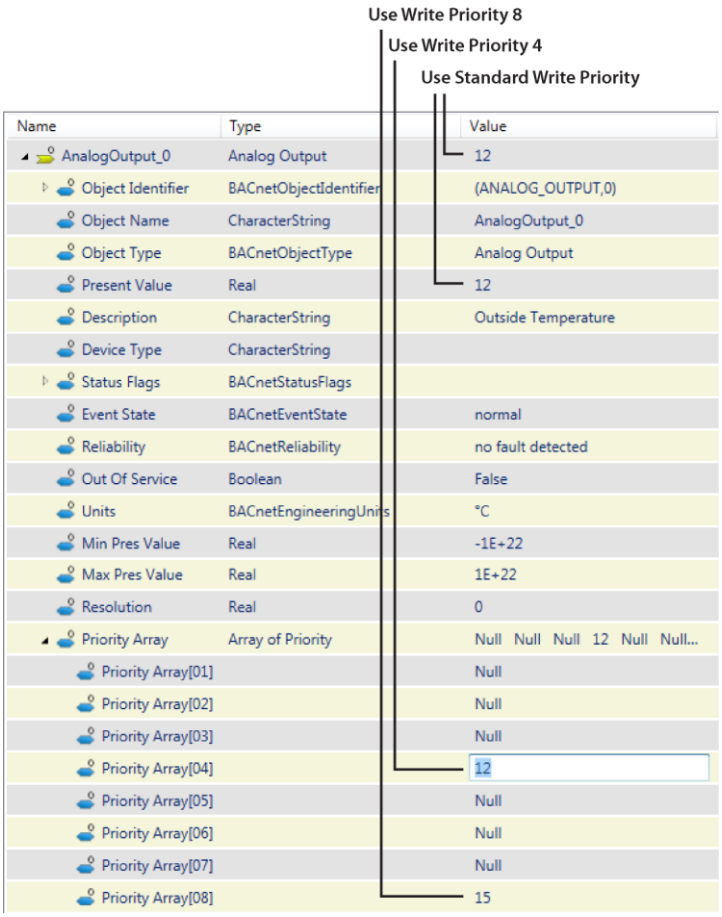


Figure 72: BACnet Write Priority

Register as Foreign Device with BACnet Broadcast Management Device (BBMD)

The LWEB-900 Server can register with an existing BBMD in the BACnet/IP network as a foreign device. This functionality is used if the LWEB-900 Server is located as a single BACnet/IP device on a remote IP subnet or behind a NAT router. If operated as a foreign device behind a NAT router, port forwarding to the BACnet/IP port must be setup in the NAT router.

1. Enable the **Register as Foreign Device with BACnet/IP Broadcast Management Device (BBMD)** checkbox.

2. Configure the IP address and port of the remote BBMD.

Configure BACnet time synchronization

The LWEB-900 Server can serve as a BACnet time master.

1. Enable the **Use BACnet Time Synchronization** checkbox.

2. Configure the time synchronization parameters:

   - **Time syn. Interval**: This value specifies the time interval in which periodic time synchronization events are created. If set to zero, no periodic time synchronization events are generated.

- **Align time sync. Interval to the top of the hour**: The checkbox determines whether or not periodic time synchronization events shall be anchored at the start of a day or hour.

- **Offset by**: This value determines the point of time within this time synchronization interval at which the time synchronization event is actually triggered. The default value of this property is 0.

3. Add BACnet devices which should receive UTC time to the **UTC time sync. Recipients** list and devices which should receive local time to the **Time sync. Recipients** list. LWEB-900 allows to add the following types of recipients:

    - Existing BACnet device from the data base

    - BACnet device identified by BACnet instance number (the object ID of its Device object)

    - BACnet device identified by BACnet address (Network number and MAC address/IP address)

    - Local broadcast

    - Foreign broadcast

    - Global broadcast

BACnet custom objects and properties

The BACnet standard defines standard objects and their properties. However, many BACnet vendors extend those standard objects with custom properties. Other vendors define new object types with a complete new set of properties. When LWEB-900 scans a BACnet device and its objects, it gathers all available information and creates a new object type definition if it does not yet exist. All object types can be modified using the **Types & Properties** editor.

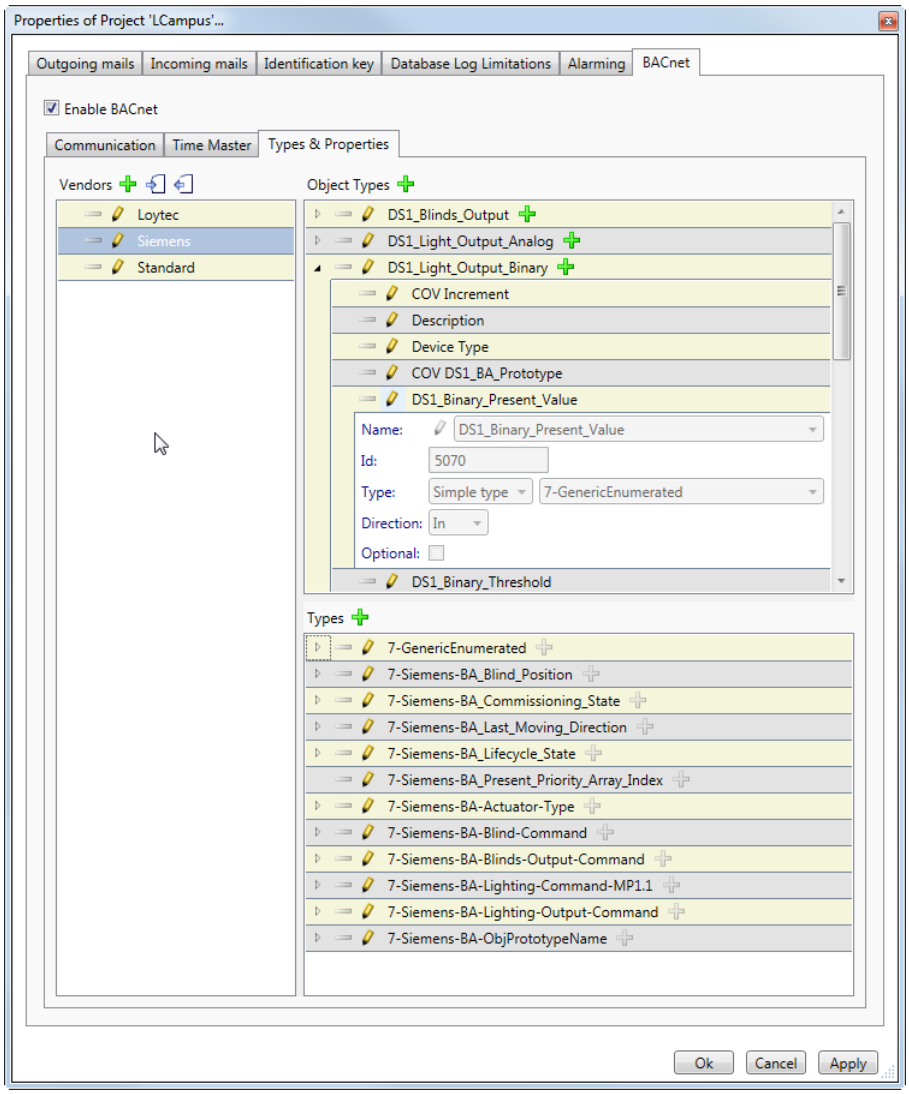


Figure 73: Types & Properties Editor

Certificate Management for BACnet/SC devices

LOYTEC devices support the BACnet/SC node function, enabling them to register with BACnet/SC hubs and participate in BACnet/SC networks. This allows installations to benefit from enhanced security features, including TLS encryption and certificate-based authentication.

LWEB-900 supports the installation of the required certificates on LOYTEC devices. For this purpose, it uses the Certificate Authority Requirements Interchange File (CARI) format, as defined in ANSI/ASHRAE Standard 135-2020 Addendum cs. The CARI format facilitates the exchange of Certificate Signing Request (CSR) files and the corresponding signed certificate files between BACnet/SC devices and a Certificate Authority.

To create a CARI file containing the Certificate Signing Requests for all BACnet/SC-capable LOYTEC devices in an LWEB-900 project, click “Generate CARI file” in the BACnet tab of the project settings. You may optionally enter a note for the request and select the storage location for the generated CARI request file.

The Certificate Signing Requests contained in the CARI file must be signed by a Certificate Authority. This can be done, for example, using the BACCARI tool, which generates a new CARI file containing the signed certificate files. These certificates can then be deployed to

the LOYTEC devices by selecting “Import signed CARI file” in the BACnet tab of the LWEB-900 project settings.

6.6 Add Devices

Devices are added in the folder **Network/Devices**. To manage a large number of devices, they can be grouped in subfolders. The LWEB-900 Server can communicate with LOYTEC devices using one of the following modes:

- **Web Service**: This is the default communication mode enabling LWEB-900 to access the full functionality of the device. The LWEB-900 Server uses web services only (HTTP or HTTPS) for all communications with the device. LOYTEC devices represent process data as data points. At the data point level, the specific technological restrictions are abstracted and hidden from the user. Therefore it makes no difference whether a LOYTEC device is connected to a BACnet, CEA709, DALI, Modbus, Mbus, etc. network or has local I/Os.

- **TCP/IP**: This communication mode should be used for devices with old firmware versions which do not yet support web services for device management. It requires that LWEB-900 can access the device using web services for real time data and FTP/Telnet (or SCP/ SSH) to manage the device.

- **E-Mail**: Most LOYTEC devices can send an e-mail with a trend or alarm log in CSV format in the attachment when a configurable fill level is reached. The LWEB-900 Server can fetch these e-mails from a mail box and process the contained data. This communication mode is a good option, if the device is behind a firewall and cannot be accessed directly. Only history data (trend and alarm logs) can be received from the device.

- **BACnet**: BACnet communication can be enabled if **Web Service** or **TCP/IP** is selected as communication mode. If the BACnet option is enabled, LWEB-900 displays the native BACnet objects and their properties as well as the abstracted data points.

LWEB-900 allows adding devices from other manufacturers if they support BACnet communication.

Add LOYTEC devices using network scan

1. Select the folder **Network/Devices** or a subfolder and choose **New → Discover devices** from the context menu.

2. Select a network adapter and click on the **Discover Devices** button to start a network scan. The results are put in the device list below.

3. Select one or multiple devices in the device list which you want to add to your project and click the **OK** button

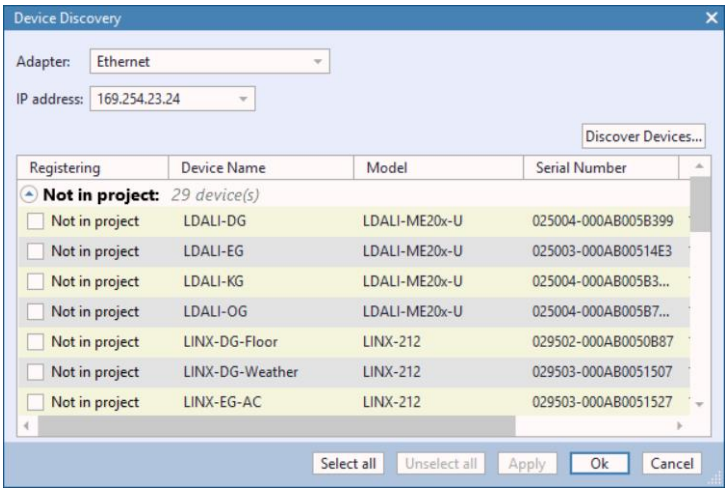


Figure 74: Discover LOYTEC devices

Manually add a device with communication mode "Web Service"

1. Select the folder **Network/Devices** or a subfolder and choose **New → New device** from the context menu.

2. In the **New Device** dialog (see Figure 75) enter the following data:

   - **Family**: Select the LOYTEC device family from the drop-down list.
   - **Type**: Select the LOYTEC device type from the drop-down list.
   - **Name**: User defined name to identify the device.
   - **Description**: Description of the device.
   - **Communication**: Select **Web Service.**
   - **BACnet**: This checkbox is available only if the LOYTEC device supports BACnet communication. If this option is enabled, LWEB-900 will display the native BACnet objects of the device.
   - **State**: If the device is online, select **Enabled**, else select **Disabled**.
   - **Public IP address**: IP address or DNS name of the device. This IP address is used by LWEB-900 to communicate with the device.
   - **Local IP address**: The local IP address is optional because it can be read from the device when it is online.
   - **Operator username**: Enter the operator username which has been configured via the Web UI of the device. The default username is "operator".
   - **Operator password**: Enter the operator password which has been configured via the Web UI of the device.
   - **Admin username**: Enter the admin password which has been configured via the Web UI of the device. The default username is "admin".
   - **Admin password**: Enter the admin password which has been configured via the Web UI of the device.

- **Communication profile**: Select one of the available communication profiles from the drop-down list. Per default the communication profiles **LAN**, **WAN**, and **WLAN** are available. The **LAN** setting ensures fast response times, the **WAN** setting saves bandwidth; the **WLAN** setting limits the number of parallel file transfers. Refer to Section 6.24 for details.

- **HTTP port**: HTTP port of the device.

- **HTTPS port**: Some LOYTEC devices (LINX-12x, LINX-22x, LINX-15x, LVIS-3E11x, LVIS-ME21x, L-ROC) support HTTPS. For those devices the **Use secure connection** checkbox can be activated and the HTTPS port can be configured.

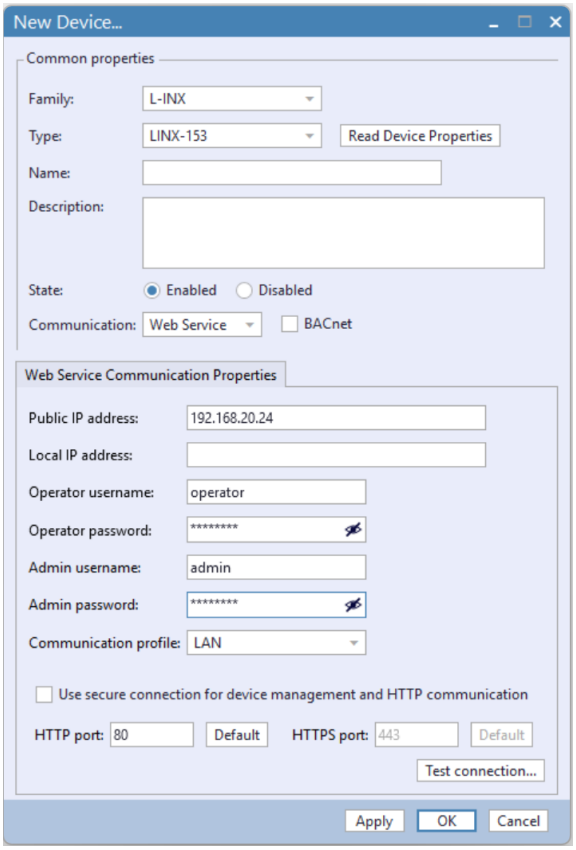


Figure 75: Add Device with Communication Mode **Web Service**

3. Press the button **Test connection** to verify that LWEB-900 can communicate with the device correctly.

4. In the next dialog you are offered the following options:

   - **Upload device configuration:** Choose this option if the device is already configured. LWEB-900 will upload the configuration of the device and display the data points.

   - **Assign device configuration:** Choose this option to assign the configuration of a different device. This option is useful if you have multiple devices with identical configuration.

   - **Start the configurator**: Open the device configuration view. Refer to Section 6.7 for details.

- **Cancel:** Perform none of the above actions. You can execute any of the actions later from the context menu of the device.

5. The new device is displayed in the navigation view. If you have uploaded the device configuration or assigned a configuration, you now have access to all data points of the device (see Figure 76).

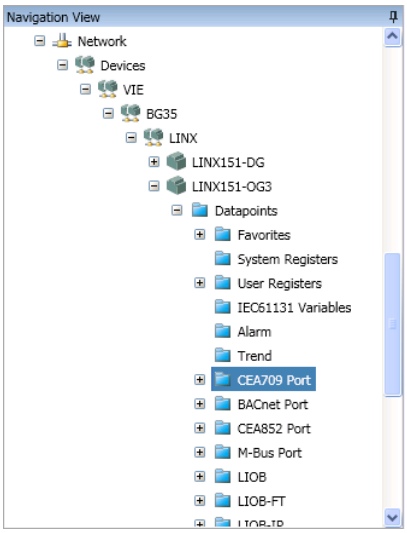


Figure 76: Device Data Points

Manually add a device with communication mode "TCP/IP"

If a device does not support the **Web Service** communication mode, use **TCP/IP** instead. The following additional parameters need to be configured:

- **FTP port** and **Telnet port**: Those ports are fixed and cannot be changed.

- **SSH port**: Some LOYTEC devices (LINX-12x, LINX-22x, LINX-15x, LVIS-3E11x, LVIS-ME21x, L-ROC) support SSH. For those devices the **Use secure connection for device management** checkbox can be activated and the SSH port can be configured.

Manually add a device with communication mode "E-mail"

1. Before mails can be received, the incoming mail server has to be configured. Select **Properties** from the context menu of the project node in the navigation view and select the **Incoming mails** tab.

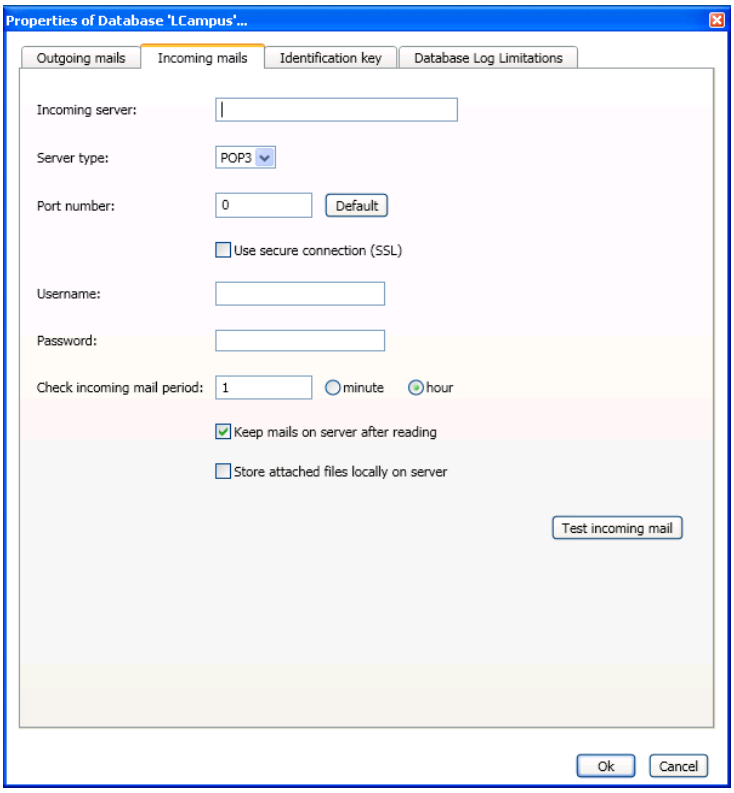


Figure 77: Incoming Mail Configuration

- **Incoming server**: IP address of the incoming mail server.
- **Server type**: The LWEB-900 Server supports POP3 and IMAP.
- **Port number**: Incoming mail server port.
- **Use secure connection (SSL)**
- **Username**: User name for mail box access.
- **Password**: Password for mail box access.
- **Check incoming mail period**: The LWEB-900 Server checks the mail box periodically for new mail. This value defines how often the mail box will be checked.
- **Keep mails on server after reading**: The LWEB-900 Server can either remove the processed e-mails from the server or leave them on the server.
- **Store attached files locally**: If this option is selected, the attached CSV log files from the processed e-mails will be stored on the hard disk in the directory <project directory>\MailInputBox\AttachedFiles.

2. Select the folder **Network/Devices** or a subfolder and choose **New → New device** from the context menu.
3. In the **New Device** dialog (see Figure 78) enter the following data:
   - **Family**: Select the LOYTEC device family from the drop-down list.
   - **Type**: Select the LOYTEC device type from the drop-down list.

- **Name**: User defined name to identify the device.
- **Description**: Description of the device.
- **Communication**: Select **E-mail.**
- **State**: If the device is online, select **Enabled**, else select **Disabled**.
- **Serial number**: Serial number of the LOYTEC device. The serial number is part of the CSV log files which are transmitted by LOYTEC devices.

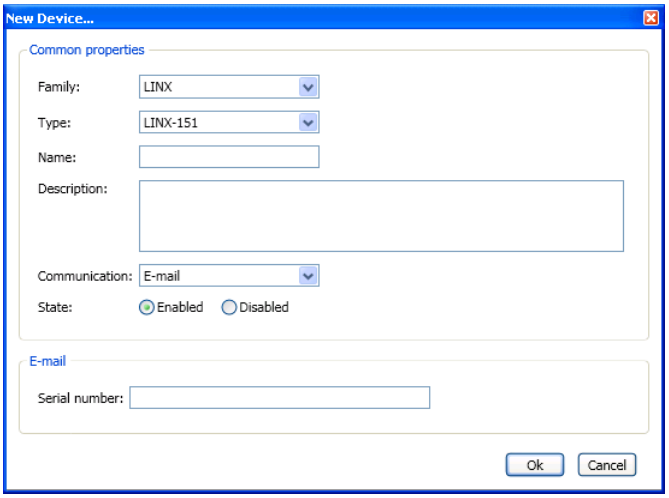


Figure 78: Add Device with Communication Mode **E-mail**

4. The new device is displayed in the navigation view. After the first data has been received via e-mail, the trend logs and alarm logs will be displayed in the corresponding folders (see Figure 79).

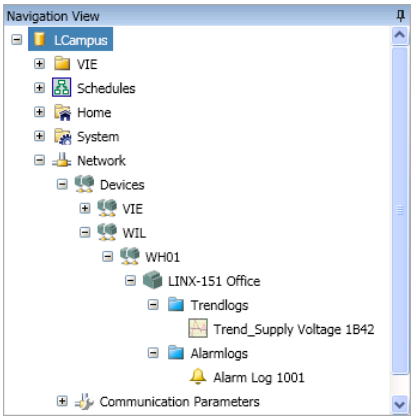


Figure 79: Device Trend and Alarm Logs

Add 3rd party BACnet devices using network scan

LWEB-900 Server supports an online network scan on the BACnet network. In this scan the LWEB-900 server searches for other devices on the BACnet network and pulls in the BACnet object information of these devices.

1. Select the folder **Network/Devices** or a subfolder and choose **Scan BACnet Network** from the context menu. This opens the BACnet network scan dialog as shown in Figure 80.

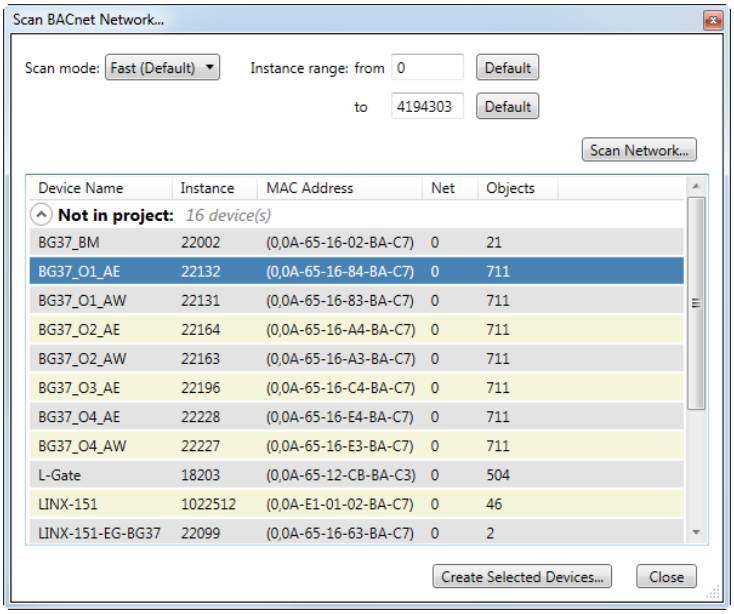


Figure 80: BACnet Network Scan

2. Click on the **Scan Network** button to start a network scan. The results are put in the device list below.

3. Select one or multiple devices in the device list and click the **Add Selected Devices…** button.

4. The new devices are displayed in the navigation view. You have access to all BACnet objects and their properties (see Figure 81).

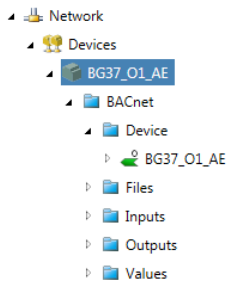


Figure 81: BACnet Objects

Add a 3rd party BACnet device offline

If the BACnet device is not yet online, it is possible to add it as follows:

1. Select the folder **Network/Devices** or a subfolder and choose **New → New device** from the context menu.

2. In the **New Device** dialog (see Figure 82) enter the following data:

   - **Family**: Third-party device.

- **Type**: BACnet/IP.
- **Name**: User defined name to identify the device.
- **Description**: Description of the device.
- **State**: If the device is online, select **Enabled**, else select **Disabled**.
- **BACnet instance**: Instance number of BACnet device object. The instance number must be unique in the BACnet network.
- **BACnet address**: The BACnet address consists of BACnet network number and BACnet MAC address. For a BACnet/IP device the BACnet MAC address is defined by its IP address and UDP port.
- **Management password**: Enter the password required for device management functions (reset, backup/restore). For LOYTEC devices the default password is "loytec4u".
- **Communication profile**: Select one of the available communication profiles from the drop-down list. Per default the communication profiles **LAN**, **WAN**, and **WLAN** are available. The **LAN** setting ensures fast response times, the **WAN** setting saves bandwidth; the **WLAN** setting limits the number of parallel file transfers. Refer to Section 6.24 for details.

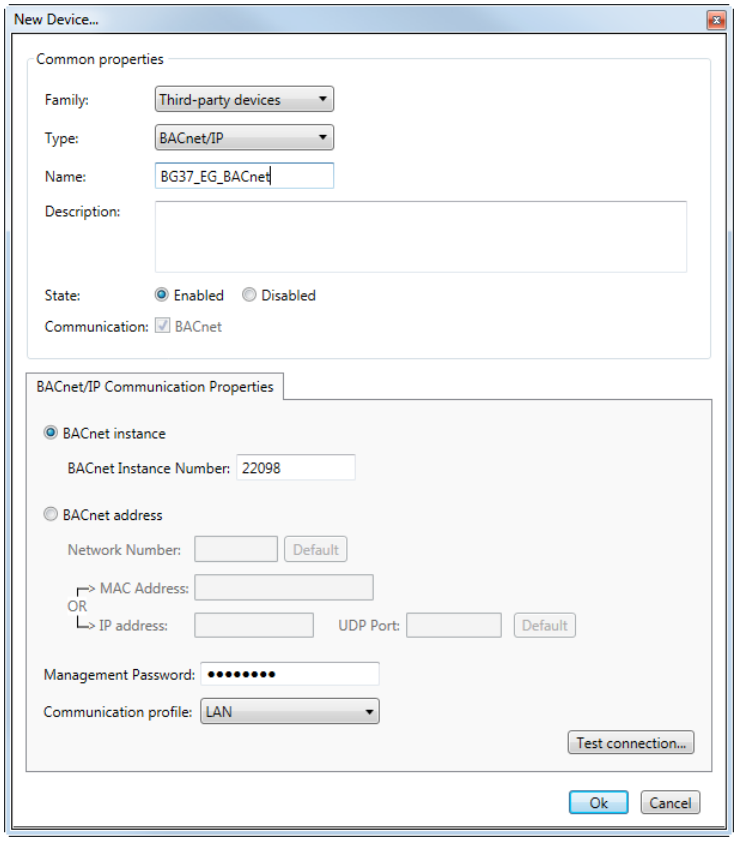


Figure 82: Add 3rd Party BACnet Device

3. Press the button **Test connection** to verify that LWEB-900 can communicate with the device correctly.

4. In the next dialog you are offered the following options:

- **Upload device configuration:** Choose this option if the BACnet device is online. LWEB-900 will upload the BACnet object information of the device.

- **Import device configuration:** Choose this option if the device is offline. You can either import an EDE file and the corresponding state text file or assign the configuration of a different device (see Figure 83). The latter option is useful if you have multiple devices with identical configuration.

- **Cancel:** Perform none of the above actions. You can execute any of the actions later from the context menu of the device.

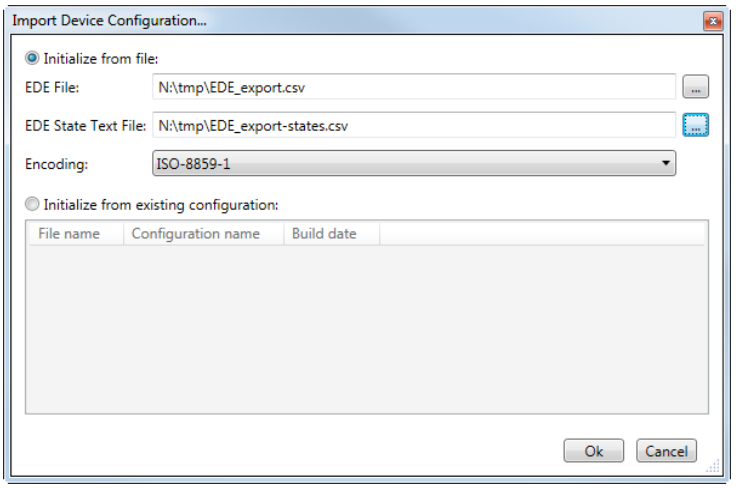


Figure 83: Import BACnet Device Configuration

5. The new device is displayed in the navigation view. If you have uploaded the device configuration or imported a configuration, you now have access to all BACnet objects of the device (see Figure 81).

Organize devices

To keep track of a large number of devices, it is recommended to organize them in folders. To create a folder, select **Add folder** from the context menu. Devices can easily be moved between folders using drag-and-drop.

6.7 Configure LOYTEC Devices

Configuration Software

LOYTEC devices can be configured very comfortably because the required software can be started directly in LWEB-900. The L-VIS, L-INX, and L-DALI Configurators are separate software packages which can be downloaded from the LOYTEC homepage. When the LWEB-900 Client is started, it checks which Configurators are installed on your PC and displays any missing components (see Figure 84).

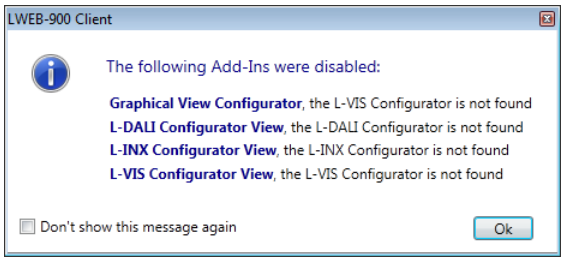


Figure 84: Device Configuration Software Not Installed

If the corresponding configuration software is installed, you can right-click on a device in the navigation view and select **Configure device**.

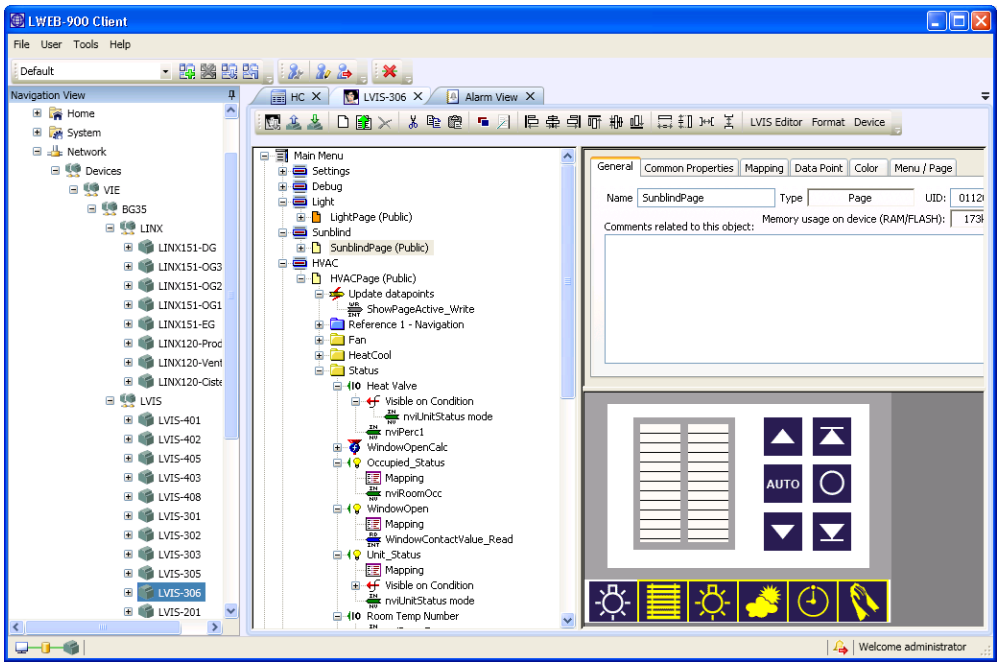


Figure 85: L-VIS Configuration Software in LWEB-900

The configuration software of the different LOYTEC devices is outside the scope of this document. It is described in the corresponding product manuals instead (see Table 5). Figure 86 shows the part of the device configuration toolbar which is independent of the product type.

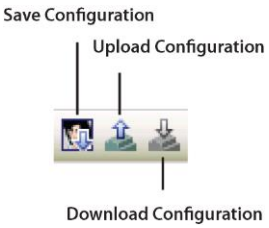


Figure 86: Common Button for Device Configuration

- **Save Configuration**: Save the current configuration in the LWEB-900 database. The navigation view will be updated with the objects created in the device configuration software.

- **Upload Configuration**: If the configuration on the device is newer than the configuration in the LWEB-900 database, use this button to upload it. It will upload the entire configuration from the device, including data points, NVs, registers, client mappings, schedules, etc.

- **Download Configuration**: To download the configuration, the device must be online. Before downloading the configuration, it will be saved in the LWEB-900 database.

Device Family	Configuration Software
L-VIS	L-VIS devices are configured with the L-VIS Configurator. Refer to the L-VIS User Manual [1] for details.
L-INX, L-GATE	L-INX and L-GATE devices are configured with the L-INX Configurator. Refer to the L-INX/L-GATE User Manual [2] for details.
L-IOB	L-IOB devices are configured with the L-INX Configurator. Refer to the L-IOB User Manual [3] for details.
L-DALI	LDALI-3E10x devices are configured with the L-DALI Configurator. LDALI-ME20x devices are configured using the web interface and do not need a separate configuration software. Refer to the L-DALI User Manual [5] for details.

Table 5: Device Configuration Software

Note: *If you are using a network management tool based on LNS, do NOT configure the devices in LWEB-900, but start the device configuration software from the network management tool in plug-in mode.*

Note: *The device configuration software accesses the device directly and does not go through the LWEB-900 Server.*

Access Web UI of device

The web UI of a LOYTEC device can be accessed easily by selecting **Open device web UI** from the context menu. There is no need to remember the password of each device. Depending on your access rights (see Sections 6.17.4 and 6.28) to the device, you will be automatically logged in as admin user or as operator user.

6.8 Identification Key

In LWEB-900 each data point is uniquely identified by its path and name. Optionally, you can define your own identification key schema and assign identification keys to each data point. Figure 87 shows an example.

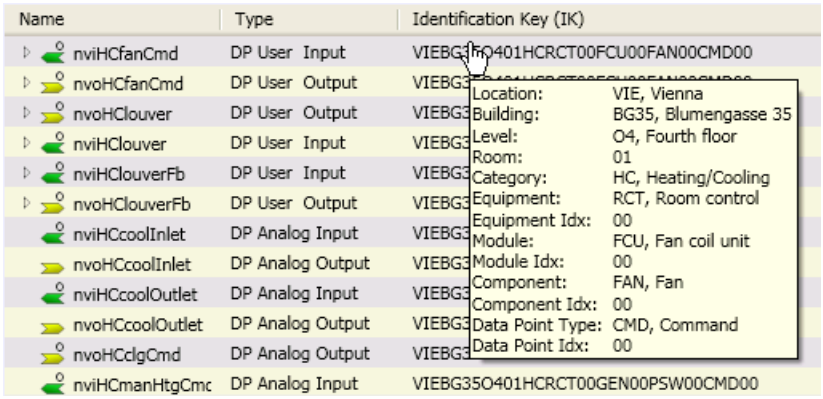


Figure 87: Identification Key Example

Define identification key schema

1. Select **Properties** from the context menu of the project node in the navigation view and select the **Identification key** tab (see Figure 88).

2. An identification key consists of a number of fields which have fixed length. To add a new field, click on the **Add field** button.

3. Specify a name and the length of the field.

4. Each field can have a number of predefined values. Define the values and optionally add a description.

5. Click on the **Apply** button to save the field configuration.

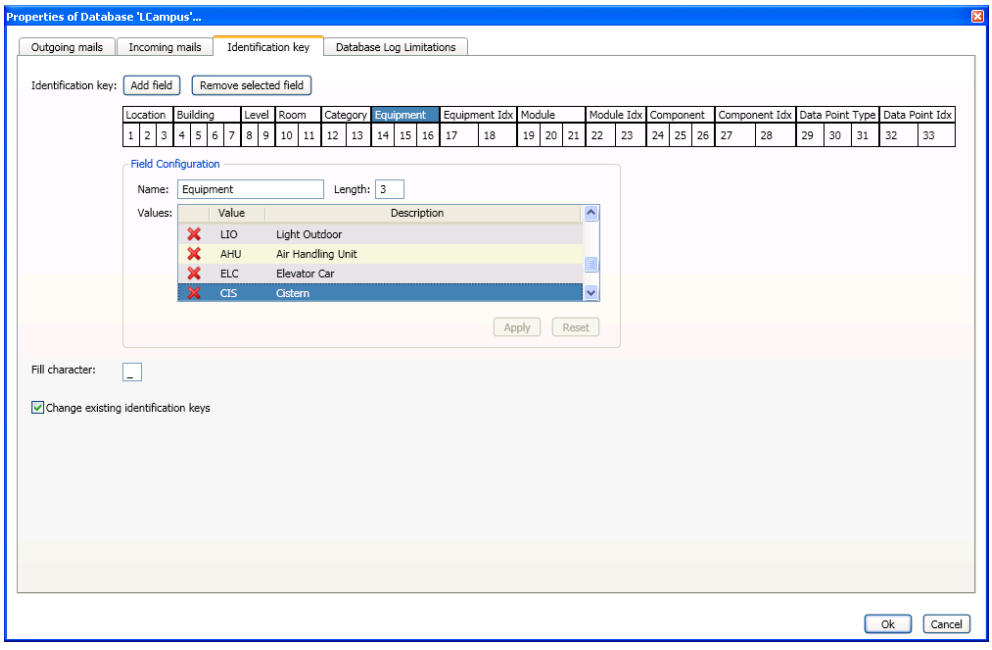


Figure 88: Identification Key Schema

Assign identification keys to data points

1. In the object list view, click on the toolbar button **Configure columns** and add the **Identification Key (IK)** column.

2. Click on the identification key which you want to change. The identification key is split into its fields as shown in Figure 89. For each field you can select one of the predefined values or enter a new value.

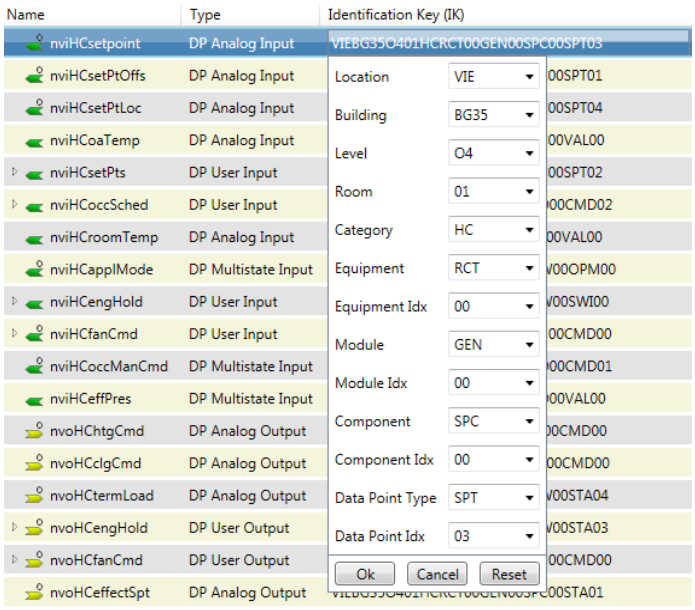


Figure 89: Assign Identification Key

Multi-edit identification key fields

1. In the object list view, click on the toolbar button **Configure columns** and add the identification key fields which you want to change.

2. Select multiple data points in the object list view.

3. Click on the identification key field of the first data point and change it (see Figure 90). The identification key of all selected data points is changed.

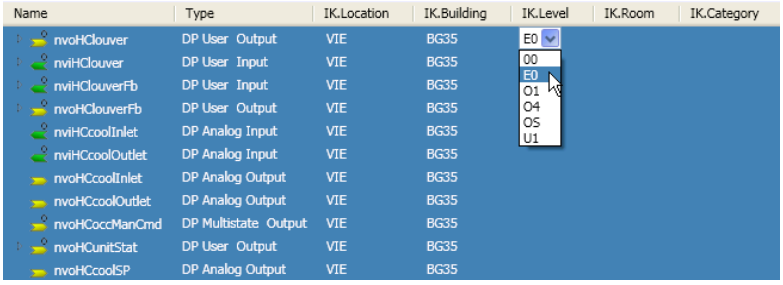


Figure 90: Multi-Edit Identification Keys

Assign identification keys from data point name or description

The name or description of a data point can be used as part of the identification key.

1. In the navigation, click with the right mouse button on a device or a device folder and select **Identification Keys → Assign Identification Keys…** from the context menu.

2. The **Assign Identification Keys** dialog allows the definition of a **Constant Part** which is assigned to the identification keys of all data points in the folder and a **Dynamic Part** which is derived either from the data point name or description. In the example

shown in Figure 91, the first two fields of the identification key will be set to the constant value “VIE BG35” for all data points in the folder. The rest of the identification key, starting with the field “Level” and ending with the field “Data Point Idx”, will be set to the name of the data points.

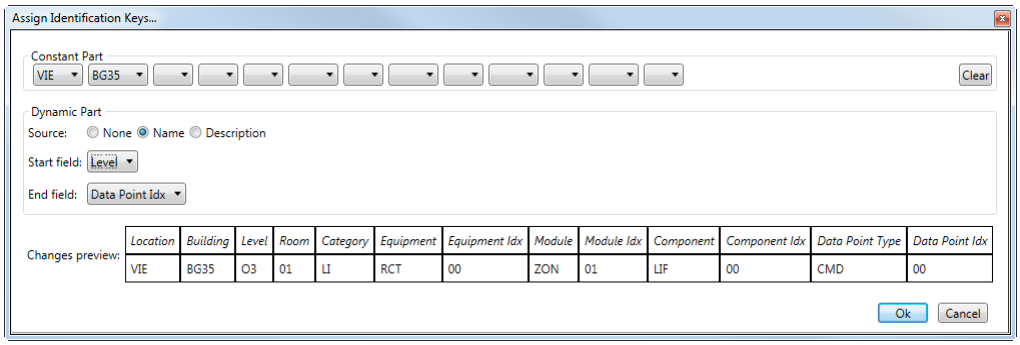


Figure 91: Assign Identification Key

Change identification key schema

If you need to change the length of an identification key field or add a new field, all existing identification keys will be affected. LWEB-900 can give you a preview of the effect of the change.

1. Select **Properties** from the context menu of the project node in the navigation view and select the **Identification key** tab

2. Change the identification key definition.

3. Click on the button **Select datapoint for preview** to see the effects of your change.

4. If you do not set the checkbox **Change existing identification keys**, the existing identification key strings will be left unchanged. In the example shown in Figure 92, the length of the field “Location” has been increased from three to four characters. Because the field boundaries change, the values of all fields change. If you activate the checkbox, the configuration key strings will be modified as shown in Figure 93. Note, that the configured **Fill character** is used to bring the length of the field “Location” from 3 characters up to 4 characters.

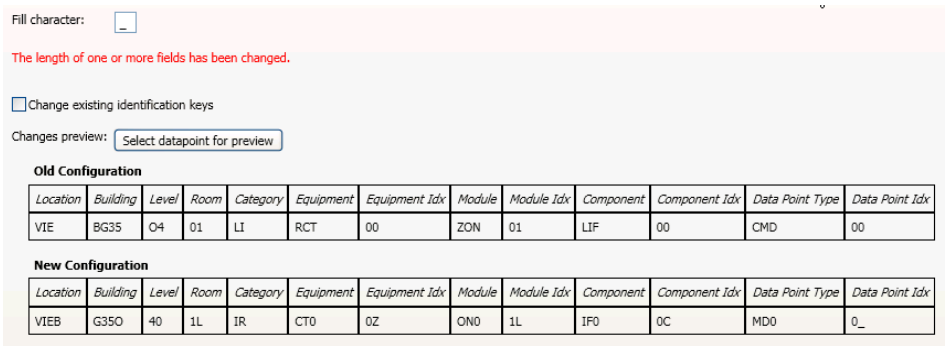


Figure 92: Do Not Change Existing Identification Keys

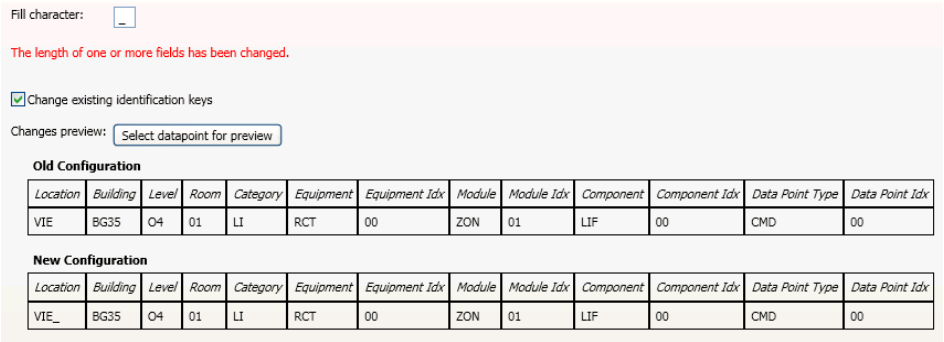


Figure 93: Change Existing Identification Keys

Export identification keys

1. Right click on a data point folder in the navigation view and select **Identification Keys → Export Identification keys to CSV file** from the context menu.

2. Select a destination folder and filename.

The format of the exported file is documented in Section 8.3.

Import identification keys

1. Right click on a data point folder in the navigation view and select **Identification Keys → Import Identification keys from CSV file** from the context menu.

2. The identification keys are imported relative to the selected folder.

Export identification key schema

1. Select **Properties** from the context menu of the project node in the navigation view and select the **Identification key** tab.

2. Click on the **Export schema…** button.

3. Select a destination folder and filename.

Import identification key schema

1. Select **Properties** from the context menu of the project node in the navigation view and select the **Identification key** tab.

2. Click on the **Import schema…** button.

3. Select the identification key schema file.

6.9 Advanced Search and Search View

Advanced Search

To access additional search options in the object list view, click on the **Advanced search** button. The following search parameters can be configured:

- **Search options**: Select whether you want to search in the identification key, name, description, or path.

- **Search string**: An object satisfies the search condition if its identification key, name, description, or path contains the specified search string.

Note: *To search for a specific field of a structured data point or BACnet property, use the "." separator in the data point name (e.g. nviSBstateFb.pos).*

*You can use the asterisk (*) and question mark (?) as a wild card characters in the search string. The asterisk matches zero or more characters, the question mark matches any single character. For example, the search string "nvi*Fb" finds all data points which have names starting with "nvi" and ending with "Fb".*

- **Object type**: This drop-down box allows limiting the search to certain object types.

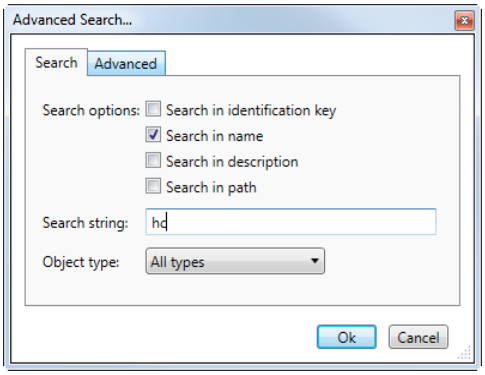


Figure 94: Search in Name

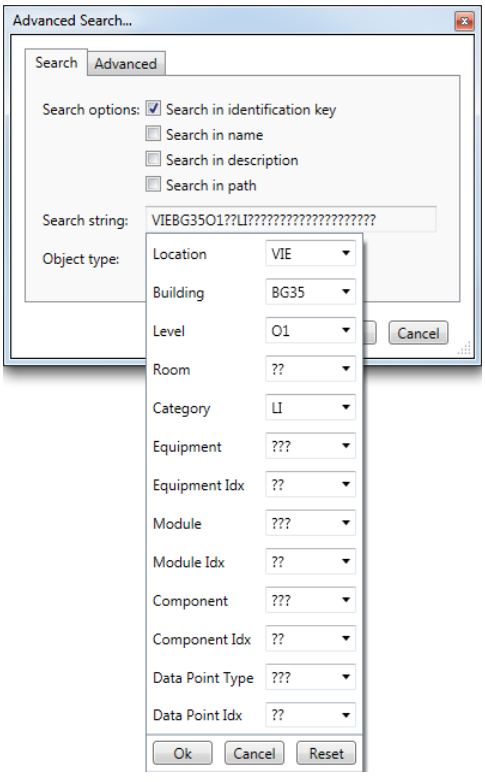


Figure 95: Search in Identification Key

The **Advanced** tab allows you to combine multiple conditions with **AND** and **OR** operators.

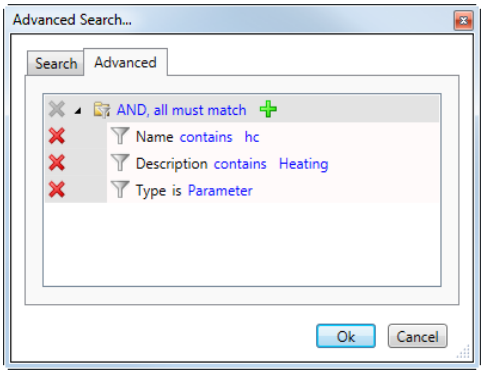


Figure 96: Advanced Search Condition

Save search parameters in search view

If you regularly search for a certain type of objects, it might be useful to save your search. If you click on the **Save Search View** button, a new search view with the current search parameters is created in your home directory. The next time you want to execute the search, just double click it, and you will see the current objects that match the original search. To modify the search parameters, click on the **Properties** button in the search view toolbar.

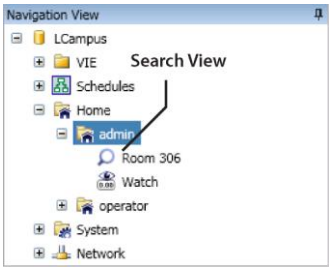


Figure 97: Search View Icon

To create a search view in another folder than your home directory, right click on the folder and select **New → New search view** from the context menu.

6.10 Watch View

The watch view allows observing data point values in real time. Per default each user has his own watch view stored in his home directory (see Figure 98). Double click on the watch view to open it. To monitor data points, drag them from an object list view to the watch view.

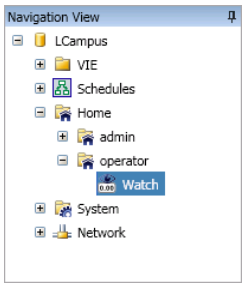


Figure 98: Watch View in Home Directory

Create new watch view

1. Right click on a folder in the navigation view and select **New → New Watch View** from the context menu. A watch view can be created in root folder (the project node), in the home folder of the user, or in any user defined folder.

2. Enter a name and a description for the watch view and click on **OK**.

3. The new watch view is created and displayed in the navigation view. Double click the watch view to open it. A new watch view does not contain any data points.

Add data points to watch view

1. Select the data points you want to monitor in the object list view and drag them to the watch view as shown in Figure 99.

2. Save your changes to the watch view by clicking on the **Save** button in the toolbar.

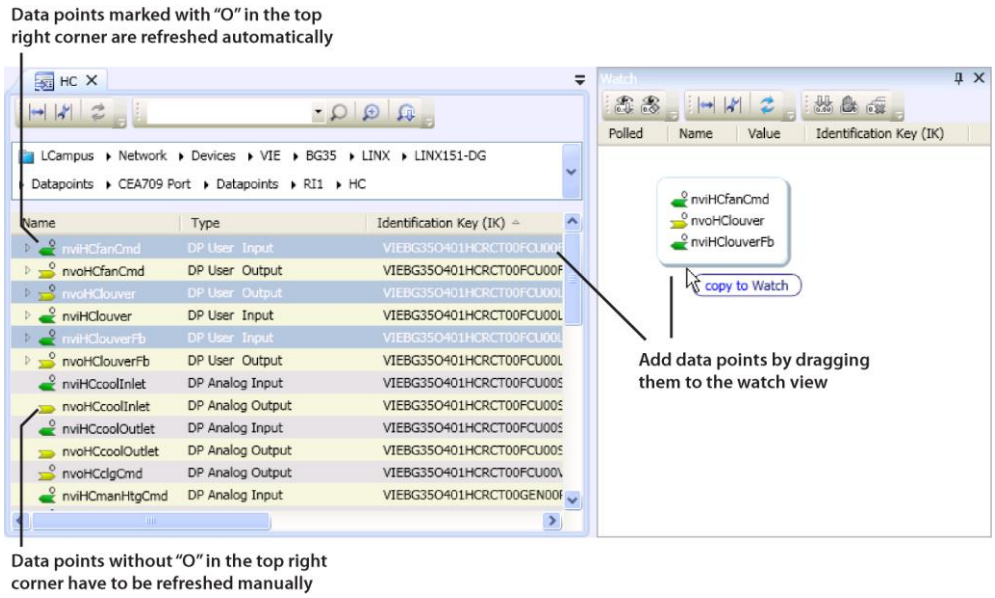


Figure 99: Add Data Points to Watch View

Note:	*OPC data points and BACnet properties are refreshed automatically in the watch view. They are marked with a small "O" in the top right corner of the data point symbol. To expose a data point via OPC, the corresponding checkbox has to be activated in the LOYTEC device configuration software. Other data points of LOYTEC devices can also be added to the watch view. Their values are refreshed when clicking the refresh button in the toolbar.*

Change data point values

1. Click on the value of a data point. Depending on the data point type, a drop down list, a number input, or a text input box is displayed (see Figure 100).

2. Enter the new value and press the Enter key.

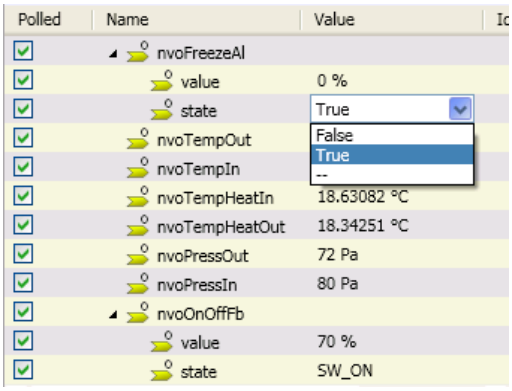


Figure 100: Change Data Point Value in Watch View

Column Configuration

The columns of the watch view can be customized. Per default the **Polled**, **Name**, and **Value** columns are displayed. To add columns or to change the column order, click on the **Configure columns** toolbar button.

The column configuration is stored for each watch view separately. To change the column configuration for the current watch view only, deactivate the **Apply to all 'Watch view' objects** checkbox and click the **Apply** button. To save the configuration for all watch views, activate the checkbox and press the **Apply** button.

Column	Description
Polled	If this checkbox is set, the data point value is updated periodically.
Name	Name of data point
Value	Current value of the data point
Timestamp	Timestamp of last value change
Type	Data point type
Description	Data point description
Referenced	Referenced data point including the path
Identification Key (IK)	Refer to Section 6.8
IK.<field name>	The identification key consists of user defined fields. Each field can be displayed as a separate column.

Table 6: Watch View Columns

Sorting

If no sort order is defined, data points in the watch view can be reordered using drag and drop.

You can sort the watch view by clicking one of the column headings. The first click sorts the data points in ascending order, the second click in descending order, and the third click removes the sort order.

Print

Use the print button in the toolbar to print the watch view. The print dialog allows adjusting the page margins and the font size.

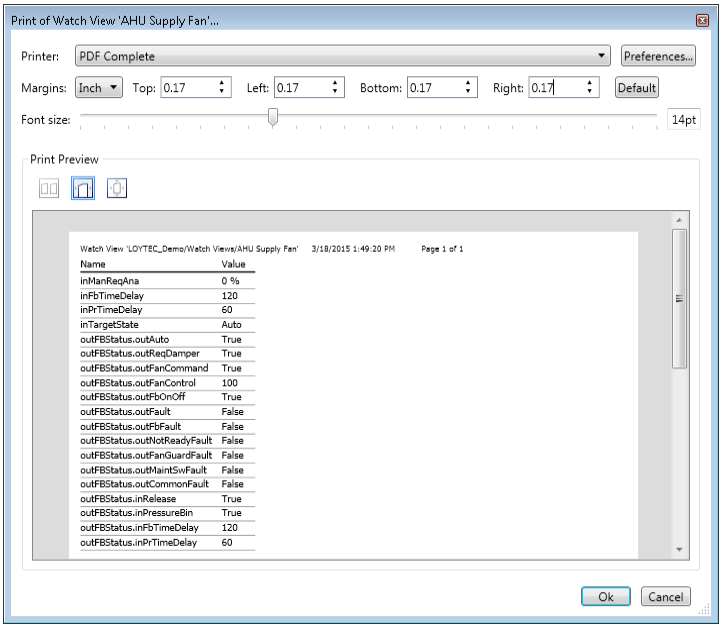


Figure 101: Print Watch View

6.11 Graphical View

Graphical views are schematics to visualize and operate areas of a building. Each graphical view can consist of a large number of dynamic display elements which reflect the current status of the facilities. Figure 102 shows an example graphical view for an air handling unit.

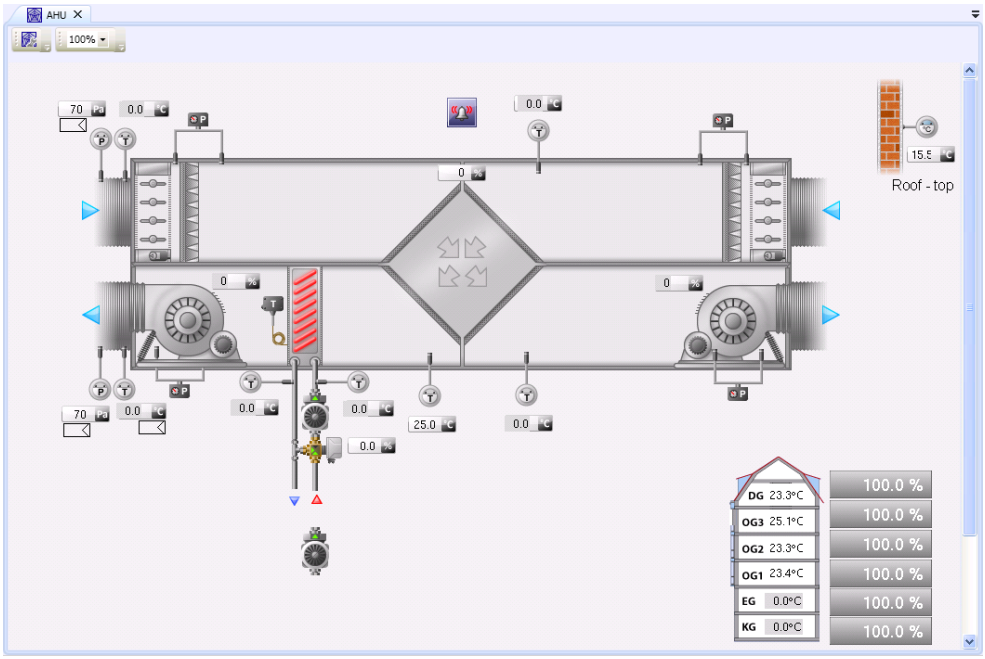


Figure 102: Graphical View

6.11.1 Operate Graphical View

A graphical view is displayed in the navigation view and in the object list view with a special icon (see Figure 103) and can be opened with a double-click.

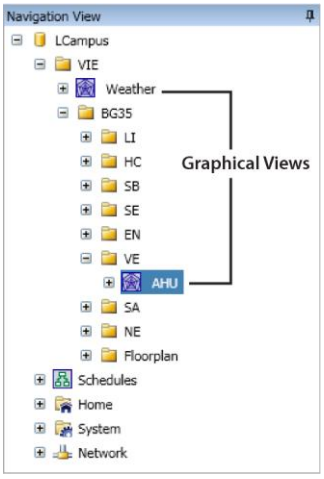


Figure 103: Graphical View Icon

Interact with schematics

When you move the mouse pointer over an element of the schematics which allows user interaction, the form of the pointer changes from arrow to hand. Depending on the nature of the element, clicking the element with your left mouse button will trigger an action (e.g. switch to another page, hide or show parts of the schematic) or allow to change the value of an underlying data point.

View data point details

You can easily access information about data points visualized in the graphical view. Click with your right mouse button on the value of a data point to open a context menu. Select the name of the data point for which you want to inspect the properties as shown in Figure 104 and Figure 105.

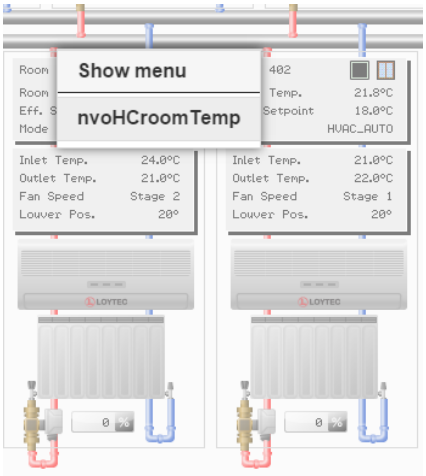


Figure 104: Graphical View Context Menu

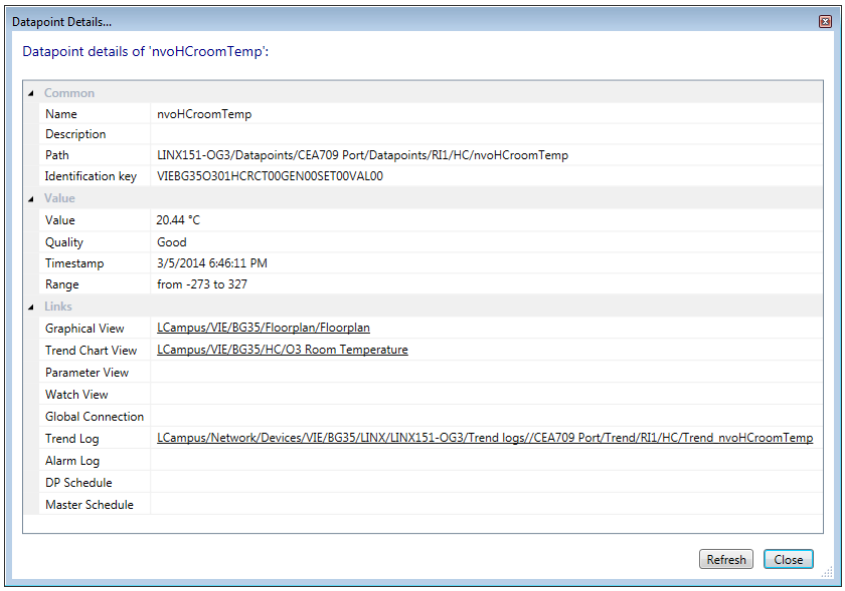


Figure 105: Data Point Properties

Error handling

If LWEB-900 cannot read the value of a data point from a LOYTEC device, the corresponding visualization element is grayed out. The OPC error message will be displayed when hovering over the control as shown in Figure 106.

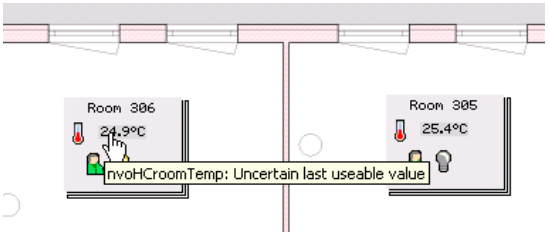


Figure 106: Error Display in Graphical View

Navigation menu

The navigation menu can be opened by a click with the right mouse button on an empty area in the schematics. If the right-click is executed over a control, a context menu is displayed which allow to either open the navigation menu or to inspect the data point properties.

Zoom levels

The zoom level can be configured in the tool bar of the graphical view. If the zoom level is set to **Auto-scale**, the schematics will be scaled to fit completely into the pane.

Print graphical view

Use the print button in the toolbar to print the graphical view. The print dialog allows adjusting the page margins and the scale factor.

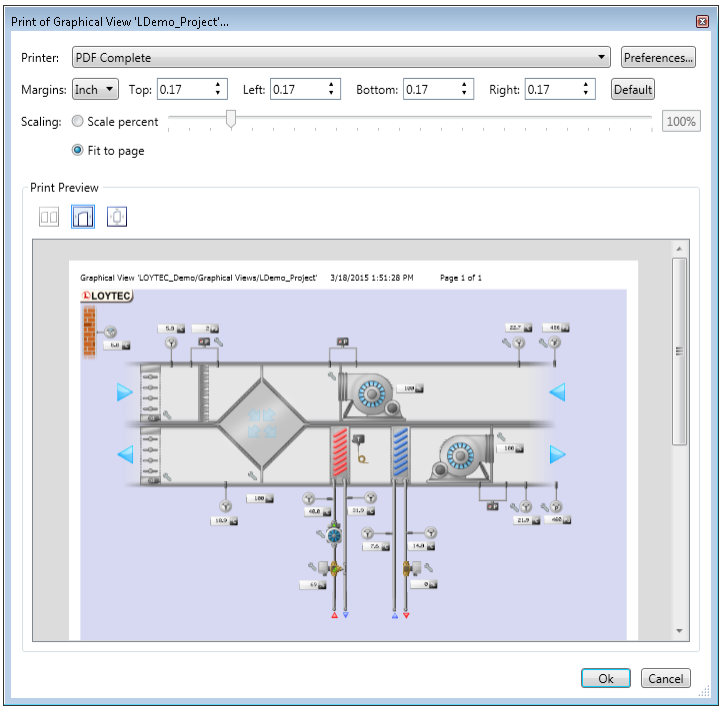


Figure 107: Print Graphical View

6.11.2 Configure Graphical View

In order to configure graphical views, the L-VIS Configurator has to be installed on your PC. This software can be downloaded from the LOYTEC homepage. When the LWEB-900 Client is started, it checks which Configurators are installed on your PC and displays any missing components (see Figure 84).

Create new graphical view

1. Right click on a folder in the navigation view and select **New → New Graphical View** from the context menu. A graphical view can be created in the root folder (the project node), in the home folder of a user, or in any user defined folder.

2. Enter a name and description for the graphical view and click on **OK**.

3. The new graphical view is created and displayed in the navigation view. Note, that a data point interface folder is created below the graphical view.

Define data point interface

The data point interface folder contains all data points which can be used in the graphical view. After creating a new project, the data point interface is empty. You can add data point in one of the following ways:

- Pull data points from an object list view into the interface. A link to the original data point is created.

- Drag a complete folder into the interface. In this case, a link to the folder is created. If the contents of the original folder change (e.g. data point configuration of a device is modified), the interface changes accordingly.

- Press the [CTRL] key while dragging a folder into the interface. The folder including all its sub-folders is created in the interface and populated with data point links.

You can create folders to organize data point and folder links by selecting **New → New Folder** from the context menu.

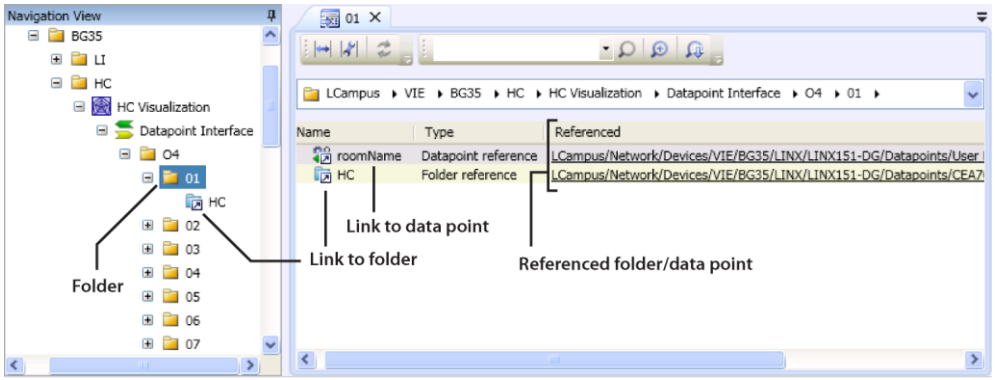


Figure 108: Data Point Interface of Graphical View

Note	*Only OPC data points can be added to the interface of a graphical view. They are marked with a small "O" in the top right corner of the data point symbol. To expose a data point via OPC, the corresponding checkbox has to be activated in the device configuration software.*

Automate the adding of data points to the data point interface

In case of a graphical view that will display the same set of data points from multiple devices, it can be time consuming to manually search, select and add those data points from all those devices to the data point interface. There is the possibility to drag/drop all the devices, but this can result in large graphical view because of all the data points contained by those devices. A better approach is to use a Data point Selector. In the following example, we will add to the interface the CPU Load register (when OPC exposed) of some devices:

- Right-click the data point interface and select the option "New/New DP Selector Folder"

- In the dialog presented, add a datapoint selector to select CPU Load inside System Registers/System folder of each device, and specify the base objects for the search of matching devices; in the example, we've restricted it to the "LWEB-900" branch. Note that multiple datapoints selectors and base objects could be added.

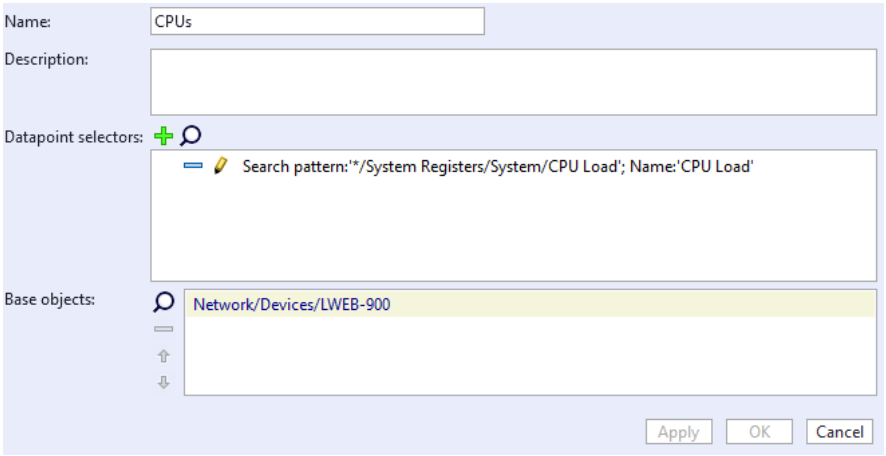


Figure 109: Data point selector

The datapoint interface is then automatically filled with all the “CPU Load” data points found, organized in a hierarchy like the devices; in the example, we’ve expanded to see the “CPU Load” 1st found.

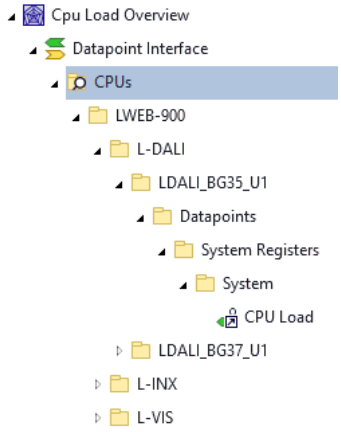


Figure 110: Data point interface with selector

In case new devices would be added later inside the hierarchy covered by the “base objects” of the DP selector, right-click the graphical view and apply the “Synchronize Graphical View with Datapoint Interface” option: the datapoint interface will get updated with the matching data points of the new devices.

Design graphics

To design the graphics, click with the right mouse button on the graphical view icon and select **Configure Graphical View** from the context menu. The graphical design tool is outside the scope of this document. It is described in the L-VIS User Manual [1].

Note	*If you dock an object list view showing the data point interface to the graphical design tool, you can quickly attach data points to controls using drag-and-drop (see Figure 111).*

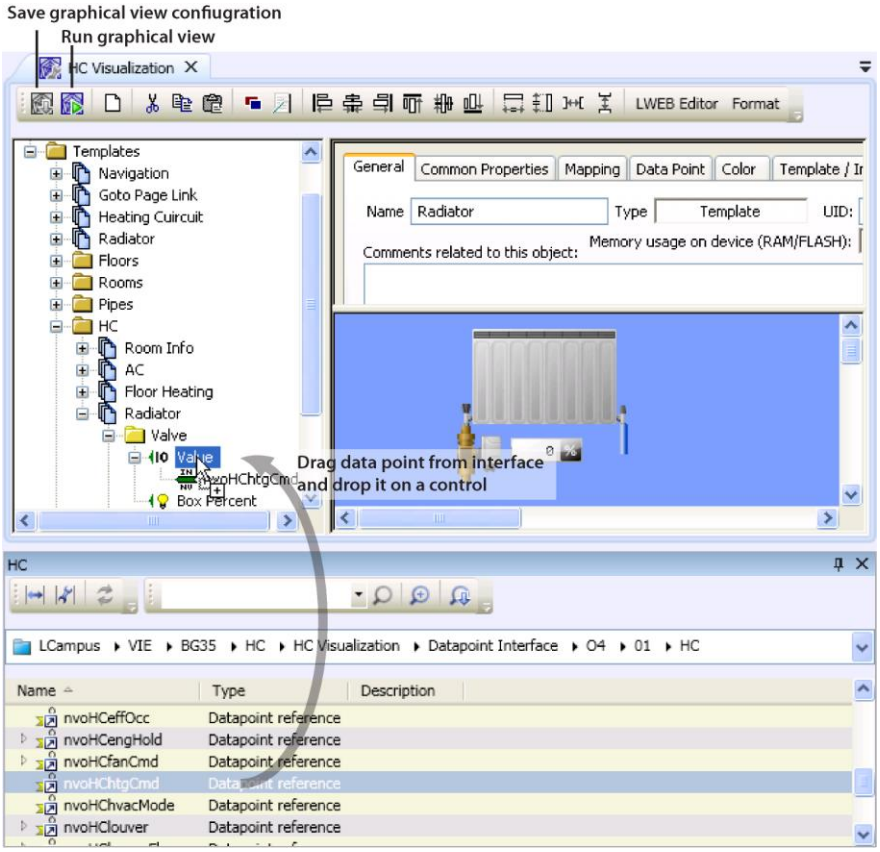


Figure 111: Design Graphics

Broken Links

A data point link breaks if the referenced data point is removed (e.g. data point configuration of the device is modified). If a graphical view contains a broken link, it is marked with an asterisk in the navigation view to warn you. In the object list view, broken links are marked with a special icon (see Figure 112). They can be easily fixed by dragging a new data point on the broken link.

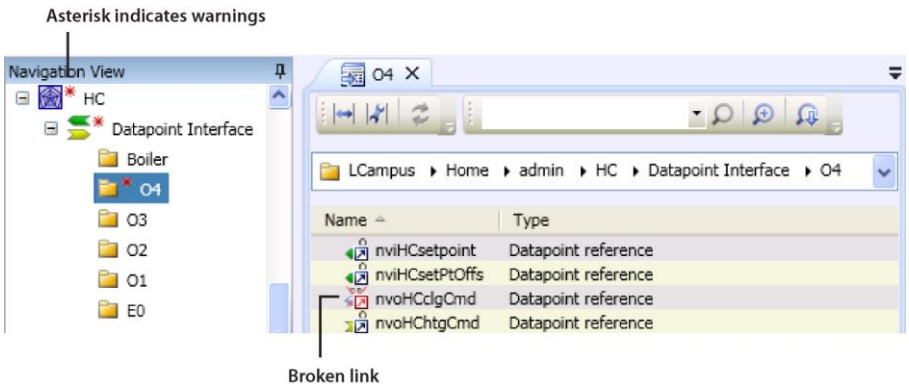


Figure 112: Broken Link

Show Page Actions

Using a **Show page** action, it is possible to create buttons in a graphical view which link to other views. Figure 113 shows how to drag a view and drop it on the action object in the tree view of the L-VIS Configurator.

Note	*The **Show page** action works inside the LWEB-900 Client. When using a web browser to display a graphical view, only links to other graphical views or chart views are supported.*

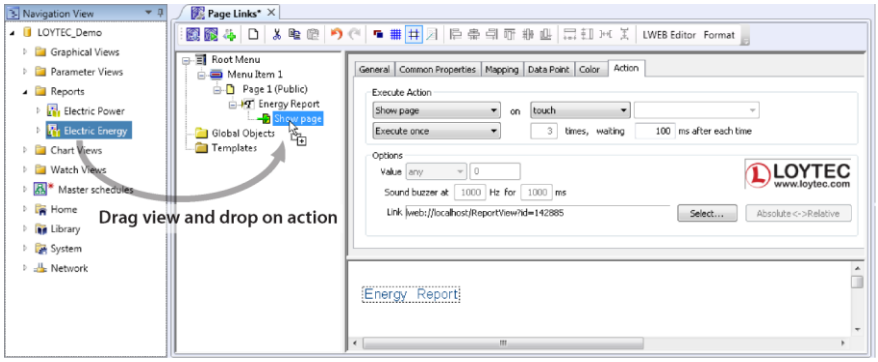


Figure 113: Show Page Action

Import Graphical View from LWEB-800/802 project

1. Right click on a folder in the navigation view and select **New → New Graphical View** from the context menu.

2. Activate the checkbox **Initialize from file** and select the LWEB-800/802 project file.

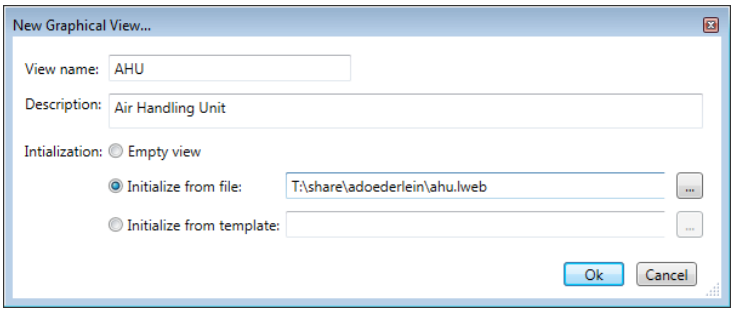


Figure 114: Import LWEB-800 Project

3. The graphical view is created and displayed in the navigation view. The data point interface contains a link to the device in the imported project (see Figure 115). If a matching device with the same IP address exists in the LWEB-900 project, the link is resolved automatically, else a broken link is displayed. To fix the broken link, simply drag a device from the **Devices** folder and drop it on the broken link.

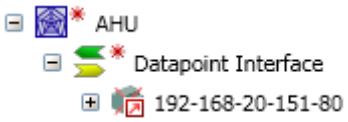


Figure 115: Navigation View after Import of LWEB-800 Project

6.11.3 Graphical View Templates

Use graphical view templates to create multiple graphical views with the same graphics but referencing different data points. For example, you can create a graphical view template which visualizes a room. This template can then be instantiated for each room in your building. If you modify the template, all instances of the template will be updated.

Create new graphical view template

1. Right click the folder **Library** in the navigation view and select **New → New Graphical View Template** from the context menu.

2. Enter a name and description for the graphical view template and click on **OK**.

3. Create the data point interface and the graphics in the same way as for a normal graphical view (see Section 6.11.2).

Instantiate Template

1. Right click on a folder in the navigation view and select **New → New Graphical View** from the context menu.

2. Enter a name and description for the graphical view.

3. Select the option **Initialize from template** and press the browser button to choose the template. Click on **OK**.

4. Replace folder/data point links: Drag a folder/data point from a device in the **Network** folder onto the folder/data point link in the data point interface for the template instance.

Note	*Wherever possible, use folder links instead of data point links. A folder which contains multiple data points can be relinked much faster than multiple separate data point links.*

6.11.4 Graphical Views in LWEB-900 Server and in LOYTEC device

There are two types of graphical views:

- Graphical view in LWEB-900 Server: Graphical views of this type can be located in any user folder in the navigation view. In order to display real-time data, the graphical view communicates with the LWEB-900 Server using OPC XML-DA. The LWEB-900 Server in turn communicates with LOYTEC devices using OPC XML-DA. This approach has the advantage that it relieves the communication load of the LOYTEC devices. For the LOYTEC devices it makes no difference whether a graphical view is displayed only on one PC or on multiple PCs. The server fetches the data only once from the LOYTEC devices and distributes it to multiple graphical views (see Figure 117).

- Graphical view in LOYTEC device: These views are located in the **Graphical Views** folder below a LOYTEC device (see Figure 116). In order to display real-time data, the graphical view communicates directly with the LOYTEC devices using OPC XML-DA. This approach has the advantage that it offers faster response times. However, value changes cannot be logged by the server, because the communication bypasses the LWEB-900 Server.

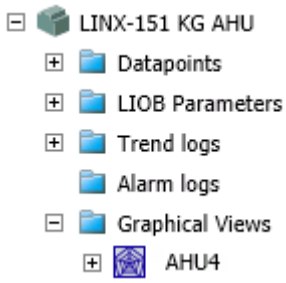


Figure 116: Graphical View in LOYTEC Device

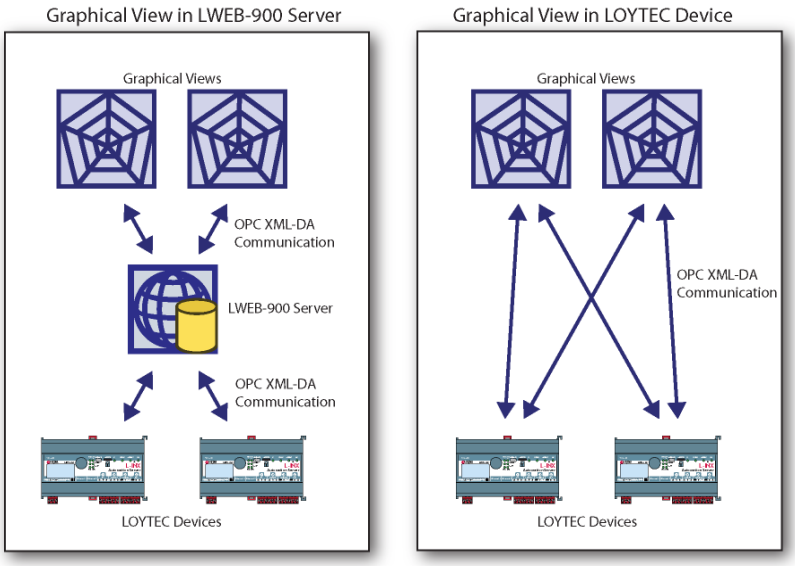


Figure 117: Comparison of Graphical View Types

Move graphical view from LWEB-900 Server to device

1. Right click on the LWEB-900 Server graphical view in the navigation view and select **Copy** from the context menu.

2. Select the **Graphical Views** subfolder of the device to which you want to move the graphical view and select **Paste** from the context menu.

3. If the new graphical view is working properly, remove the original LWEB-900 Server graphical view.

Move graphical view from device to LWEB-900 Server

1. Right click on the device graphical view in the **Graphical Views** folder of the device view and select **Copy** from the context menu.

2. Select the user folder to which you want to move the graphical view and select **Paste** from the context menu.

3. If the new graphical view is working properly, remove the original device graphical view.

Creating an L-VIS project from a LWEB-900 Server graphical view

1. Right click on the LWEB-900 Server graphical view in the navigation view and select **Copy** from the context menu.

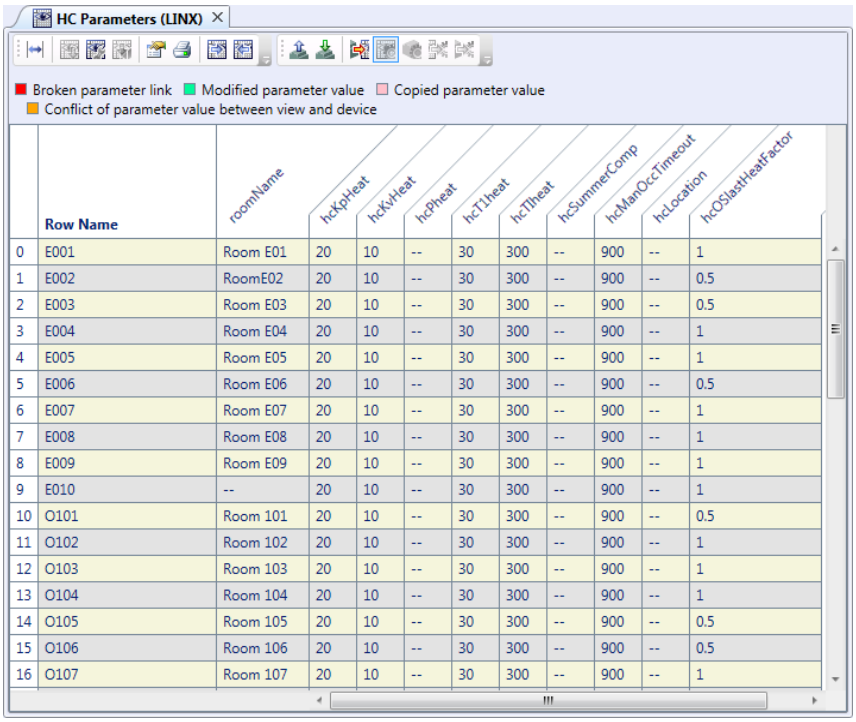
2. Use the right mouse button to click on the target L-VIS device in the navigation view and select **Paste** from the context menu.

3. The L-VIS Configurator is opened and automatically converts the graphical view to an L-VIS project.

4. Click on the **Download Configuration** button.

6.12 Parameter View

The parameter view allows to efficiently configure operational parameters which are distributed over multiple devices. Figure 118 shows an example parameter view for room temperature control. Each cell of the matrix represents a parameter. Parameters can be organized freely in the matrix depending on space layout and function.



	Row Name	roomName	hcKpHeat	hcKvHeat	hcPheat	hcT1heat	hcTIheat	hcSummerComp	hcManOccTimeout	hcLocation	hcOSlastHeatFactor
0	E001	Room E01	20	10	--	30	300	--	900	--	1
1	E002	RoomE02	20	10	--	30	300	--	900	--	0.5
2	E003	Room E03	20	10	--	30	300	--	900	--	0.5
3	E004	Room E04	20	10	--	30	300	--	900	--	1
4	E005	Room E05	20	10	--	30	300	--	900	--	1
5	E006	Room E06	20	10	--	30	300	--	900	--	0.5
6	E007	Room E07	20	10	--	30	300	--	900	--	1
7	E008	Room E08	20	10	--	30	300	--	900	--	1
8	E009	Room E09	20	10	--	30	300	--	900	--	1
9	E010	--	20	10	--	30	300	--	900	--	1
10	O101	Room 101	20	10	--	30	300	--	900	--	0.5
11	O102	Room 102	20	10	--	30	300	--	900	--	1
12	O103	Room 103	20	10	--	30	300	--	900	--	1
13	O104	Room 104	20	10	--	30	300	--	900	--	1
14	O105	Room 105	20	10	--	30	300	--	900	--	0.5
15	O106	Room 106	20	10	--	30	300	--	900	--	0.5
16	O107	Room 107	20	10	--	30	300	--	900	--	1

Figure 118: Parameter View

6.12.1 Operate Parameter View

A parameter view is displayed in the navigation view and in the object list view with a special icon (see Figure 119) and can be opened with a double-click.

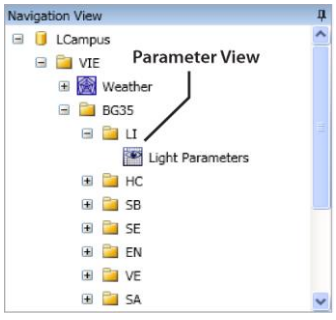


Figure 119: Parameter View Icon

Edit parameters

1. Parameter values can be edited in one of two ways:

   - Edit single parameters: Click on the corresponding value field and enter a new value.

- Edit multiple parameters: Select multiple parameters and select **Edit** from the context menu (see Figure 120) and enter a new value.

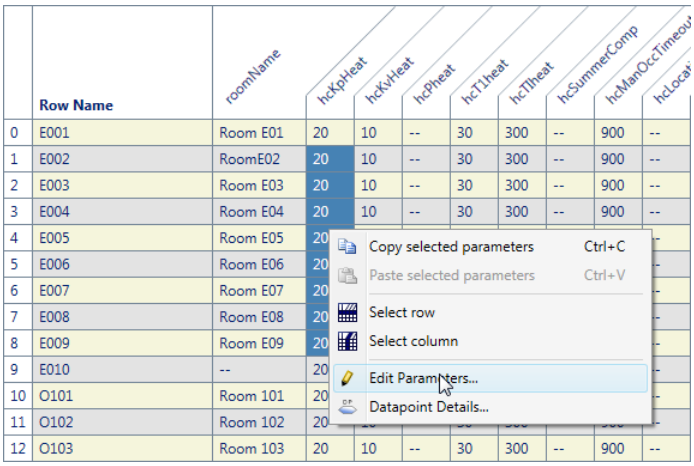


Figure 120: Edit Multiple Parameters

2. Parameters which have been modified in the parameter view but have not yet been saved yet are highlighted in green.

3. Press the **Download Parameters** button in the toolbar. A dialog showing the progress is displayed.

Upload Parameters

To upload the currently configured parameters from the device(s) and save them in the database, click on the **Upload Parameters** button in the toolbar.

Upload Parameters and Merge

1. Press the **Upload Parameter and Merge…** button in the toolbar. All parameters which are different on the device and in the parameter view are highlighted in orange. Hover the mouse over the value to see the different values.

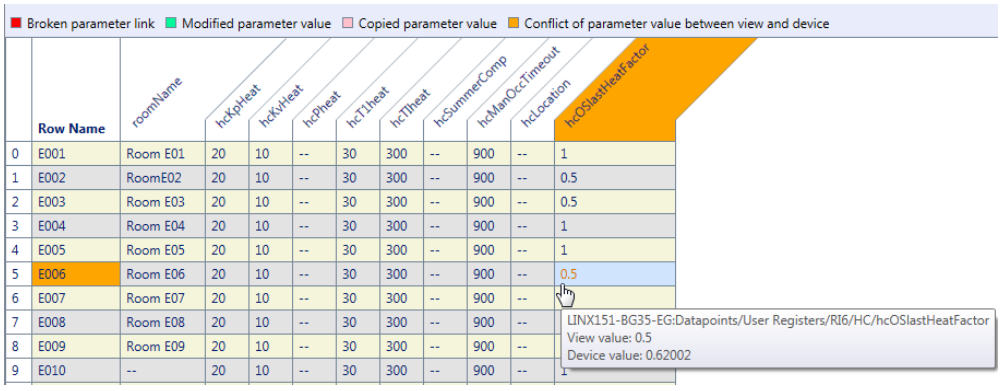


Figure 121: Parameter Merge

2. Using the toolbar buttons you can choose between displaying the device values or the view values.

3. To resolve the conflict for a single parameter, right click on the value and choose between **Resolve conflicts of selected parameters with view values** and **Resolve conflicts of selected parameters with device values**.

4. To resolve the conflict for all parameters in the same way, use the toolbar buttons **Resolve all conflicts with view values** and **Resolve all conflicts with device values**.

5. Press the **Download Parameters** button in the toolbar. A dialog showing the progress is displayed.

Print

Use the print button in the toolbar to print the parameter view. The print dialog allows adjusting the page margins and the font size.

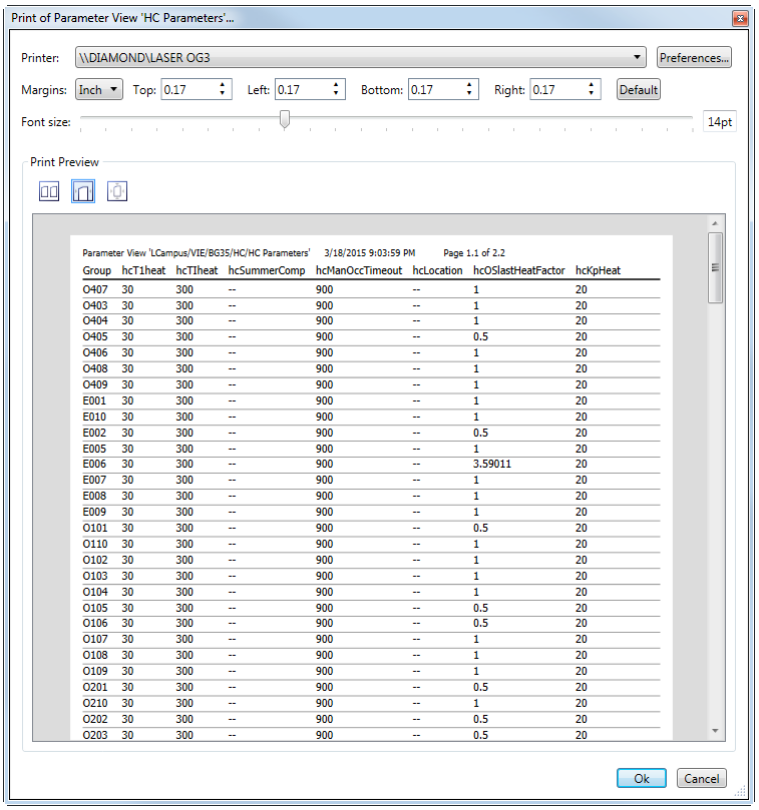


Figure 122: Print Parameter View

6.12.2 Configure Parameter View

To configure the parameter view, you have to switch from operating mode to configuration mode. You can switch between the two modes using the toolbar buttons shown in Table.

Button	Description
	Change from operating mode to configuration mode
	Change from configuration mode to operating mode

Table 7: Buttons to Switch between Operating and Configuration Mode

Create new parameter view

1. Right click on a folder in the navigation view and select **New → New Parameter View** from the context menu. A parameter view can be created in the root folder (the project node), in the home folder of a user, or in any user defined folder.

2. Enter a name and description for the parameter view and click on **OK**.

3. The new parameter view is created and opened in configuration mode.

Add parameters

Parameters can be added to the view by pulling them from an object list view to the parameter list. You can also perform a search operation and then select the results and drop them on the parameter list. The advanced search dialog, offers the possibility to filter for objects of type **Parameter** (see Figure 123 and Figure 124).

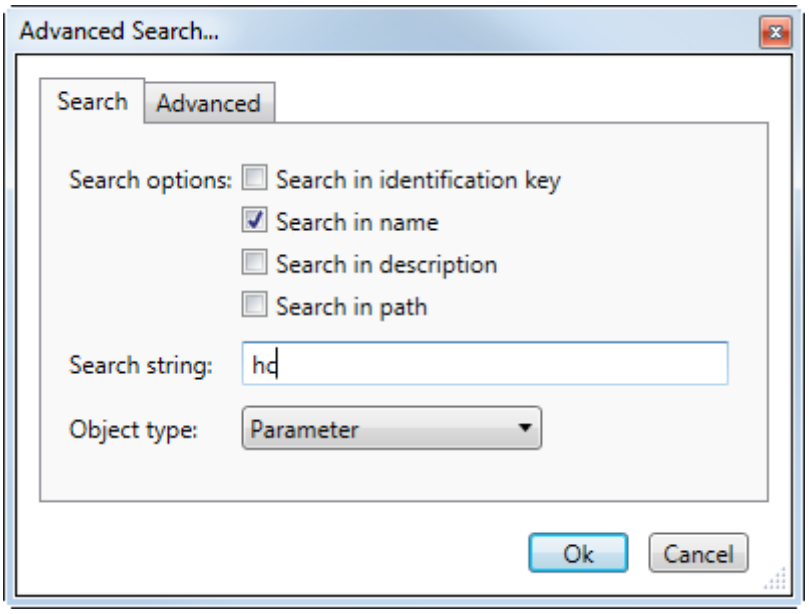


Figure 123: Search for Object Type **Parameter**

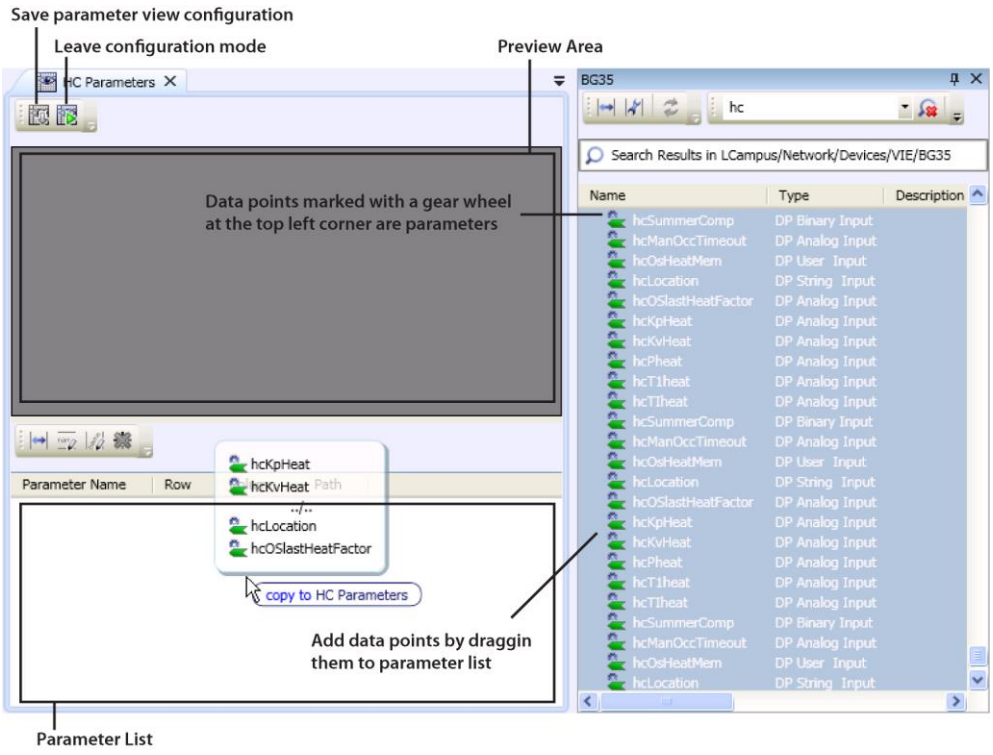


Figure 124: Add Data Points to Parameter View

Note	*Only parameters can be added to a parameter view. They are marked with a small gear wheel in the top left corner of the data point symbol. To expose a data point as parameter, the corresponding checkbox has to be activated in the device configuration software.*

Assign column and row

When adding a new parameter, it is automatically assigned to a default row and column: The parameter name determines the column and the path determines the row. To change the default row, select one or multiple parameter and choose **Change row of selected parameters** from the context menu. The default column can be changed by selecting the option **Change column of selected parameters**.

Order rows and columns

The upper part of the parameter view displays a preview of the parameter matrix. To change the column order, grab a column header and drag it to the desired new position. Rows can be reordered in the same way.

6.12.3 Parameter View Templates

Use parameter view templates to create multiple parameter views with the same parameter names but different paths. The parameter view template defines the parameter view columns and specifies a search pattern for each column.

Create new parameter view template

1. Right click the folder **Library/Parameter View Templates/User Parameter View Templates** in the navigation view and select **New → New Parameter View Template** from the context menu.

2. Enter a name and description for the parameter view template.

3. Add a new column by pressing on the plus icon for columns. Configure the following properties:

Property	Description
Column Name	Name of the column displayed in the parameter view
Description	The description is displayed as tooltip for the column name
Read only	If this checkbox is set, parameter values in this column cannot be changed
Width	Width of the column in pixels. If 0 is configured, the width of the parameter column is adjusted automatically depending on the values.

Table 8: Column Properties in Parameter View Template

4. Add parameters to the column by pressing on the plus icon for parameters. Configure the following properties:

Property	Description
Search pattern	The search pattern specifies the path and name of the parameter(s) which are displayed in the column. Up to 9 wild card characters (* and ?) can be used to define the search pattern.
Row name	This property defines in which row(s) the parameter(s) defined by the search pattern should be displayed. The following placeholders can be used: \1, \2, … \9: replaced by content matched by first, second, … ninth wildcard character \d: replaced by name of the device

Table 9: Parameter Properties in Parameter View Template

Note *Instead of configuring the properties from scratch it is often easier to use the search icon and select a single parameter. The search pattern and row name can then be modified to include wildcard characters.*

5. Define the default search order of the rows in the parameter view. This step is optional.

Instantiate parameter view templates

1. Right click on a folder in the navigation view and select **New → New Parameter View** from the context menu.

2. Enter a name and description for the parameter view.

3. Select the option **Initialize from template** and press the browser button to choose the template.

4. Select one or multiple base objects. The base object is the starting point for searching parameters which match the search patterns of the template. Examples for base objects are the whole **Network/Device** folder, a specific device, or a data point folder.

6.13 Web View

Web views display the contents of a web page. They are useful to e.g. integrate web cams into your LWEB-900 project. A web view is displayed in the navigation view and in the object list view with a special icon and can be opened with a double-click (see Figure 125 and Figure 126).

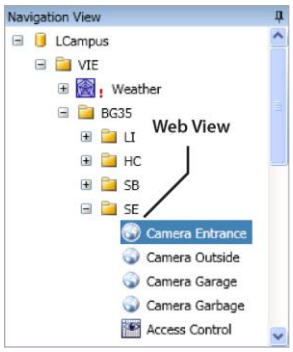


Figure 125: Web View Icon

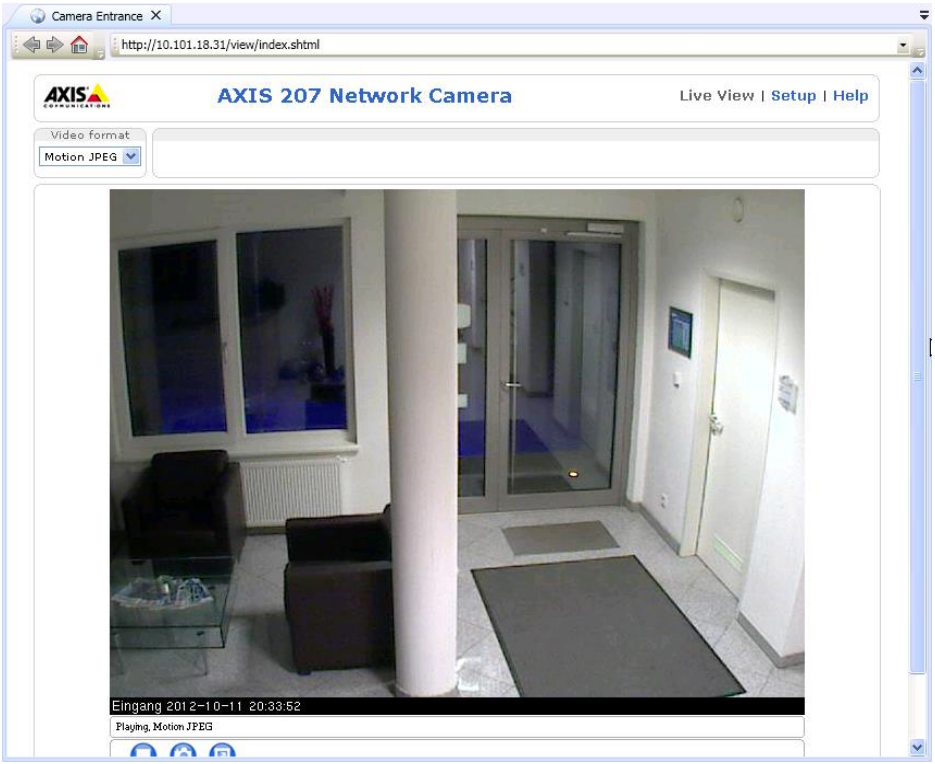


Figure 126: Web View

Create new web view

1. Right click on a folder in the navigation view and select **New → New Web View** from the context menu. A web view can be created in the root folder (the project node), in the home folder of a user, or in any user defined folder.

2. Enter a name, description, and an URL for the web view

3. Fill out user name and password if required and click on **OK**.

4. The new web view is created and displayed in the navigation view.

6.14 Alarming

In the bottom right corner of the LWEB-900 client window, the status bar displays an icon reflecting the current alarm state. To see the alarm details, double click on the icon and the alarm view is opened.

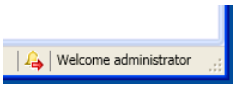


Figure 127: LWEB-900 Client Status Bar

Icon	Description
	At least one active, not acknowledged alarm
	At least one active, acknowledged alarm
	At least one inactive, not acknowledged alarm
	No alarms

Table 10: Alarm Icons in LWEB-900 Status Bar

6.14.1 Alarm View

The alarm view displays the currently pending alarms. It can be opened by clicking on the alarm icon in the LWEB-900 status bar or by selecting **Show Alarms** from the context menu of a folder. An example is shown in Figure 128.

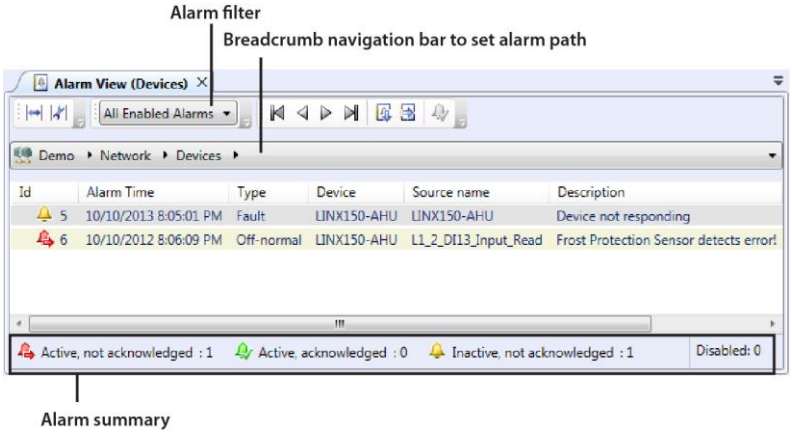


Figure 128: Alarm View

Alarm path

LWEB-900 receives alarms from a number of different sources which are called alarm servers. Each LOYTEC device can have one or multiple alarm servers. System alarms originate from the LWEB-900 alarm server in the folder **System/Alarming** (see Section 6.14.2). The alarm view displays only alarms from alarm servers which are inside the path set in the breadcrumb navigation bar. To see all alarms, select the top folder. To see alarms of a single device only, select the corresponding device folder. To see system alarms only, select the **System** folder.

Alarm filter

The alarm filter lets you drill down to the specific alarms you want to see. The alarm view offers a number of predefined filters described in Table 11 or you can use the powerful custom filter.

Column	Description
Not Acknowledged Alarms	Display alarms which are not disabled and have one of the following states: • Active, not acknowledged • Inactive, not acknowledged
Active Alarms	Display alarms which are not disabled and have one of the following states: • Active, not acknowledged • Active, acknowledged

Table 11: Predefined Alarm Filters

Figure 129 shows an example of a custom filter definition. As you can see, the custom filter allows to combine multiple conditions with **AND** and **OR** operators.

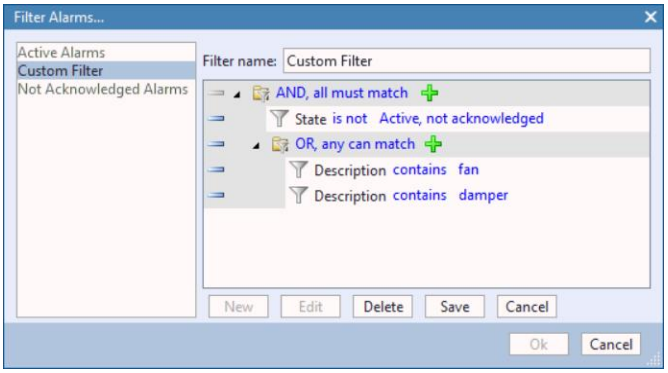


Figure 129: Custom Filter

Acknowledge alarms

To acknowledge alarms, select one or multiple alarms and choose **Acknowledge selected alarms** from the context menu. Alternative, you can use the corresponding toolbar button.

In the project settings, you can configure that users have to enter a comment when acknowledging alarms with a priority higher than a certain value and you can configure a list of predefined comments (see Figure 130).

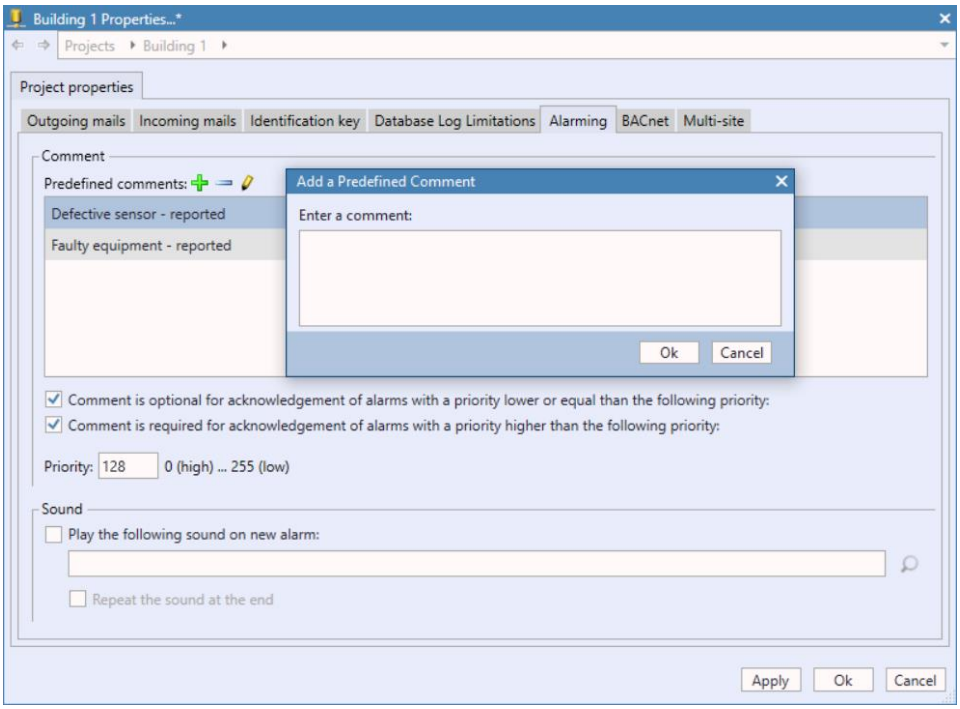


Figure 130: Alarming Configuration

Disable alarms

To disable alarms, select one or multiple alarms and select **Disable selected alarms** from the context menu. When you disable an alarm, you can enter a comment explaining the reason why you disabled the alarm. The disabled alarms disappear from the current alarm view. To see the disabled alarms, select **Show Configured Alarms** from the toolbar, then apply the predefined filter "Disabled Alarms". Disabled alarms can be enabled again, by selecting **Enable selected alarms** from their context menu.

Multiple occurrences of the same alarm

If the same alarm is triggered multiple times, only the last alarm entry is displayed. This alarm entry can be expanded to see the previous occurrences of the alarm (see Figure 131).

Id	Alarm Time	Type	Source name	Description	Device	Ack. Source	State	Source
34462	5/22/2013 9:39:27 AM	Fault	nviWindSpeed	Wind input failed	LDALI-OG3		Inactive, not acknowledged	Device
34459	5/22/2013 7:57:09 AM	Fault	nviWindSpeed	Wind input failed	LDALI-OG3		Inactive, not acknowledged	Device
34456	5/22/2013 7:53:48 AM	Fault	nviWindSpeed	Wind input failed	LDALI-OG3		Inactive, not acknowledged	Device
34453	5/22/2013 5:18:45 AM	Fault	nviWindSpeed	Wind input failed	LDALI-OG3		Inactive, not acknowledged	Device

Figure 131: Multiple Occurrences of the Same Alarm

Column Configuration

The columns of the alarm view can be customized. To add columns or to change the column order, click on the **Configure columns** toolbar button.

The column configuration is stored for each alarm view separately. To change the column configuration for the current alarm view only, deactivate the **Apply to all 'Alarm view' objects** checkbox and click the **Apply** button. To save the configuration for all alarm views, activate the checkbox and press the **Apply** button.

Column	Description
Id	Unique alarm ID
Alarm Time	Date and time when the alarm occurred.
Clear Time	Date and time when the alarm condition was cleared. If the alarm is still active, this field is empty.
Ack. Time	Data and time when the alarm was acknowledged. If the alarm has not yet been acknowledged, this field is empty.
Ack. Source	Name of the user who acknowledged the alarm. If the alarm has not yet been acknowledged, this field is empty.
State	An alarm undergoes a number of state changes during its life-cycle. When the alarm occurs, it is **Active, not acknowledged**. The alarm can be acknowledged by a user. Then it becomes **Active, acknowledged**. Alarms can also become inactive, but an acknowledgement is still required. Then they become **Inactive, not acknowledged**. When an alarm is inactive and was acknowledged it disappears from the alarm view.
Type	An alarm can be of different alarm types. The alarm type specifies the class of the alarm. The following alarm types exist: • **Off-Normal**: This alarm type is a generic alarm class. It indicates that the alarmed data point is on an off-normal operating condition that triggered the alarm. An alarm value is supplied, if the technology supports it. • **High/Low Limit**: This alarm type is typical for analog alarm conditions. It applies when the alarmed value is over or under the defined alarm limits. An alarm value is supplied, if the technology supports it. • **Fault**: This alarm type is indicating that the monitored data point or device is in a fault state.
Value	Value of the data point at the time the alarm occurred.
Description	Description of the alarm condition. The description is configured in the device configuration software.
Priority	Priority of the alarm.
Priority Name, Priority Color	If the priority of the alarm is contained by one of the optional Alarm Priority Ranges configured in the Project Alarming settings, name and color specified for the alarms of this priority range.
Source	• **Device**: The alarm was generated by a LOYTEC device. • **Server**: The alarm was generated by the LWEB-900 Server.
Device	Name of the device which was the source of the alarm.
Alarm Server	Name of the alarm server which was the source of the alarm
Alarm Server Path	Path to alarm server.
Source Name	Name of the data point which was the source of the alarm.
Identification Key (IK)	Identification key of the data point which was the source of the alarm. Section 6.8 describes how to assign identification keys to data points.
Disable Source	Name of the user who disabled the alarm. If the alarm is not disabled, this field is empty.
Comment	This text is entered by the user when he disables an alarm and specifies the reason. If the alarm is not disabled, this field is empty.
XAID	On a LOYTEC device, each alarm is uniquely identified by the XAID. The XAID is used in the acknowledgement to identify the alarm.

Table 12: Alarm View Columns

Save alarm view

If you regularly need to filter for certain alarms, it might be useful to save your alarm view. A new alarm view with the current path and filter settings is created in your home directory. The next time you want access the alarm view, just double click it, and you will see the most current alarms matching your path and filter.

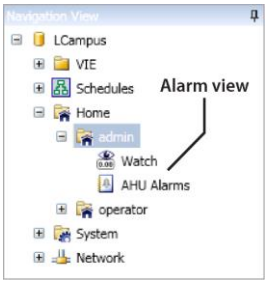


Figure 132: Alarm View Icon

Print alarm view

Use the print button in the toolbar to print the alarm view. You can print all alarms or only alarms which occurred during a configurable time interval. The print dialog allows adjusting the page margins and the font size.

Configured alarms

Per default, the content of the Alarm View displays the pending alarms, which are occurrences of some "Configured Alarms". Click the **Show Configured Alarms** button to display the list of the alarms configured. This list basically presents the alarms that have been configured on the devices, their alarm conditions and a summary of their occurrences (count, last state and time).

When an alarm has been disabled by a user, the column "Disabled" will display a checked box (and the name of this user).

You can right-click on a configured alarm to:

- get some details about the alarm (basically, list all its properties)
- disable/enable the alarm,
- clear its count of occurrences,
- show its history: selecting this option will open the LWEB-900 Alarm Log and show all the events logged for this alarm, if any.

You can right click on any column and select the options for grouping/ungrouping the alarms displayed.

Alarms colouring and sounding

The Project Properties/Alarming panel allows you to globally configure some common properties that will apply to all the alarms having a priority that belongs to a specific range:

- A color to quickly identify those alarms amongst others in Alarm View and Alarm Log View.
- An alarm sound played by LWEB-900 Client when a new alarm occurs.

In the following example, two ranges have been configured:

- The alarms having a priority in range 0-50 will appear in the Alarm View and Alarm Log with “Disaster” as Priority Name, and their Priority Color will be red.
- The alarms having a priority in range 51-255 will appear in the Alarm View and Alarm Log with “Warn” as Priority Name, and their Priority Color will be orange. Also, any new occurrence of such alarm will trigger the playing of a sound in LWEB-900 client.

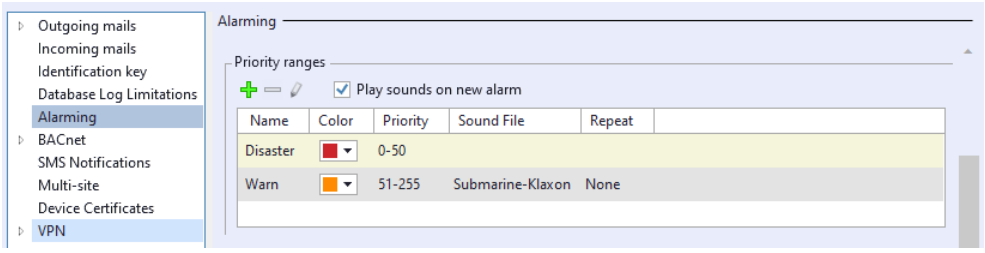


Figure 133: Alarm priority ranges configuration

It is also possible to globally configure in this Project Properties/Alarming panel the color of each symbol representing a specific alarm state in the Alarm View/Alarm Log. The default set of colors is the following:

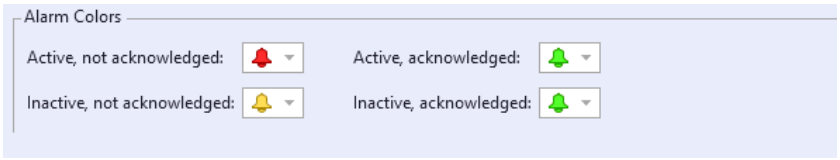


Figure 134: Alarm colors settings

You can select the possible other colors in each dropdown box, then Apply the new settings.

6.14.2 System Alarms

LWEB-900 alarm server is located in the folder **System/Alarming** and can generate the following alarm types:

- Fault alarms: LWEB-900 monitors all devices. If a device is not responding, the device icon in the navigation view turns red and a fault alarm is generated. In case the alarm occurs too often (for example because of a slow network connection to the device), the delay to wait before generating this alarm can be increased globally in the Communication Profile of the device (see its “Offline-Alarm-device alarm properties”).
- Off-normal alarm: It is possible to define alarm conditions for LWEB-900 data points. LWEB-900 data points are located inside the **System** folder or below a camera device.

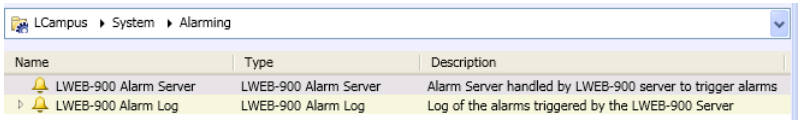


Figure 135: LWEB-900 Alarm Server

Create an alarm condition

To create the alarm condition right-click on the data point and select **Create Alarm Conditions** from the context menu.

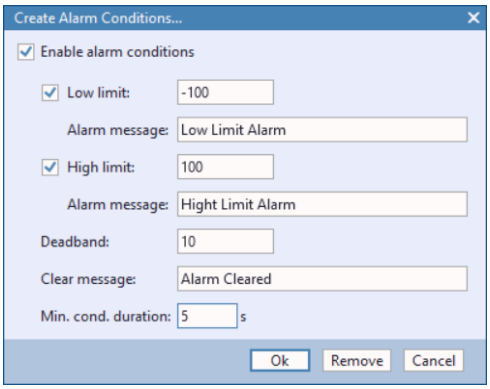


Figure 136: Create Alarm Condition

Configure priority of system alarms

1. Right click on the **LWEB-900 Alarm Server** and select **Properties** from the context menu.

2. For alarm transitions you may define, which require acknowledgement and at which priority they are reported. The highest priority is 0, the lowest priority is 255.

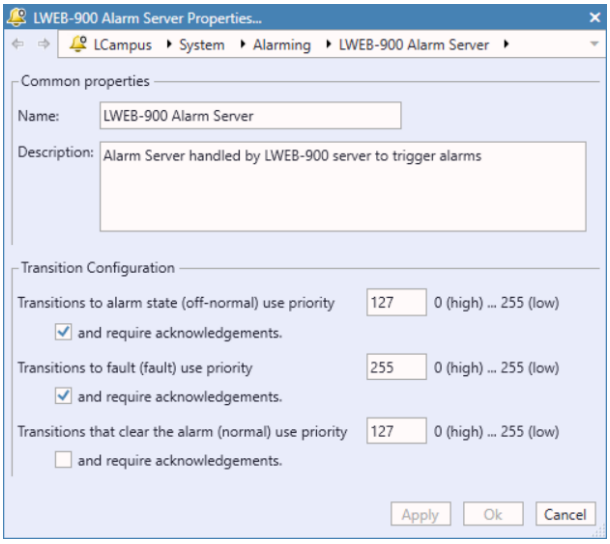


Figure 137: LWEB-900 Alarm Server Properties

6.14.3 Alarm Notification

When an alarm occurs, LWEB-900 can notify one or multiple users via e-mail, SMS, log the alarm in a text file, or trigger a video recording. The target of the notification is called an alarm receiver. Primary alarm receivers are notified as soon as the alarm occurs. Secondary alarm receivers are notified only if the alarm is not acknowledged in time. A prerequisite to sending e-mails is the configuration of the outgoing e-mail server as described in Section 0.

Create new alarm notifier

The alarm notifier determines which alarms are notified to which alarm receivers. It also defines the format of the notification.

1. Right click on a folder in the navigation view and select **New → New Alarm Notifier** from the context menu. An alarm notifier can be created in the root folder (the project node), in the home folder of a user, or in any user defined folder.

2. Enter a name and description for the new alarm notifier.

3. Define notification properties:

   - **Acknowledge timeout**: An alarm is sent to the primary receivers first. If it is not acknowledged after the acknowledgement timeout, the alarm is sent to the secondary alarm receivers. To disable the acknowledge timeout, set it to 0.

   - **Notify transitions**: You can separately specify if you want to send a notification if the alarm is triggered (**Alarmed**), acknowledged (**Acked**), or cleared (**Cleared**).

   - **Aggregation time**: This parameter defines the time period in which LWEB-900 collects alarm notifications before it sends an e-mail. All alarm notifications occurring during this time are included in the e-mail. Use this setting to receive related alarm notifications in a single e-mail.

   - **Min. send time**: This parameter defines the minimum time that elapses between two e-mail notifications. If alarm notifications occur more often, they are postponed and sent after the minimum send time. Use this setting to limit the e-mail transmission rate.

4. Define one or more notification templates. In case of an e-mail receiver, the template is used for the subject and message body. If the alarm is logged to a text file, the template specifies the format of the log entry. You can easily add any column of the alarm view (see Table 12) to the template body and include values of data points using the context menu. Select the "Colored by priority color" checkbox to apply the color defined for each priority range in the **Project Properties → Alarming** panel to the message body.

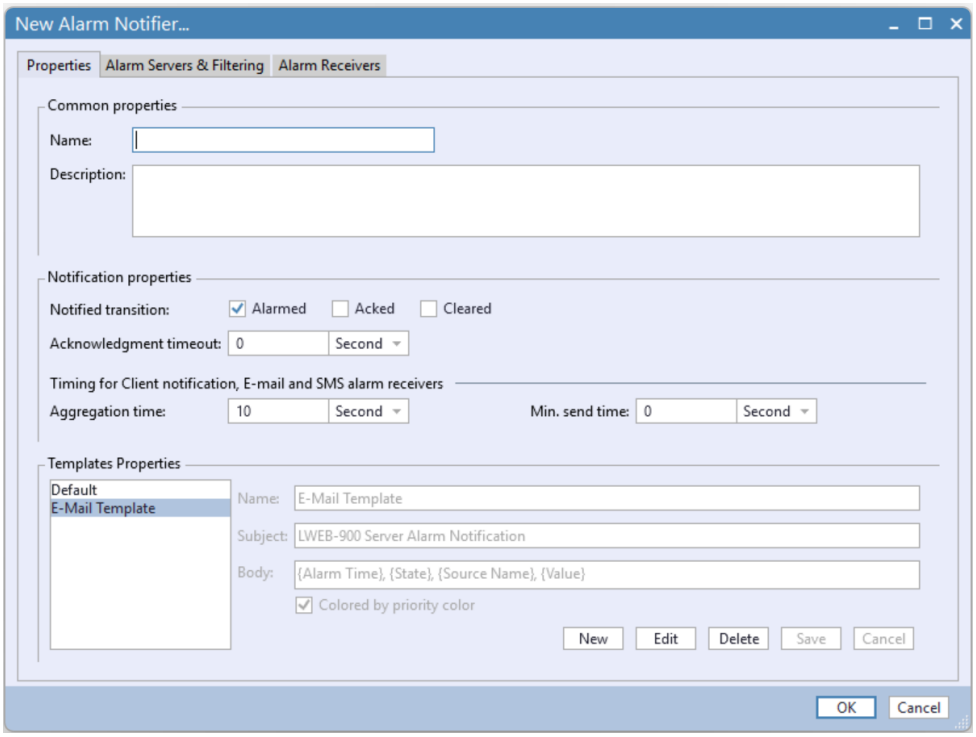


Figure 138: Alarm Notifier, Properties

5. Switch to the **Alarm Servers** tab and specify a folder as the **Base object**. The base object serves the same function as the path in the alarm view: the alarm notifier applies only to alarms from alarm servers which are inside the base folder.

6. **Enable custom filter**: If you enable this checkbox, only alarms will be notified which pass through the configured filter. This filter has the same functionality as the custom filter for the alarm view.

7. Switch to the **Alarm Receivers** tab to define who should be notified of the alarm. The primary alarm receivers are notified as soon as the alarm occurs. Secondary alarm receivers are notified only if the alarm is not acknowledged in time. To add an alarm receiver, click on the corresponding plus icon.

8. Enter a name for the alarm receiver and select the type. LWEB-900 supports the following alarm receiver types:

   - **E-Mail Alarm Receiver:** This alarm receiver sends an e-mail notification to one or multiple e-mail addresses.

   - **SMS Alarm Receiver:** This alarm receiver sends an SMS notification to one or multiple telephone numbers. This feature uses a LOYTEC device with a connected LTE-800 interface as an SMS gateway.

   - **File Alarm Receiver:** This alarm receiver logs alarms in a text file.

   - **Client Notification Alarm Receiver:** This alarm receiver displays a pop-up message inside the LWEB-900 Client when an alarm occurs.

   - **Camera Recording Alarm Receiver:** When the alarm is triggered, the selected camera moved to a configurable preset and starts recording.

   - **Datapoint Alarm Receiver:** This alarm receiver copies the alarm message to a string data point. Using a Nodejs script or Node-RED flow that subscribes to this

data point (see section 6.33), it becomes possible to send the alarm message to other external receivers (WhatsApp, Telegram, IFTTT, MQTT, etc.). For advanced usage, the Alarm Template of this message can be customized to produce a JSON object containing the various fields of the alarm.

9. Configure the properties of the alarm receiver as described in the following tables.

Property	Description
Alarm Template	This template is used for the e-mail body when an alarm occurs.
Alarm State Changes Template	This template is used for the e-mail body when the alarm changes its state. You have to assign this template only if you have selected the option **Notify alarm state changes**.
Enable	Per default this parameter is set to **Always**. When you click on this parameter, you can select an enable data point and specify the enable condition. Use an LWEB-900 Server scheduler to control the enable data point (see Section 6.15)
E-Mail addresses	Select the e-mail addresses which should be notified about the alarm. The list of available e-mail addresses contains all users for which an e-mail address has been specified (see Section 6.27). If you want to send alarm notification to an e-mail address which does not belong to an LWEB-900 user, you can add this e-mail address in the project properties: Select **Properties** from the context menu of the project node in the navigation view and switch to the **Outgoing mails** tab.

Table 13: E-Mail Alarm Receiver Properties

Property	Description
Alarm Template	This template is used for the e-mail body when an alarm occurs.
Alarm State Changes Template	This template is used for the e-mail body when the alarm changes its state. You have to assign this template only if you have selected the option **Notify alarm state changes**.
Enable	Per default this parameter is set to **Always**. When you click on this parameter, you can select an enable data point and specify the enable condition. Use an LWEB-900 Server scheduler to control the enable data point (see Section 6.15)
SMS receivers	Select the telephone numbers which should be notified about the alarm. The configuration of the SMS gateway and the definition of the phone numbers is done in the project properties: Select **Properties** from the context menu of the project node in the navigation view and switch to the **SMS Notification** tab (see Figure 139).

Table 14: SMS Alarm Receiver Properties

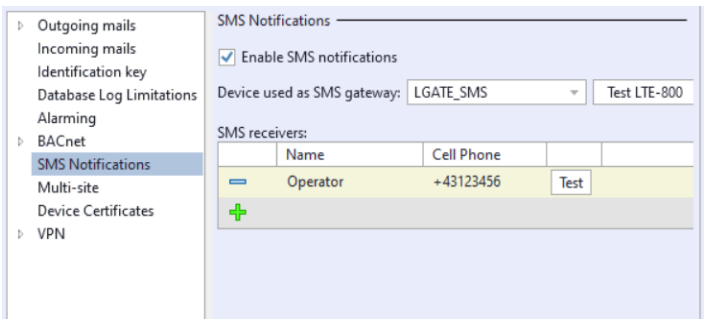


Figure 139: SMS Configuration

Property	Description
Alarm Template	This template defines the format of a log entry in the text file when an alarm occurs.
Alarm State Changes Template	This template defines the format of a log entry in the text file when the alarm changes its state. You have to assign this template only if you have selected the option **Notify alarm state changes**.
Enable	Per default this parameter is set to **Always**. When you click on this parameter, you can select an enable data point and specify the enable condition. Use an LWEB-900 Server scheduler to control the enable data point (see Section 6.15)
File name	Specify the name of the log file. The file is stored on the server in the directory <project directory>\AlarmReceiverFiles\

Table 15: File Alarm Receiver Properties

Property	Description
Alarm Template	This template is used to display alarm information in the popup message when an alarm occurs.
Alarm State Changes Template	This template is used to display alarm information in the popup message when the alarm changes its state. You have to assign this template only if you have selected the option **Notify alarm state changes**.
Enable	Per default, this parameter is set to **Always**. When you click on this parameter, you can select an enable data point and specify the enable condition. Use an LWEB-900 Server scheduler to control the enable data point (see Section 6.15)
Users & Groups	Select the users and groups which should be notified.
Popup Message	Enter a text which will be displayed as part of the popup window.
Sound	Select a sound which is played for notification. This property is optional.
View	The popup message can contain links to views (e.g. graphical view, alarm view). This property is optional

Table 16: Client Notification Alarm Receiver Properties

Property	Description
Enable	Per default, this parameter is set to **Always**. When you click on this parameter, you can select an enable data point and specify the enable condition. Use an LWEB-900 Server scheduler to control the enable data point (see Section 6.15)
Camera	Select a video camera.
Preset	If the camera supports PTZ control, select a preset to which the camera should move before starting recording.
Record Duration	Configure the recording duration.

Table 17: Camera Recording Alarm Receiver Properties

6.14.4 Alarm Log

The alarm view contains a live list of currently active and acknowledge-pending alarms. As soon as an alarm becomes inactive and has been acknowledged, it disappears from the alarm view. To store a historical log of alarm transitions, the alarm log in the folder **System/Alarming** is utilized. This alarm log records transitions of the LWEB-900 alarm server and all device alarm servers.

LOYTEC devices can have their independent alarm logs. Those device alarm logs are part of the device configuration and displayed in the **Alarm logs** sub folder of the device.

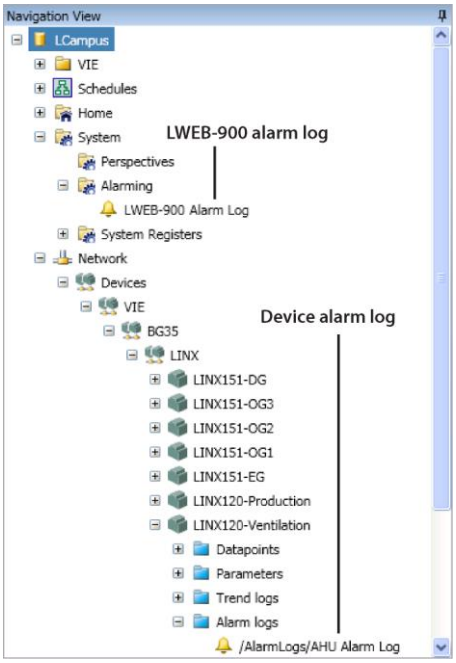


Figure 140: Alarm Log Icon

An alarm log can be viewed by double clicking on the alarm log icon in the navigation or object list view.

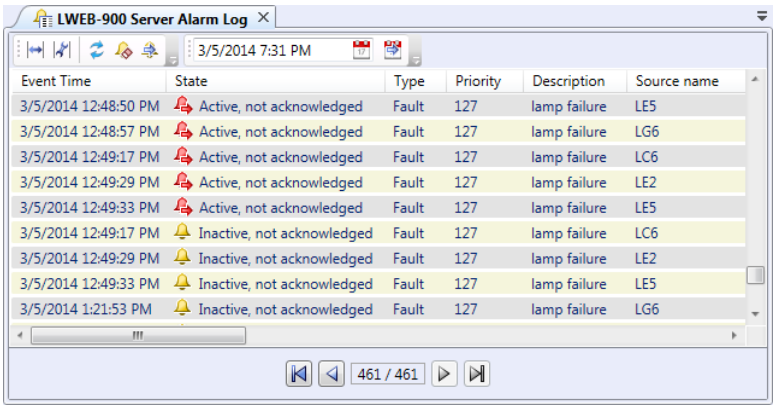


Figure 141: Alarm Log

The contents of the alarm log can be exported as a comma separated value list (CSV export). The alarm log window can be refreshed by hitting the [F5] function key or pressing the **Refresh value** toolbar button. If the log contains a large number of entries, the log is split into multiple pages and the buttons at the bottom can be used to navigate through the pages. Alternatively, the **Go to date** button can be used to jump to a specific date and time.

Note — *Alarms are a special kind of events. Therefore, you can also use the event view (see Section 6.17.4) to investigate alarm transitions. The event view is often more convenient, because its filters let you drill down to the specific alarm transitions you want to see.*

Filter alarm log

To search for specific records in the alarm log, click on the **Filter Log Data** button in the toolbar. The filter dialog allows you to combine multiple conditions with **AND** and **OR** operators. The example in Figure 174 finds all alarm log records with priority higher than 128 and the state “Active, not acknowledged”.

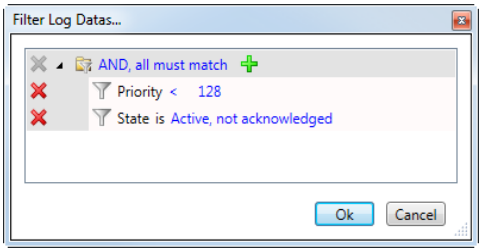


Figure 142: Alarm Log Filter

Print alarm log

Use the print button in the toolbar to print the alarm log. You can print all alarm log records or only alarm events which occurred during a configurable time interval. The print dialog allows adjusting the page margins and the font size.

6.15 Scheduling

Schedulers are objects that schedule values of data points on a timely basis. LWEB-900 distinguishes between two kinds of schedulers:

- **Device scheduler**: The scheduler is executed on a LOYTEC device. Device schedulers should be used to schedule data points on the device.
- **LWEB-900 Server scheduler**: The scheduler is executed by the LWEB-900 Server. LWEB-900 Server scheduler should be used to schedule an LWEB-900 user register. The scheduled user register can in turn be used to trigger a report or to enable/disable an alarm receiver.

Both scheduler types can be configured using the master schedule configuration view in LWEB-900.

6.15.1 Device Schedulers

Device schedulers are part of the device’s data point configuration. Therefore, they are created using the device configuration software. How to create device schedulers is outside the scope of this document. Refer to the device specific manuals (see Table 5).

6.15.2 LWEB-900 Server Schedulers

LWEB-900 Server schedulers are located in the **System/Scheduler** folder. Per default a new LWEB-900 project includes one scheduler which schedules an LWEB-900 user registers of type **Binary**. User registers are located in the folder **System/User Registers**. If necessary, additional user registers and schedulers can be created.

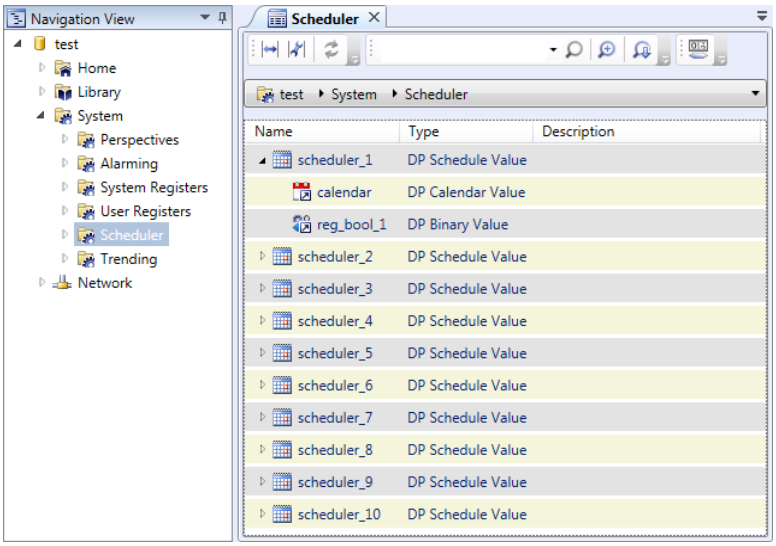


Figure 143: Default LWEB-900 Server Schedulers

Create new LWEB-900 user registers

1. Right click on the folder **System/User Registers** and select **New → New Register…** from the context menu. This opens the register creation dialog as shown in Figure 144.

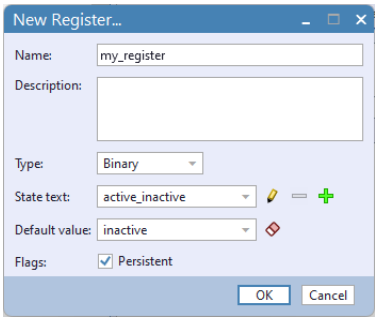


Figure 144: New LWEB-900 Server User Register

2. Enter a **Name** and **Description** for the register.

3. Select the **Type** of the register. The following types are available:

   - **Analog:** An analog data point typically represents a scalar value. The optional Unit of its value can be selected in the drop-down list (type characters to filter the list presented, for example by typing “°” or “m/”).

   - **Binary:** A binary data point contains a Boolean value. The **State text** defines human-readable labels for the two Boolean states. Select one of the existing state texts from the drop-down list or create a new one by clicking on the plus icon.

   - **Multistate:** A multi-state data point represents a discrete set of states. The **State map** defines the possible states and the human-readable labels. Select one of the existing state maps from the drop-down list or create a new one by clicking on the plus icon.

   - **String:** A string data point contains a string of characters.

4. Select the **Default value**.

5. If you want the register value to be persisted in database, select the **Persistent** checkbox.

6. Click **OK**.

Note: because this new register is OPC exposed, it can be used in Graphical Views and scripts.

Create a new LWEB-900 Server scheduler

1. Right click on the folder **System/Schedulers** and select **New → New Scheduler…** in the context menu.

2. Enter a name for the schedule and a description.

3. Select the scheduler **format**:

   - **Generic Scheduler**: These schedulers provide technology-independent scheduling functionality.

   - **iCalendar Scheduler**: This scheduler class can be selected as an alternative to the generic scheduler class. It supports extended features such as events that span over midnight or last for several days, flexible recurrence patterns known from Outlook, and booking information.

4. Select the tab **Datapoints** (see Figure 145).

5. Click the **Add…** button. This opens a data point selector window.

6. Select the LWEB-900 Server user register to attach and click **OK**. For each of the attached data points, one line appears in the list below the **Add…** button.

7. Data points can be removed from the scheduler by clicking **Remove**.

8. Select the default value for the attached data point.

9. Click **OK**.

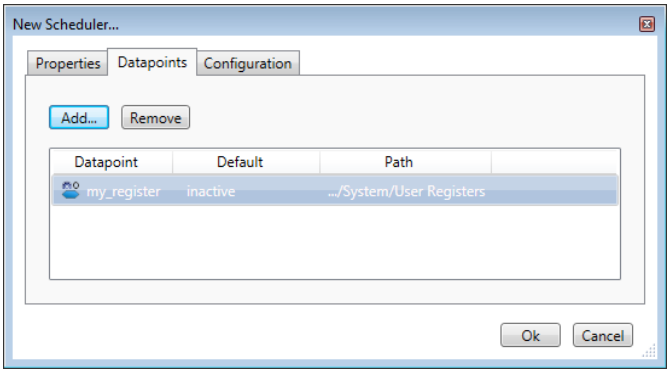


Figure 145: New Scheduler, Datapoints Tab

6.15.3 Master Scheduler View

LWEB-900 offers the unique possibility of organizing schedules in a hierarchical way, independently of whether they are executed. The resulting tree structure permits defining entries which apply to all schedulers or only a subset. For example, a standard occupancy schedule can be defined for a whole building. This global schedule can be modified for

certain areas of the building. The area specific entries can in turn be supplemented by room specific entries (see Figure 146).

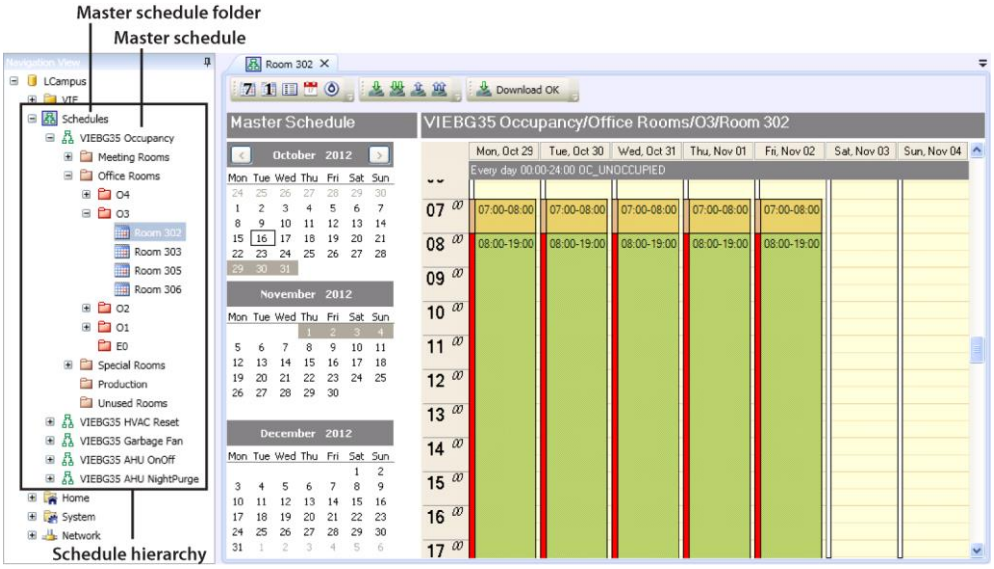


Figure 146: Schedule Hierarchy

6.15.3.1 Using the Master Scheduler View

To open the master schedule view, double click on any object in the schedule hierarchy. The master schedule view is linked to the navigation view. Whenever a different hierarchy level is selected in the navigation view, the master schedule view is updated. The current hierarchy level is displayed on the top right (see Figure 147). The toolbar buttons shown in Table 18 select the information which is displayed in the master schedule view.

Button	Description
	Display the schedule for a complete week from Monday to Sunday. The week is selected in the calendar on the left.
	Display the schedule details of a single day. The day is selected in the calendar on the left.
	Display all events in a list.
	Display the calendar configuration.

Table 18: View Selection Buttons

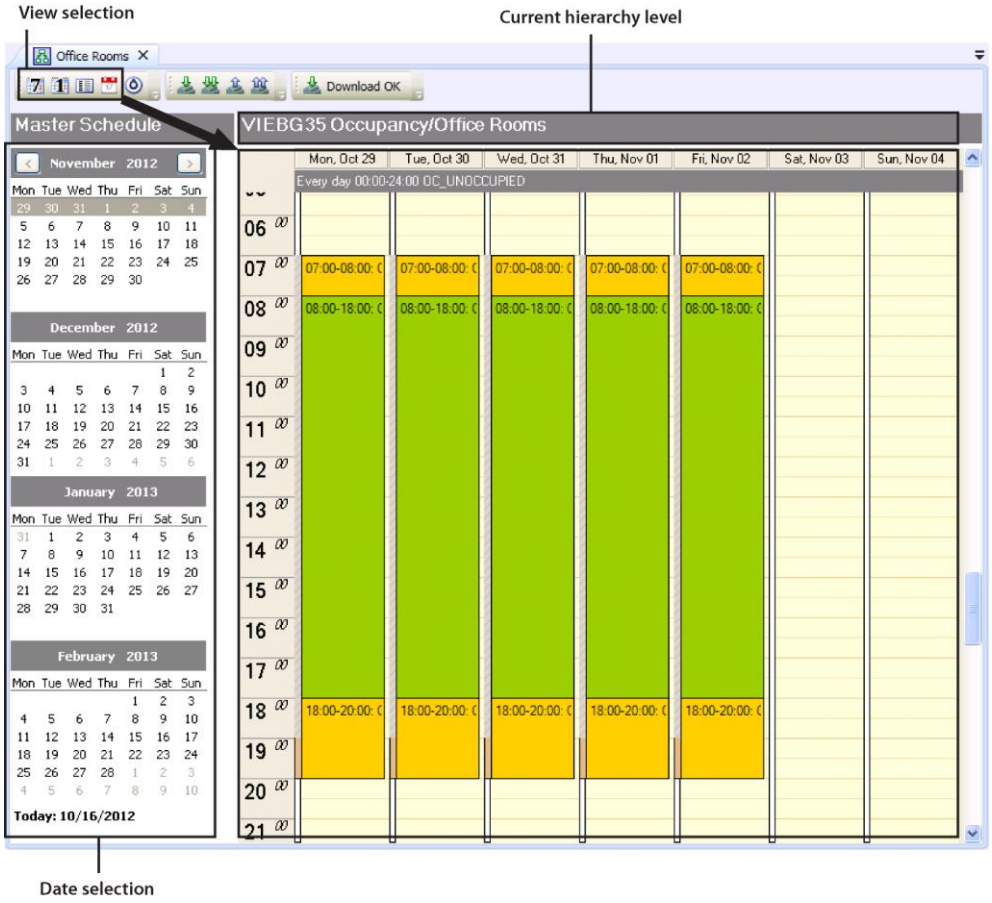


Figure 147: Master Scheduler View

Week view

Week view gives a quick overview of the scheduled events for one week. The week can be selected in the calendar on the left. All events which are defined on the current hierarchy level are displayed and can be modified. Events which are defined on higher hierarchy levels are also displayed, but are greyed out and cannot be edited. Figure 148 shows an example schedule for a specific meeting room. Figure 149 shows the same schedule for a higher hierarchy level which applies to all meeting rooms.

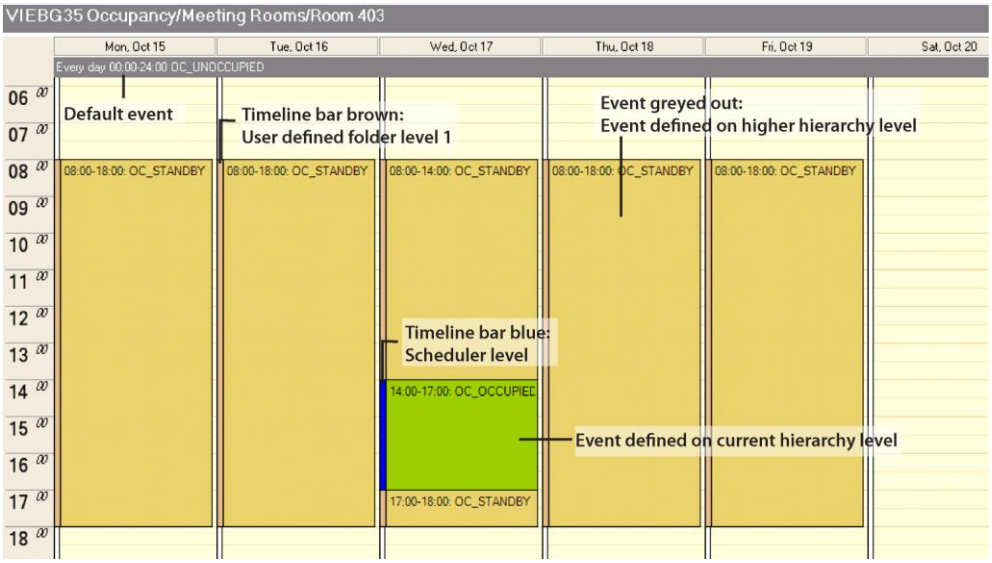


Figure 148: Master Schedule Week View Example 1

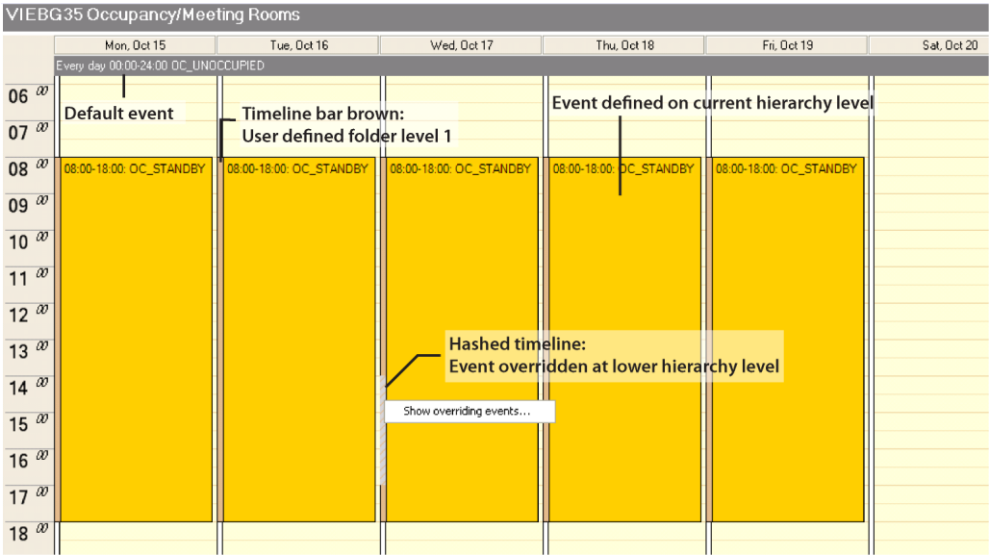


Figure 149: Master Schedule Week View Example 2

The color of the timeline bar depends on the level of hierarchy on which the event is defined. The color of the timeline bar corresponds with the color of the icons in the navigation view (see Table 19).

Hierarchy Level	Symbol in Navigation View	Timeline Bar Color
Master schedule level		Green
User defined folder level 1		Brown
User defined folder level 2		Red
User defined folder level 3		Purple
Scheduler level		Blue

Table 19: Schedule Hierarchy Levels

If an event is overridden by events defined on lower hierarchy levels, the corresponding part on the timeline is hatched. You can right click on the hatched part and select **Show overriding events…** to see the list of events which override the event at that time (see Figure 149).

If you have defined a default value for the schedule, it is displayed at the top of the week view.

Day view

The left side of the day view shows a preview similar to the week view. The right part shows the details of all defined events. Lower priority events are displayed to the left and higher priority events are displayed further to the right and partly cover the lower priority events (see Figure 150).

Events with higher priority override events with lower priority. There are three priority levels:

- Low
- Normal
- Override

If two events have the same priority, the event on the lower hierarchy level overrides the event on the higher hierarchy level.

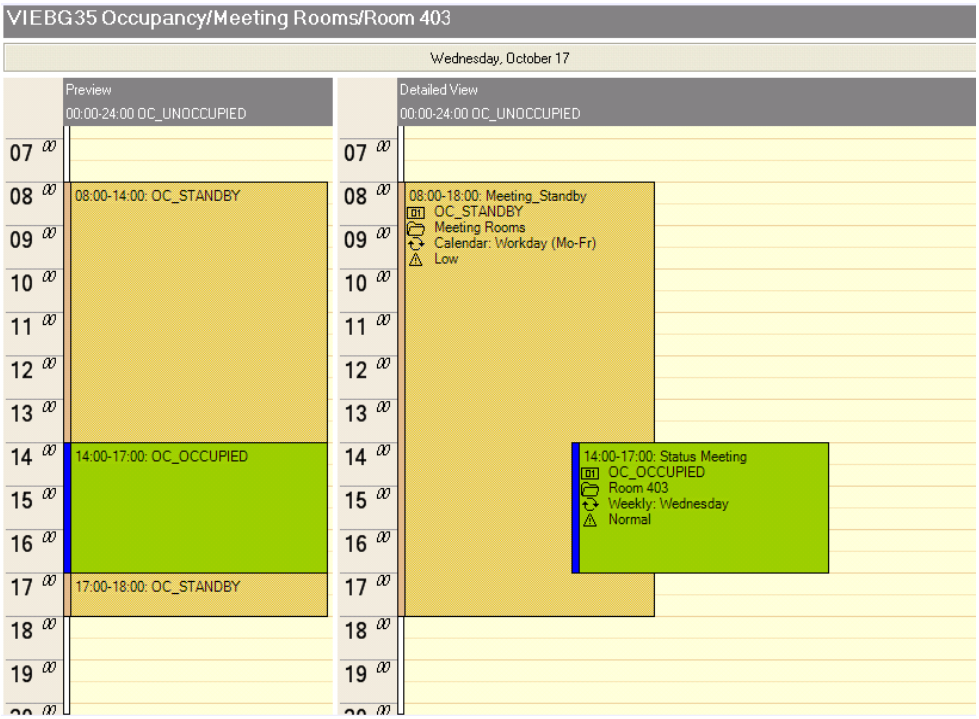
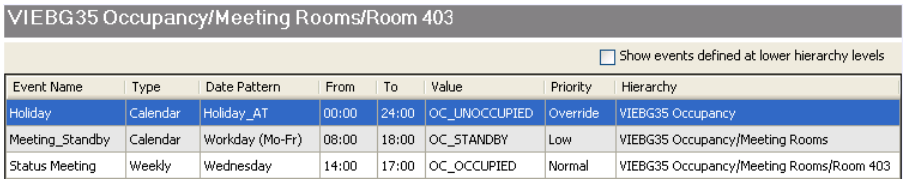


Figure 150: Master Schedule Day View

Event List

The event list displays the events defined in the master schedule (see Figure 151). Events of the current hierarchy level can be edited. Events which are defined on higher hierarchy level are greyed out and cannot be edited. To see events defined on lower hierarchy levels, activate the checkbox **Show events defined at lower hierarchy levels**.



Event Name	Type	Date Pattern	From	To	Value	Priority	Hierarchy
Holiday	Calendar	Holiday_AT	00:00	24:00	OC_UNOCCUPIED	Override	VIEBG35 Occupancy
Meeting_Standby	Calendar	Workday (Mo-Fr)	08:00	18:00	OC_STANDBY	Low	VIEBG35 Occupancy/Meeting Rooms
Status Meeting	Weekly	Wednesday	14:00	17:00	OC_OCCUPIED	Normal	VIEBG35 Occupancy/Meeting Rooms/Room 403

Figure 151: Master Schedule Event List

Calendar

Events can reference a calendar pattern which defines on which days the event will be active. Each calendar pattern is a collection of date entries (see Figure 152). Calendar patterns can be defined on any hierarchy level. If you define a calendar patterns at the level of the master schedule folder, it will apply to all master schedules.

Calendar patterns of the current hierarchy level can be edited. Calendar patterns which are defined on higher hierarchy levels are greyed out and cannot be edited. To see calendar pattern defined on lower hierarchy levels, activate the checkbox **Show calendar patterns defined at lower hierarchy levels**.

If you select a calendar pattern or a date entry, the corresponding days are highlighted in the calendar pane on the left.

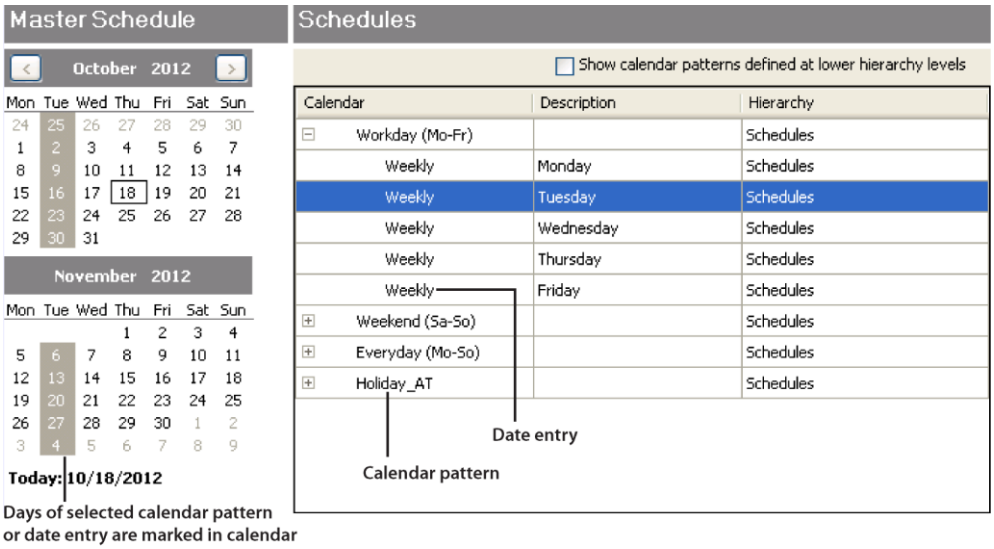


Figure 152: Master Schedule Calendar

Configure presets

Presets define the set of values which can be scheduled. Each master schedule has its own presets.

1. Double click on a master schedule in the navigation view.
2. Click on the toolbar button **Define presets**.
3. Click on the **Create** button to add a new presets (see Figure 153).

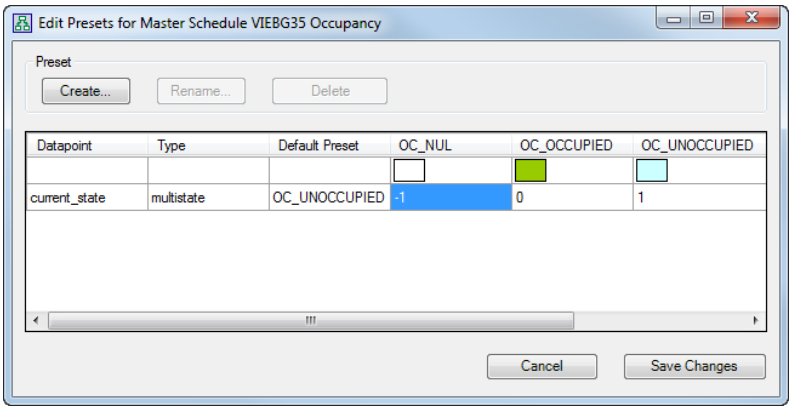


Figure 153: Preset Definition

4. For each preset, the following parameters can be changed:
   - Name of the preset
   - Color: The color is used to display the preset in week view and day view.
   - Value
5. To set a default preset, right-click on the input field and select a preset from the context menu. The default preset will be scheduled when no event is active.

Note *The buttons **Rename** and **Delete** become active if the name of a preset is selected in the table header.*

Add events

1. Double click on a schedule hierarchy level in the navigation view.
2. Right click anywhere in the week view, day view, or event list and select **Add event…** from the context menu.
3. Figure 154 shows an example for the event definition dialog. The following parameters can be configured:

   - **Name**: Each event is given a name. The name has to be unique.
   - **Value**: Select a preset.
   - **Priority**: If two events are scheduled at the same time, the priority defines which event takes precedence. The following priority levels are supported:
     - **Low**: Lowest priority
     - **Normal**
     - **Override**: Highest priority

     If two events have the same priority, the event defined on the lower hierarchy level takes precedence.
   - **Start, End, Duration**: Define start and end time of an event. At the end of an event, the value is withdrawn. This means that the event with the next highest priority can take over and set a different value. If there is no lower priority event, the default preset will be sent out. If no default preset is defined, no value update will be sent out.
   - **Event Type**: The event type defines on which days an event will be active. The following event types are supported:
     - **One-time**: The event is active only on one specific date.
     - **Daily**: The event is executed daily, starting at a specific date and ending on another date or never.
     - **Weekly**: The event is active on a specific weekday (e.g. every Monday).
     - **Monthly**: Monthly events are repeated every month or only every odd/even month.
     - **Yearly**: Yearly events are repeated every year.
     - **Calendar**: The days on which the event is active is defined by a calendar pattern.
     - **Special**: The special event type is available for compatibility reasons.

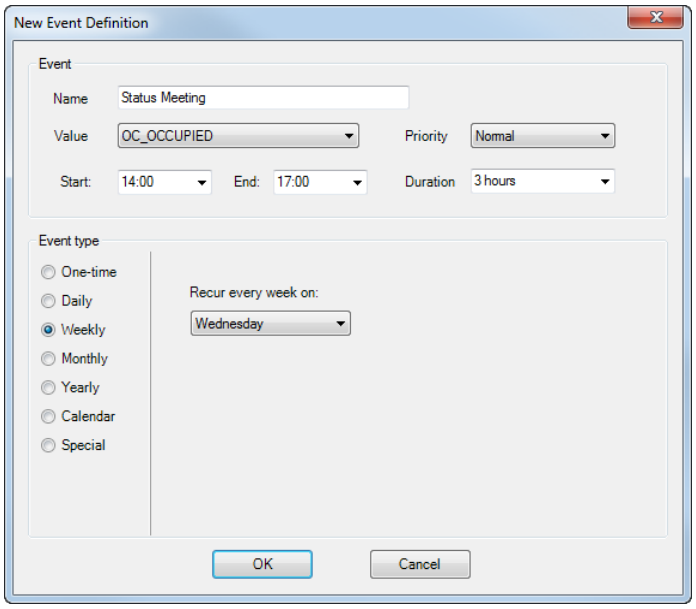


Figure 154: Event Definition

Add calendar patterns and date entries (generic schedulers only)

1. Double click on a schedule hierarchy level in the navigation view. If you want to add a calendar pattern which applies to all schedulers, select the master schedule folder.

2. Switch to the calendar view by clicking the corresponding button on the tool bar.

3. Right click anywhere in the calendar view and select **Add calendar pattern…** from the context menu.

4. Specify a name for the new calendar pattern and click **OK**.

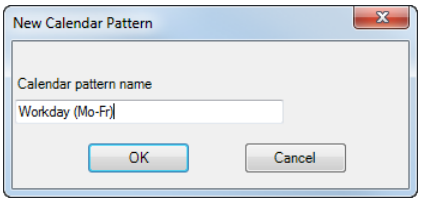


Figure 155: New Calendar Pattern

5. Right click on the new calendar pattern and select **Add date entry…** from the context menu.

6. The dialog is very similar to the lower part of the event definition dialog. You can define One-time, Daily, Weekly, Monthly, Yearly, or Special date entries.

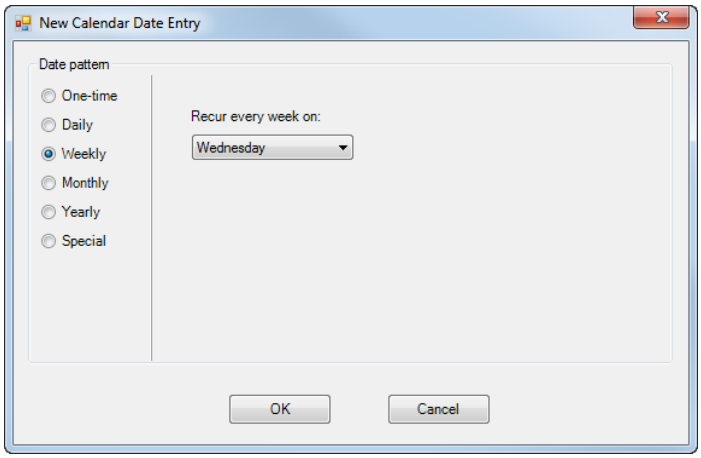


Figure 156: New Calendar Date Entry

7. To add additional date entries to the same calendar pattern, repeat Step 5 and 6.

Note

Calendar patterns can be defined on any hierarchy level. A calendar pattern will be visible only at the hierarchy level it was defined and in lower hierarchy levels.

It is possible to add date entries on different hierarchy levels. Date entries are visible only in the hierarchy on which they were defined and below. In this way, a calendar pattern can be composed of different date entries in different hierarchy levels.

To Add a Remote iCalendar

1. Click on the **List View** button in the toolbar and right-click in the event table
2. Select **Add Remote iCalendar** from the context menu.
3. Assign a **Name**, event **Preset** to be scheduled, a **Priority** to be used for the imported events, a URL to load data from and a **Sync. time** in minutes.

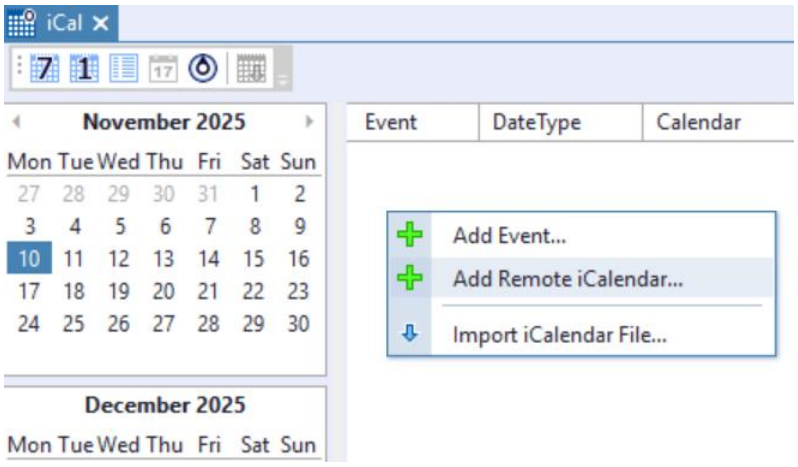


Figure 157: Add Remote iCalendar

Download master schedules

After you have configured the schedules in LWEB-900, you have to download them to the LOYTEC devices. The schedules are executed decentralized in the devices to increases reliability of the system.

1. The download to the LOYTEC devices is triggered by pressing one of the buttons shown in Table 20.

Button	Description
	Download schedulers in or below the currently selected hierarchy level.
	Download all schedulers.

Table 20: Schedule Download Buttons

2. The download dialog is shown in Figure 158. If the checkbox **Process only modified items** is selected, only the schedulers which have been modified since the last download will be downloaded. This is useful to speed up the download if you have a large number of schedulers. If this checkbox is not active, all schedulers displayed in the list below will be downloaded. This is useful to override any potential changes of the schedulers on the devices.

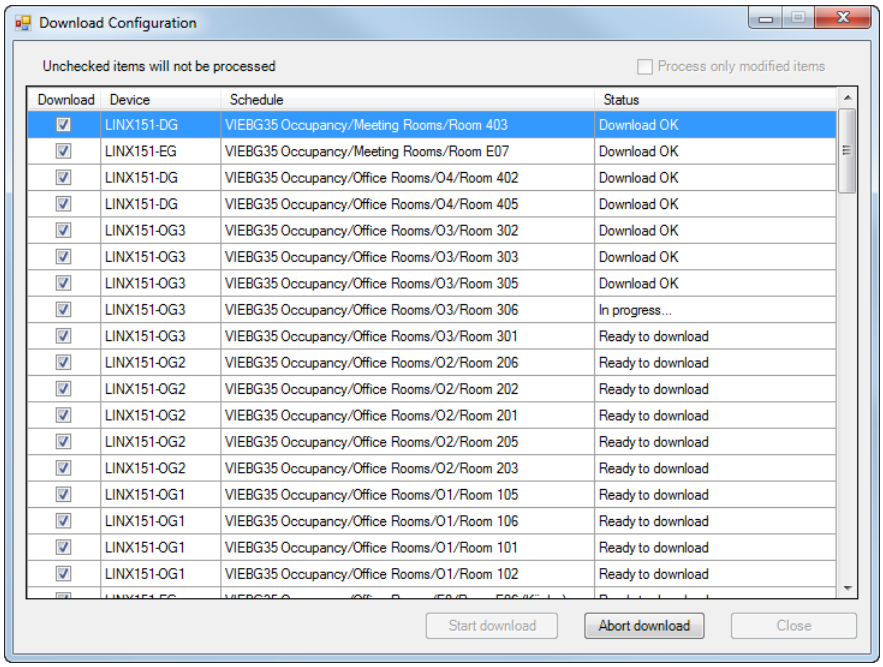


Figure 158: Master Schedule Download

3. Press the **Start download** button.

Note *Events which are in the past and unused calendar patterns will not be downloaded to the LOYTEC device to save resources.*

Upload schedules from device

After a schedule has been downloaded by LWEB-900 to a LOYTEC device, it can be changed locally on the device (e.g. using the Web UI). LWEB-900 detects these changes and marks changed schedulers with an asterisk. Changes are detected because LWEB-900 periodically polls the devices. The poll cycle is configured as part of the communication profile (see Section 6.24).

LWEB-900 can upload local schedule changes only if they do not affect other schedulers. This means that e.g. a change to the start or end time of an event, which was defined on the scheduler level, can be uploaded. However, if an event is changed, which is defined on a higher hierarchy level, it will not be uploaded because it might affect other schedulers.

1. The upload of schedules is triggeredd by pressing one of the buttons shown in Table 21.

Button	Description
	Upload schedulers in or below the currently selected hierarchy level.
	Upload all schedulers.

Table 21: Schedule Upload Buttons

2. The upload dialog is shown in Figure 159. If the checkbox **Process only modified items** is selected, only the schedulers which have been detected as modified will be uploaded. This option is useful to speed up the process if you have a large number of schedulers. However, if schedulers have been changed since the last poll cycle of LWEB-900, these changes will not be taken into account. If the checkbox is not active, all schedulers displayed in the list below will be uploaded. Use this option to get the most current scheduler configuration from the devices.

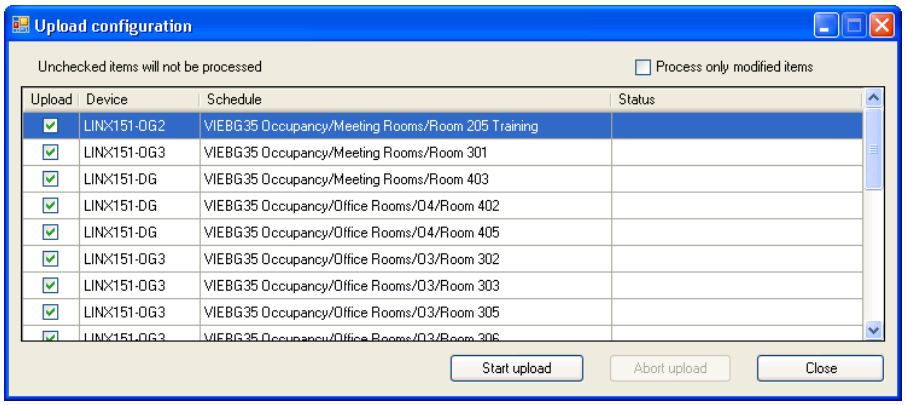


Figure 159: Master Schedule Upload

3. If the changes cannot be uploaded into the master schedule configuration, an error will be displayed as shown in Figure 160. In this example the preset values were changed using the Web UI. Because the presets affect all other schedulers under the same master schedule node, the modified presets will not be uploaded to the master schedule configuration.

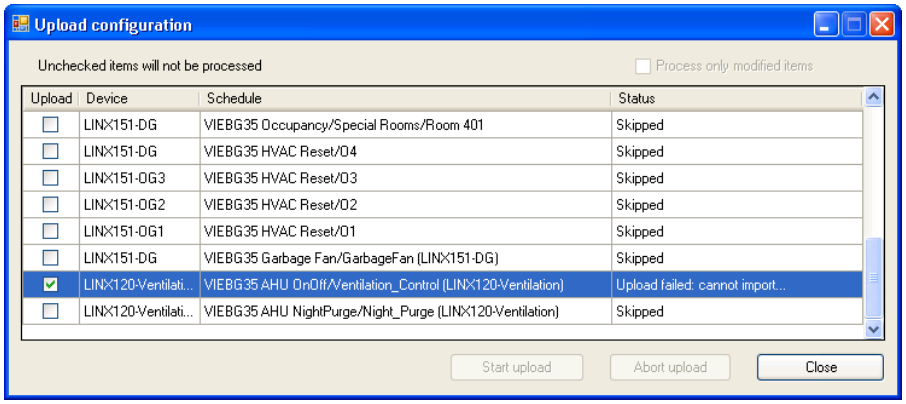


Figure 160: Master Schedule Upload Error

4. To find out more about why the upload did not work, double click on the scheduler in the upload dialog. The pop-up window shows on the left side the scheduler as

configured in LWEB-900 and on the right side the changes made on the device (see Figure 161).

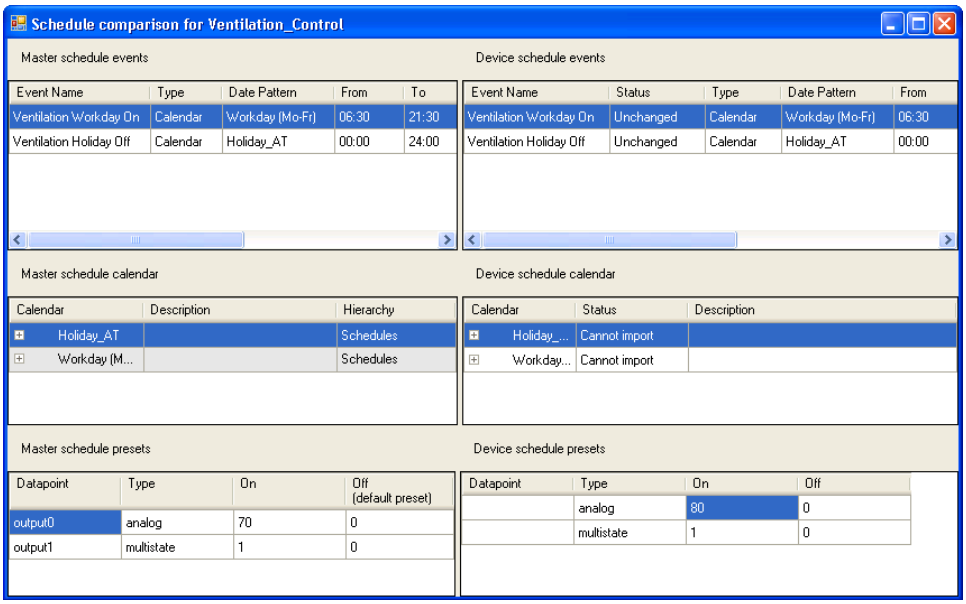


Figure 161: Schedule Comparison

Note	*If you have a master schedule which contains only a single scheduler, define the events on the scheduler level. This gives you the possibility to upload any local changes.*

Print master scheduler view

Use the print button in the toolbar to print the currently displayed view of the master scheduler. The print dialog allows adjusting the page margins and the scale factor.

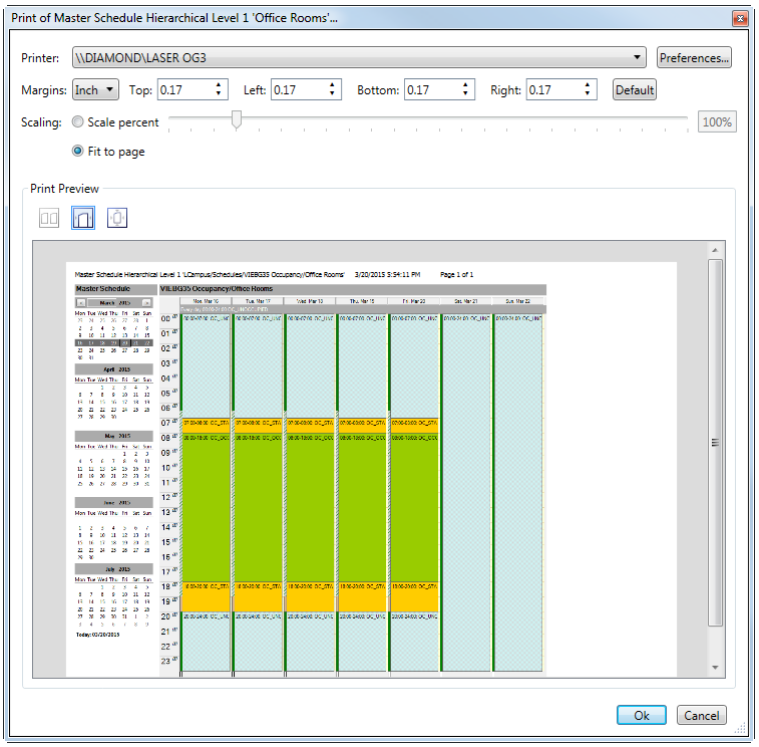


Figure 162: Print Master Scheduler View

6.15.3.2 Configure Master Schedule View

Create new master schedule

1. Right click on the master schedule folder and select **New → New Master Schedule** from the context menu. If no master schedule folder exists yet, right click on the project node instead. The master schedule folder is created automatically when creating the first master schedule.

2. Enter a name and description for the new master schedule and click on **OK**.

3. The new master schedule is displayed in the navigation view. Double click the master schedule to open the master schedule view.

Configure scheduler hierarchy

1. To add a hierarchy level select **New hierarchical folder** from the context menu. Each hierarchy level can contain further hierarchy levels. Up to three nested hierarchy levels can be created under the master schedule node. All events defined on a specific hierarchy level affect all schedulers attached to the same or lower hierarchy levels.

2. To add schedulers to a hierarchy level select **Add scheduler…** from the context menu. Device schedulers as well as LWEB-900 Server schedulers can be added. All schedulers which are added under a master schedule node must be compatible. This means that all schedulers must have the format (generic scheduler or iCalendar scheduler) and the type of the scheduled data points must be identical.

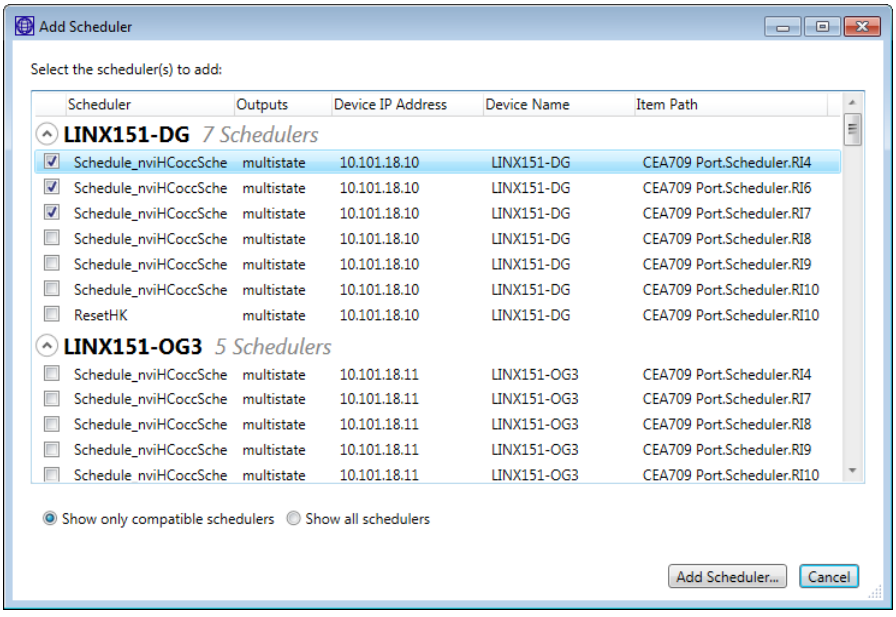


Figure 163: Add Scheduler

Note *LWEB-900 takes over the presets from the first scheduler which is added to a master schedule node. Presets can be edited any time.*

Scheduler naming rules

Per default a new scheduler is displayed using the name of the scheduler data point. This can be a problem if multiple schedulers have identical names. You can either rename the scheduler in LWEB-900 or define a new naming rule which can include the path information. To define a naming rule right click on a node in the master scheduler and select

Define Schedules Naming Rules from the context menu. Scheduler naming rules are inherited from a node to all lower hierarchy levels. Figure 164 shows an example naming rule. Right click in the **Schedule name format** field to add placeholders as defined in Table 22.

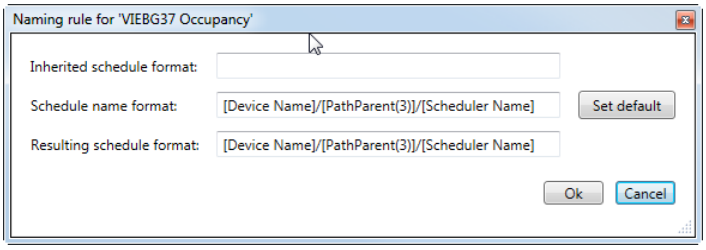


Figure 164: Scheduler Naming Rules

Placeholder	Description
[Scheduler Name]	Name of the scheduler data point
[Device Name]	Name of the device
[PathParent(n)]	The path of the scheduler consists of a sequence of folders. The [PathParent(n)] placeholder is replaced with the n-th folder starting from the right.
[PathFolder(n)]	The path of the scheduler consists of a sequence of folders. The [PathFolder (n)] placeholder is replaced with the n-th folder starting from the left.

Table 22: Placeholders for Scheduler Naming Rule

Scheduler and calendar limitations

Each LOYTEC device has only a limited amount of resources. LWEB-900 knows about these limitations and checks every time a preset, event, or calendar pattern is added whether there are enough resources available. Figure 165 shows an example error message which is caused by adding too many presets.

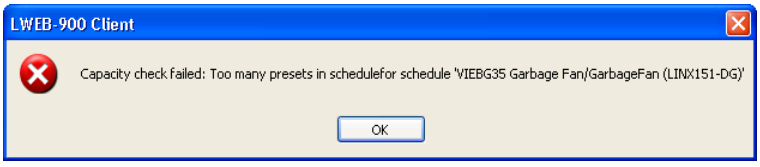


Figure 165: Too Many Presets Defined

For CEA-709 devices, the number of available daily schedule, calendar patterns, etc. can be configured in the configuration software. Open the menu **Settings → Project Settings …** and select the **CEA709 AST** tab as shown in Figure 166.

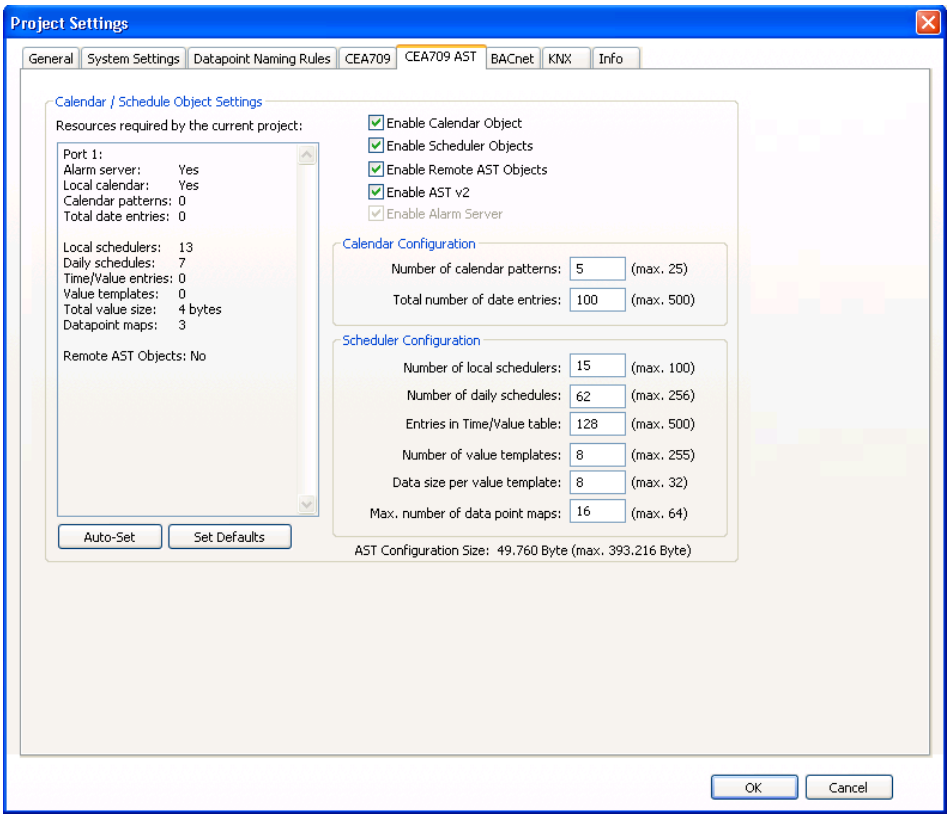


Figure 166: Project Settings, CEA709 AST Tab

For the master schedule view, the following settings are relevant:

- **Number of calendar patterns**: Influences the number of calendar patterns which can be created in a master schedule. However, there is no one-to-one mapping of calendar patterns in a master schedule and in a device. Depending on the configuration, LWEB-900 sometimes has to split a calendar pattern into multiple calendar patterns before downloading it into the device.
- **Total number of date entries**: This parameter specifies the total number of date entries for all calendar patterns on a device.
- **Number of daily schedules**: Defines how many events can be created.
- **Entries in Time/Value table**: Also limits the maximum number of events. Each event consists of 2 time/value pairs.
- **Number of value templates**: Defines the maximum number of presets.

Note: *Every change of the **CEA709 AST** settings changes the static network interface of the device.*

6.16 Trending

Trending refers to the ability to log values of data points over time. LWEB-900 distinguishes between two kinds of trend logs:

- **Device trend log**: The data points are logged by a LOYTEC device or a third-party BACnet device. The LWEB-900 Server reads out the stored data periodically

(e.g. once a day). This approach has the advantage, that data points are logged even if the LWEB-900 server is offline. Moreover, the traffic between LWEB-900 server and LOYTEC devices is kept to a minimum.

- **LWEB-900 Server trend log**: The data points are logged directly by the LWEB-900 server. This approach has the advantage that you do not need to change the configuration of the LOYTEC device. However, the LWEB-900 Server has to access the device much more frequently. Therefore, the LWEB-900 Server trend log is recommended only for temporary trends.

Trend logs can be visualized using a chart view. One chart view can reference multiple trend logs.

6.16.1 Trend Log Size Limitation

Even on a server with a large hard drive, the disk space is limited. Therefore, you need to configure for how long the LWEB-900 Server keeps old trend log records.

Configure default values for log size limitations

1. Select **Properties** from the context menu of the project node in the navigation view and switch to the **Database Log Limitations** tab.

2. The trend and alarm log size is limited by the following parameters (see Figure 167):

   - **Size limit**: Trend and alarm logs are organized as ring buffers. As soon as the maximum number of log items has been reached, new log entries will overwrite the oldest entries.

   - **Duration limit**: This parameter defines the maximum time span for which old data is kept before deleting it from the database.

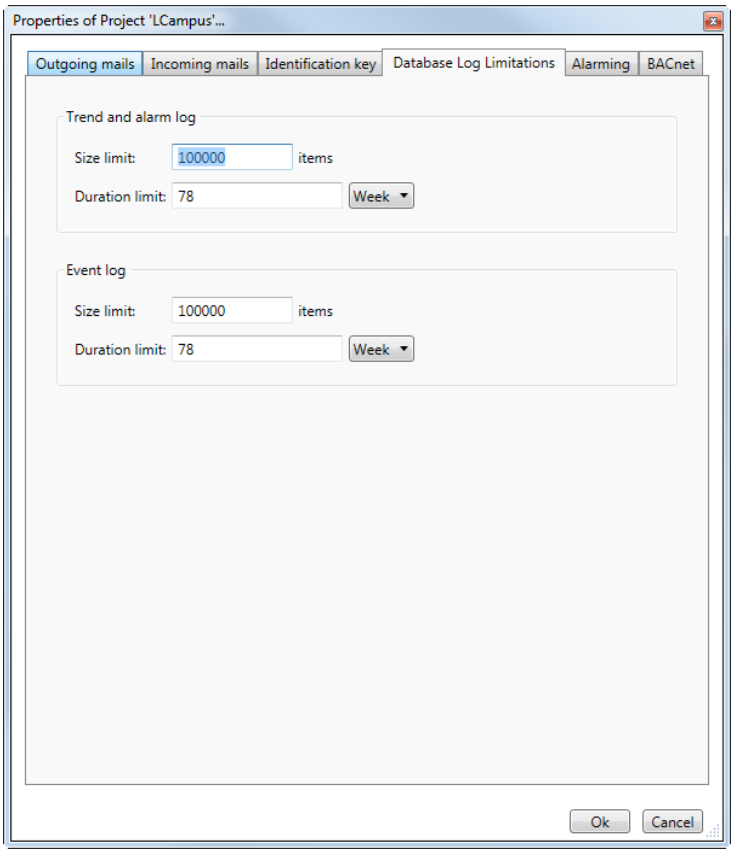


Figure 167: Database Log Limitations

New trend logs are assigned the configured default values. These initial values can be changed any time by editing the properties of an individual trend log.

6.16.2 Device Trend Logs

Device trend logs are part of the device's data point configuration. Therefore, they are created using the device configuration software. How to create device trend logs is outside the scope of this document. Refer to the device specific manuals (see Table 5).

LWEB-900 automatically detects new records in trend logs of devices. Before the trend log buffer on the device can overrun, LWEB-900 reads out the trend log data and stores it in the LWEB-900 database on the PC. The trend log poll cycle is configured as part of the communication profile (see Section 6.24). Thus, memory limitations on the devices can be overcome.

All trend logs of a device are stored in the folder **Trend logs** below the device (see Figure 168). Double click on the trend log to open it.

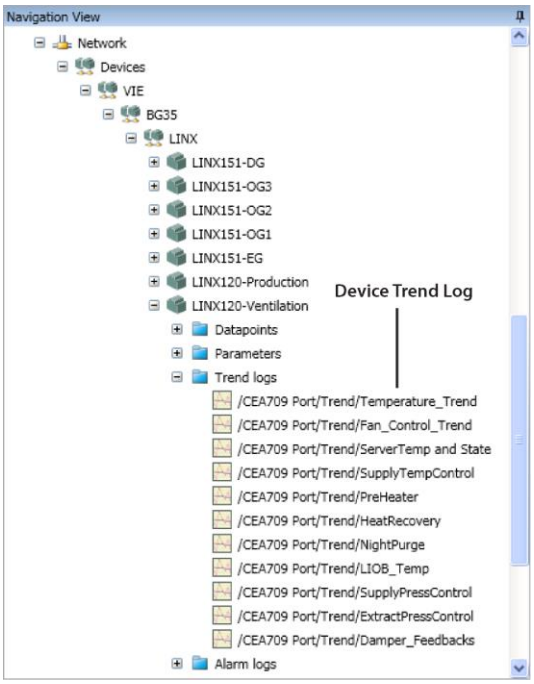


Figure 168: Device Trend Log

Edit device trend log properties

1. Right-click on a device trend log and select **Properties** from the context menu.

2. The properties dialog is opened (see Figure 169). You can only modify the **Database Log Limits** (refer to Section 6.16.1) parameters. The other parameters are defined by the device configuration and cannot be edited.

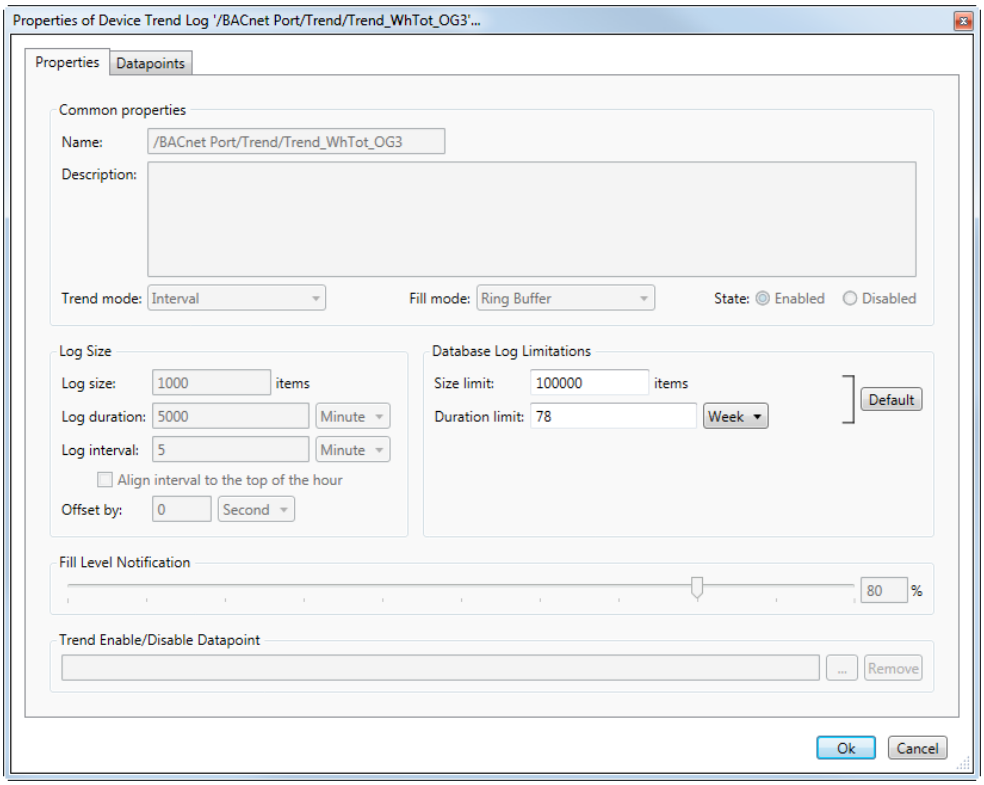


Figure 169: Device Trend Log Properties

Note: *It is possible to select multiple trend logs and select **Properties** from the context menu to change the size limits. To find specific trend logs, select the object type **Trend Log** in the advanced search (see Section 6.9).*

6.16.3 LWEB-900 Server Trend Logs

Server trend logs can record one or multiple data points and operate in one of the following modes:

- **Interval Mode**: In this mode a snapshot of all trended data points is logged periodically.
- **COV Mode**: In this mode, each of the trended data points is logged separately if and only if its value changes. For analog data points, a specific COV increment can be configured.
- **Trigger Mode**: In this mode a snapshot of all trended data points is logged each time a trigger condition fires. The trigger condition is applied to a trigger data point.

Create a new server trend log

1. Right click on the folder **System/Trending** in the navigation view and select **New → New Trend Log** from the context menu.
2. Enter a name and description for the new trend log.

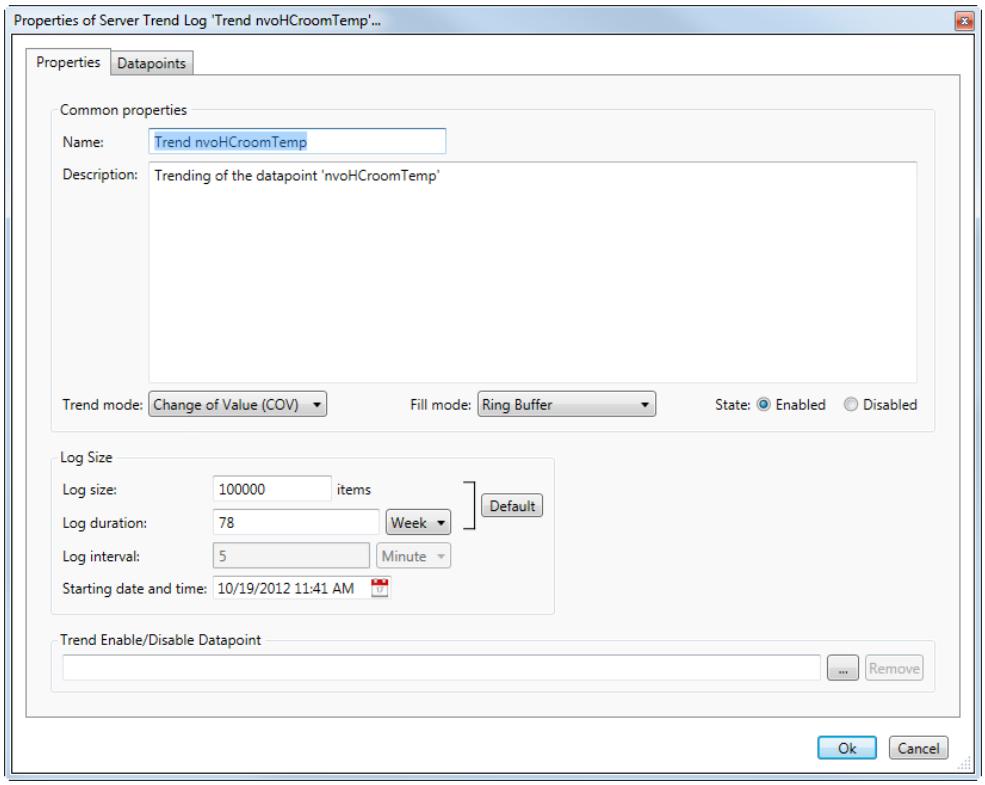


Figure 170: LWEB-900 Server Trend Log Properties

3. Select the desired **Trend mode**.
4. If necessary, change the **Log size** and **Log duration** parameters (refer to Section 6.16.1).

5. For trend logs of type **Interval**, select the **Log interval**.

6. Select **Starting date and time**. For trend logs of type **Interval**, LWEB-900 aligns the log interval to this time.

7. The trending can be enabled/disabled by attaching an enable data point. This data point should be of type binary. If the value of that enable data point is TRUE, the trend logs data as defined by the trend mode. If the value of the enable is FALSE, trending is disabled. If no enable data point is configured, the trend log is always enabled. Click the **…** button to select a data point.

8. To remove the enable data point, click the **Remove** button.

9. Click **OK** to store the basic configuration of the trend. The new trend log appears in the navigation view.

Configure trended data points

When an LWEB-900 Server trend log has been created, it needs to be configured, which data points it shall log. This is done by attaching data points to the trend log. Only simple data points can be attached for trending, i.e. analog, binary, or multi-state.

1. Right click on the LWEB-900 Server trend log and select **Properties** from the context menu. The same dialog which appears when a new trend object is created is shown and allows configuring the trend.

Note	*Of course, this step can also be done directly when the object is created.*

2. Switch to the **Datapoints** tab.

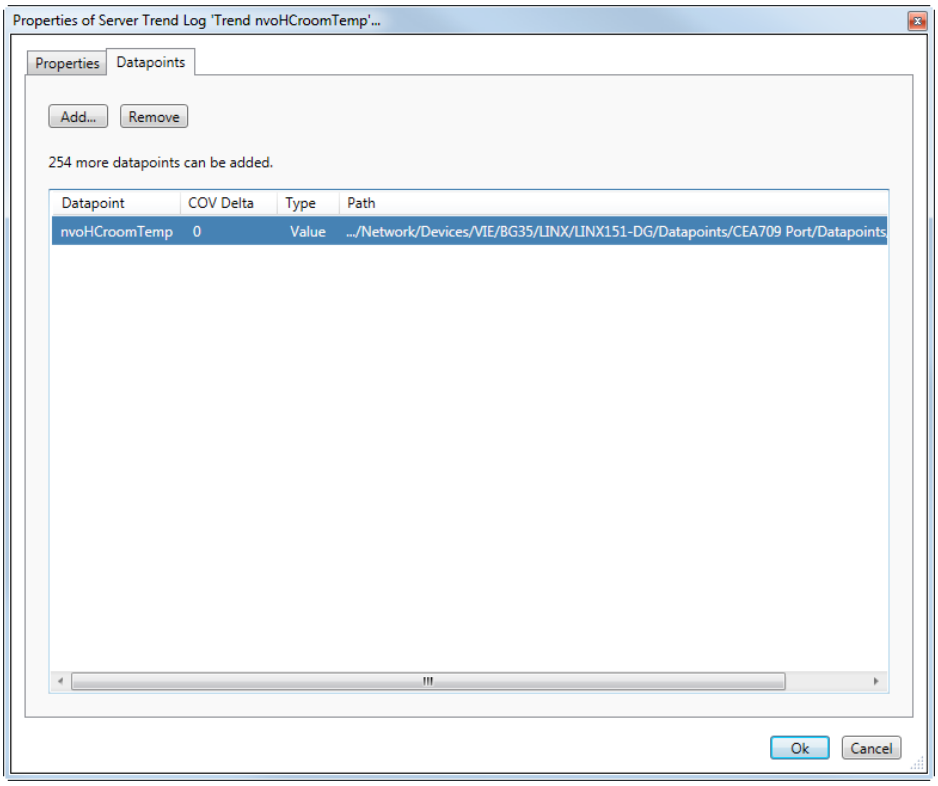


Figure 171: LWEB-900 Server Trend Log Datapoints

3. Add data points to be trended. Click on **Add…** to open a data point selector window.

4. Select the data points and click **OK**. For each of the attached data points, a line appears in the list below the add button.

Note: *Data points can also be attached to a trend by selecting a data point in the object list view and dragging it onto a trend log.*

Only OPC data points can be added to LWEB-900 Server trend logs. They are marked with a small "O" in the top right corner of the data point symbol. To expose a data point via OPC, the corresponding checkbox has to be activated in the device configuration software.

5. Data points can be removed from the trend by clicking **Remove**.

6. If COV mode was selected, the COV increment is displayed in the **COV Delta** column. This value can be increased to generate less trend data.

7. If the trended value of the data point shall be aggregated over the log interval, select the desired aggregation in the **Type** column. Available options are **Min**, **Max**, **Avg**.

Note *To create multiple curves with min, average, and maximum values, add the same data point three times and select the different aggregation types.*

8. When done with the data point setup, click **OK** to leave the dialog.

Configure trigger data points

In trigger mode, one or more trigger data points cause the generation of a snapshot containing the values of the trended data points at the time instant the trigger is activated. For a trend log, one or more trigger conditions can be defined.

1. Right-click on the LWEB-900 Server trend log and select **Properties** from the context menu.

Note *Of course, this step can also be done directly when the object is created.*

2. Switch to the **Triggers** tab.

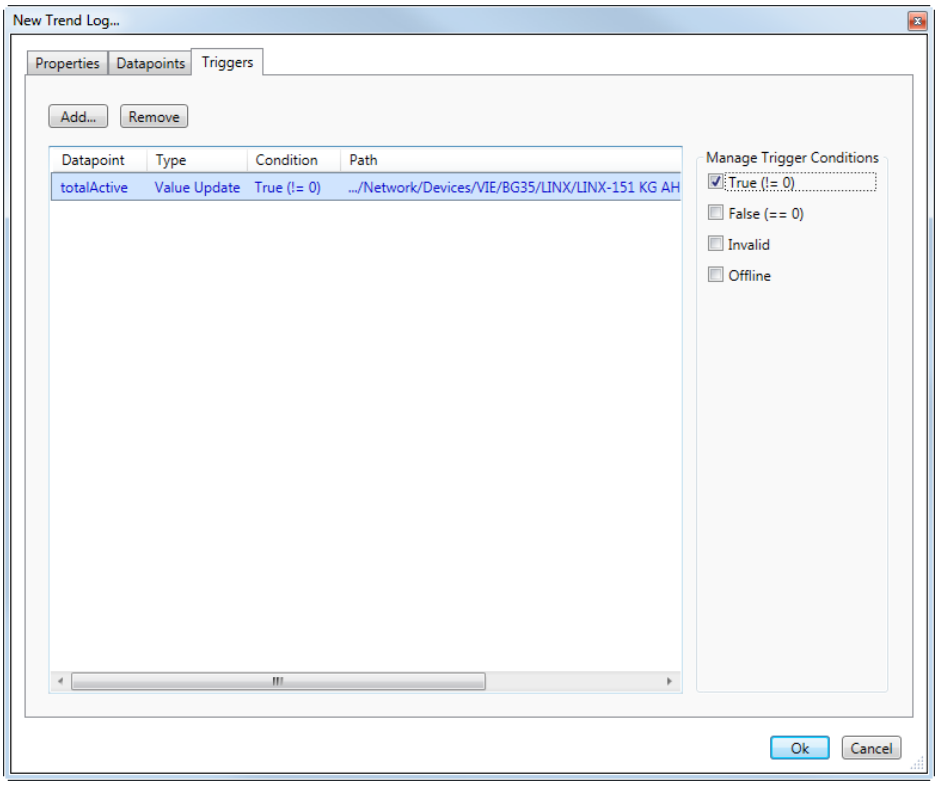


Figure 172: Trend Log Trigger

3. Click the **Add…** button. A data point selection dialog opens.

4. Select one or more data points and click **OK**.

5. The triggers appear now in the list.

6. In the **Manage Trigger Conditions** you can refine the trigger condition depending on the trigger data point class.

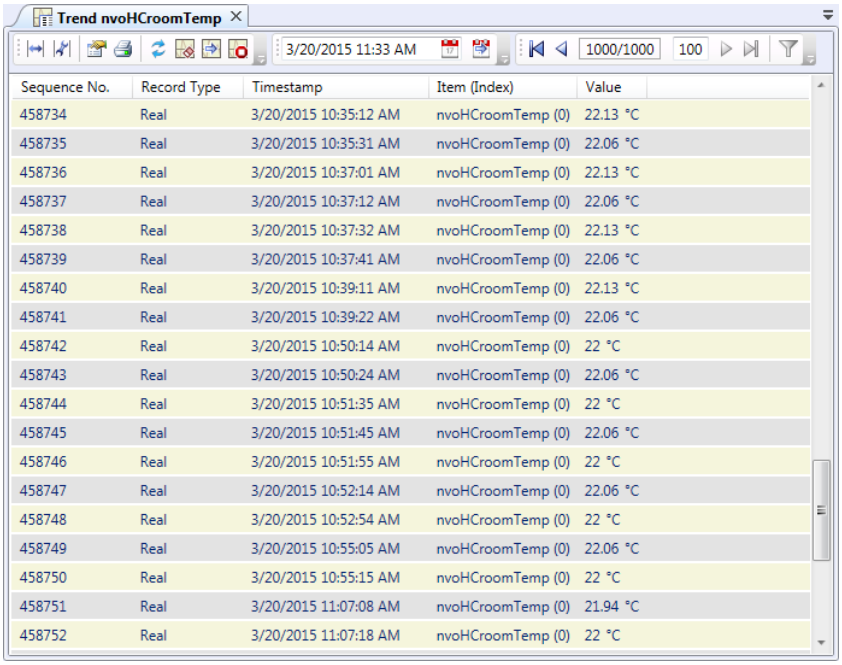
7. When done with the data point setup, click **OK** to leave the dialog.

Disable server trend logs

A server trend log can be temporarily disabled using the **Disable Trend Log** option in the context menu. When the trend log is disabled, the LWEB-900 Server does not record the attached data points. A disabled trend log can be enabled with the **Enable Trend Log** menu entry.

6.16.4 Trend Log View

To view a trend log, double click on it in the navigation view or object list view.



Sequence No.	Record Type	Timestamp	Item (Index)	Value
458734	Real	3/20/2015 10:35:12 AM	nvoHCroomTemp (0)	22.13 °C
458735	Real	3/20/2015 10:35:31 AM	nvoHCroomTemp (0)	22.06 °C
458736	Real	3/20/2015 10:37:01 AM	nvoHCroomTemp (0)	22.13 °C
458737	Real	3/20/2015 10:37:12 AM	nvoHCroomTemp (0)	22.06 °C
458738	Real	3/20/2015 10:37:32 AM	nvoHCroomTemp (0)	22.13 °C
458739	Real	3/20/2015 10:37:41 AM	nvoHCroomTemp (0)	22.06 °C
458740	Real	3/20/2015 10:39:11 AM	nvoHCroomTemp (0)	22.13 °C
458741	Real	3/20/2015 10:39:22 AM	nvoHCroomTemp (0)	22.06 °C
458742	Real	3/20/2015 10:50:14 AM	nvoHCroomTemp (0)	22 °C
458743	Real	3/20/2015 10:50:24 AM	nvoHCroomTemp (0)	22.06 °C
458744	Real	3/20/2015 10:51:35 AM	nvoHCroomTemp (0)	22 °C
458745	Real	3/20/2015 10:51:45 AM	nvoHCroomTemp (0)	22.06 °C
458746	Real	3/20/2015 10:51:55 AM	nvoHCroomTemp (0)	22 °C
458747	Real	3/20/2015 10:52:14 AM	nvoHCroomTemp (0)	22.06 °C
458748	Real	3/20/2015 10:52:54 AM	nvoHCroomTemp (0)	22 °C
458749	Real	3/20/2015 10:55:05 AM	nvoHCroomTemp (0)	22.06 °C
458750	Real	3/20/2015 10:55:15 AM	nvoHCroomTemp (0)	22 °C
458751	Real	3/20/2015 11:07:08 AM	nvoHCroomTemp (0)	21.94 °C
458752	Real	3/20/2015 11:07:18 AM	nvoHCroomTemp (0)	22 °C

Figure 173: Trend Log View

The contents of the trend log can be exported as a comma separated value list (CSV export). The trend log view can be refreshed by hitting the [F5] function key or pressing the **Refresh value** toolbar button. If the log contains a large number of entries, the log is split into multiple pages and the buttons at the bottom can be used to navigate through the pages. Alternatively, the **Go to date button** can be used to jump to a specific date and time.

Column Configuration

The columns of the trend log view can be customized. To add columns or to change the column order, click on the **Configure columns** toolbar button.

The column configuration is stored for each trend log view separately. To change the column configuration for the current trend log view only, deactivate the **Apply to all 'Log' objects** checkbox and click the **Apply** button. To save the configuration for all trend log views, activate the checkbox and press the **Apply** button.

Column	Description
Sequence No.	The log record sequence number. This is a monotonously increasing number, which is unique for each log record.
Record Type	Data records: • **Bool** • **Real** • **Enum** • **Unsigned** • **Signed** • **Null**: This element is included if the logged data point has no value. System records: • **Error**: This element is included if a communication error has occurred. The value of the error is technology-specific. • **Purge**: This element is included if a purge action is logged. In this case, no value is logged. • **Log Enable**: This element is included if a log enable (TRUE) or log disable (FALSE) action is logged. • **Time Change**: This element is included, if a change in the device's clock has been logged. The integer value specifies the number of seconds the clock was put forward or backward.
Timestamp	The date/time of the log record.
Item (Index)	Name of logged data point and index.
Value	Logged value.
Value Type	Data type of the **Value** field.
Aggregation Mode	**Value**: No aggregation. **Min**.: Minimum value during log interval. **Max**.: Maximum value during log interval. **Avg**.: Average value during log interval.
Path	Complete path of logged data point (if available).

Table 23: Trend Log View Columns

Filter trend log

To search for specific records in the trend log view, click on the **Filter Log Data** button in the toolbar. The filter dialog allows you to combine multiple conditions with **AND** and **OR** operators. The example in Figure 174 finds all data records of the data point "nvoHCroomTemp" with a value less than 20.

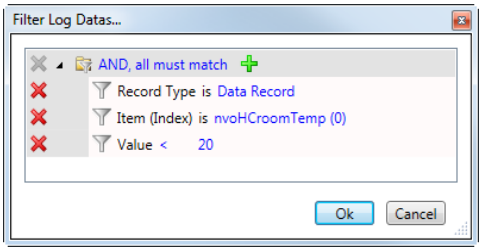


Figure 174: Trend Log Filter

Clear trend log

1. Click on the **Clear Trend Log** button in the toolbar.

2. To clear all data, activate the checkbox **Remove all data**, else specify a date.

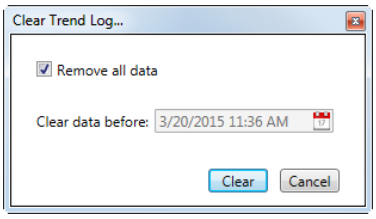


Figure 175: Clear Trend Log

Note	*In case of a device trend log, only data in the LWEB-900 database is cleared. Data logged by the device is left unchanged. You can clear the trend log data on the device using its web UI.*

Note	*Clearing trend log data is recorded in the event log.*

Edit trend log records

1. Select one or multiple trend log records and open the context menu

Note	*Only data records, no system records can be edited.*

2. The context menu allows to remove the selected records or to change the recorded value.

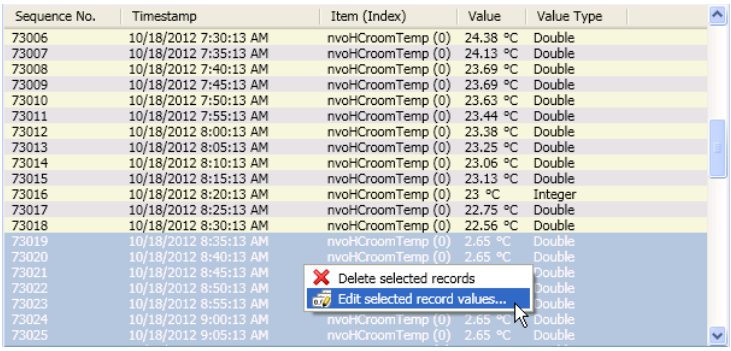


Figure 176: Edit Trend Log Records

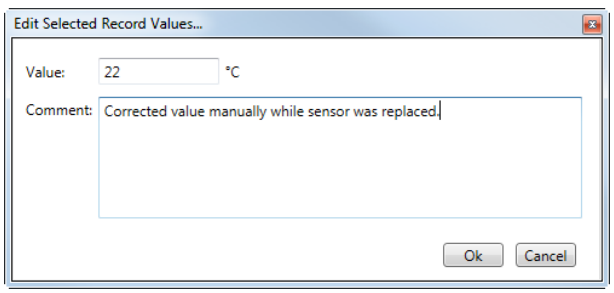


Figure 177: Edit Trend Log Record

Note	*Editing trend log records is recorded in the event log.*

Print trend log

Use the print button in the toolbar to print the trend log. You can print all trend log records or only data logged during a configurable time interval. The print dialog allows adjusting the page margins and the font size.

6.16.5 Trend Chart View

One or multiple trend logs are visualized using a chart view. Figure 178 shows the chart icon in the navigation view. Double click on the icon to open the chart view (see Figure 179).

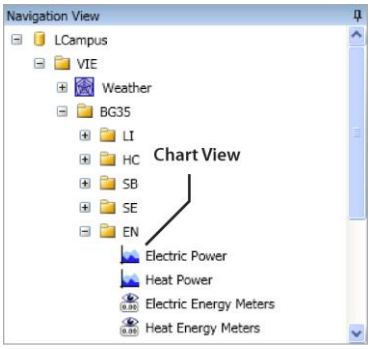


Figure 178: Chart View Icon

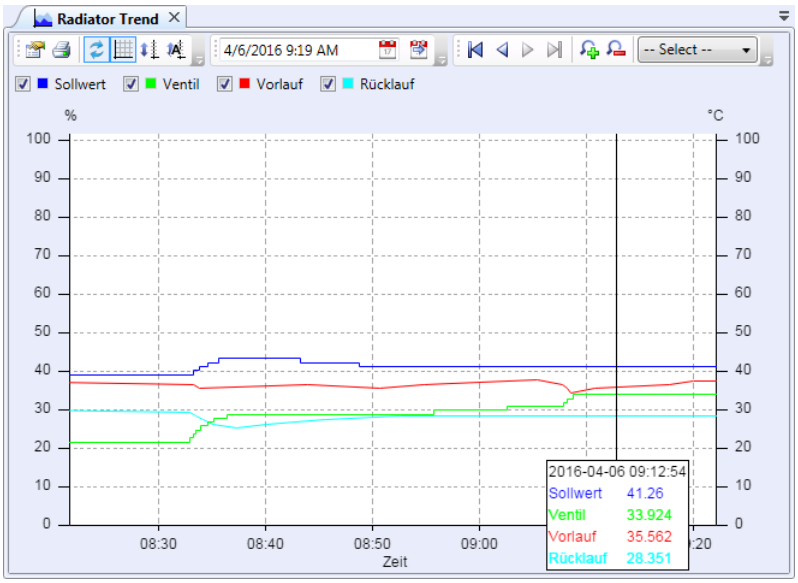


Figure 179: Chart View

Create a new chart view

1. Right click on a folder in the navigation view and select **New → New Chart View** from the context menu. A trend chart can be created in the root folder (the project node), in the home folder of a user, or in any user defined folder.

2. Enter a name and description for the new chart view.

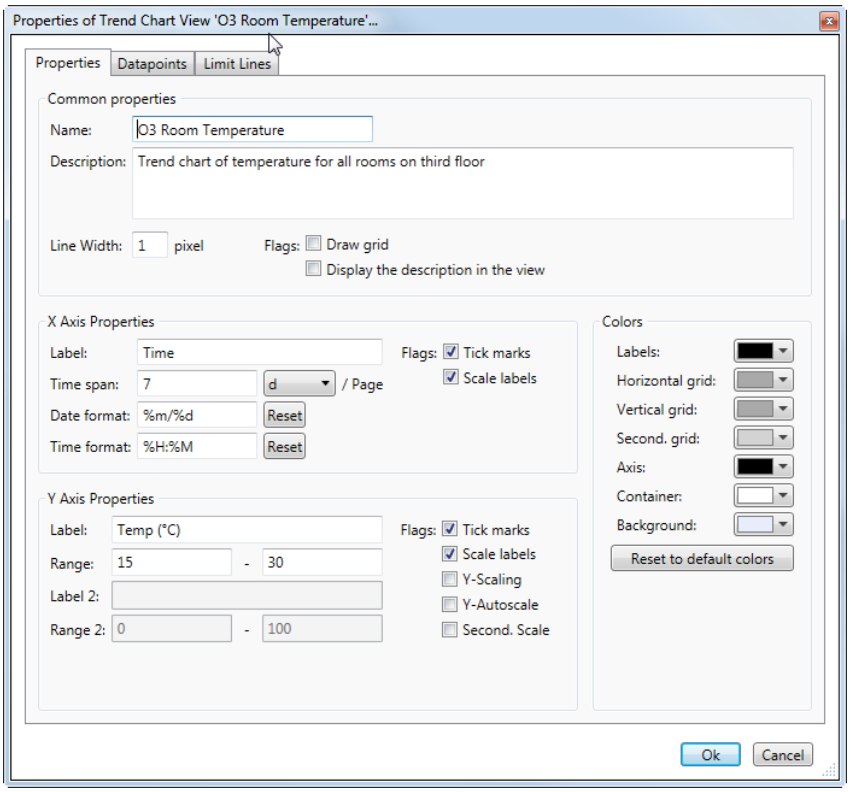


Figure 180: Chart View Properties

3. **Line Width**: Sets the line width for all curves drawn in this trend control.

4. **Draw grid**: This option enables a grid which allows easier readout of the displayed data. The checkbox defines the initial state of the grid when you open the chart view. You can enable/disable the grid any time using the corresponding toolbar button.

5. **Display description in the view**: If this option is enabled, the description of the chart view is displayed as title of the chart.

6. Configure the **X Axis Properties**:

   - **Label**: Text displayed as label for the x-axis.

   - **Time Span**: Select a suitable time span which is displayed initially when you open the chart view. You can zoom in and zoom out any time using the corresponding toolbar buttons of the char view.

   - **Date Format**: Format string used to display date labels on the time axis. Date labels are shown at midnight of each day which has a label drawn. If the user zooms out further, date labels will be shown only for every other day, every start of the week, or every month, as space allows.

   - **Time Format**: Format string used to display time labels on the time axis. Time labels are displayed only when there is more than one label for one day. Otherwise, time labels will not be used.

   - **Tick marks**: Enables drawing of tick marks for the time axis.

   - **Scale labels**: Enables drawing of scale labels.

7. Configure the **Y Axis Properties**:

- **Label**: Text displayed as label for the primary y-axis.
- **Range:** Value range for the primary value axis drawn on the left end of the trend graph. This is the default range for the standard zoom setting and may be changed during runtime when the option **Y-Scaling** is enabled.
- **Label 2**: Text displayed as label for the secondary y-axis.
- **Range 2:** Value range for the secondary value axis. If enabled, the secondary scale is drawn on the right end of the graph.
- **Tick Marks:** Enables drawing of tick marks for the value axis.
- **Scale Labels:** Enables drawing of scale labels. Note that scale labels should always be enabled for controls which have the **Y-Scaling** option set.
- **Y-Scaling:** Enables navigation buttons for the value axis.
- **Y-Autoscale:** The range of the Y-axis automatically scales to the displayed values.
- **Second. Scale:** Activates the secondary Y-axis.

8. Configure the chart view **Colors**:

Color Name	Description
Labels	Labels of the value scale (x-axis) and the time scale (y-axis).
Horizontal Grid	Horizontal grid lines (if the grid is enabled).
Vertical Grid	Vertical primary grid lines (if the grid is enabled).
Second. Grid	Vertical secondary grid lines (if the grid is enabled).
Axis	Tick marks and axis for value and time.
Container	Background of the graph area, which is the rectangular area spawned by the value and time axis.
Background	Color of the background outside the graph.

Table 24: Colors of Trend Chart View

9. Click **OK** to store the basic configuration of the chart view. The new chart view appears in the navigation view.

Attach trend logs

When a chart view has been created, it needs to be configured, which trend logs it shall display. This is done by attaching trend logs to the chart view. Device trend logs as well as LWEB-900 Server trend logs can be attached.

1. Right-click on the chart view and select **Properties** from the context menu. The same dialog which appears when a new char view is created is shown and allows configuring the chart view.

Note	*Of course, this step can also be done directly when the object is created.*

2. Switch to the **Datapoints** tab.

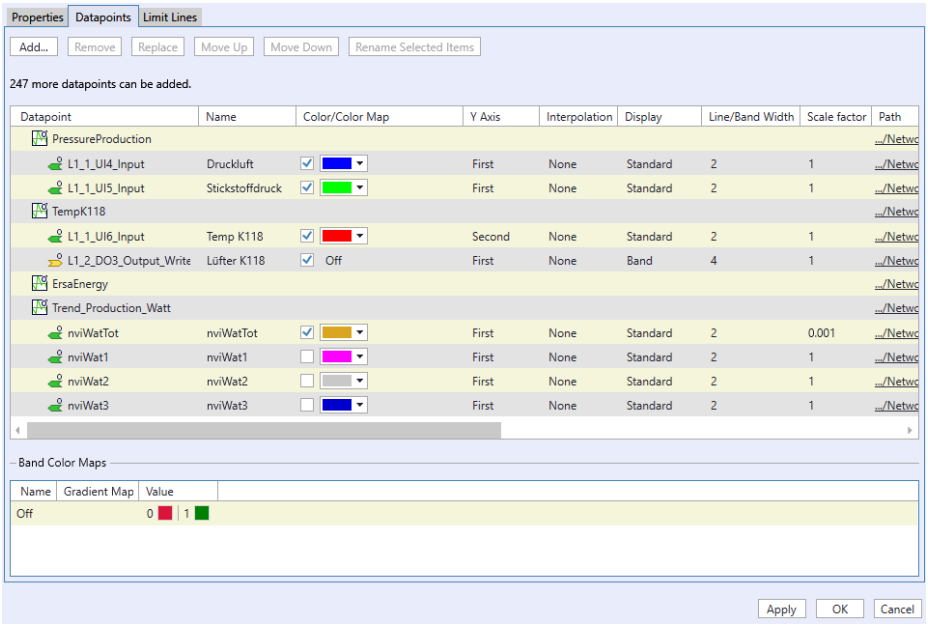


Figure 181: Chart View Datapoints

3. Click on **Add…** to add a trend log to the chart view. A trend log selector window is opened.

4. Select the trend log and click **OK**. The trend log and the logged data point(s) appear in the list below the add button.

5. Trend logs can be removed from the chart view by clicking **Remove**.

6. For each logged data point the following parameters can be configured:

   - **Name**: Name displayed in the chart view legend. If you leave this field empty, the data point name will be displayed per default.

   - **Color**: Color used to draw the trend curve.

   - **Y-Axis**: Select **First** to display the data point on the primary y-axis or **Second** to display the data point on the secondary y-axis.

   - **Interpolation:** If you select **None**, the current value will be drawn horizontally until the next recorded value is available, causing the trend graph to show a vertical step to the new value. This setting is suitable to record binary or multi state values like window state or room occupancy. Selecting **Linear** will draw straight lines between the recorded values, which is suitable for temperatures or other analog values which do not represent a small set of discrete values.

   - **Display:** Select the kind of display that will be applied to the curve. Standard for a plain line, Area fill, Stacked, Dots or Band are available.

   - **Band Color Maps:** When display is set to Band, specify the colors to be used for each value. Gradient can be applied to smooth the color maps.

   - **Scale Factor:** The data records are multiplied with this factor before displaying them. Example: To convert Wh into kWh enter the value 0.001.

7. When done with the data point setup, click **OK** to leave the dialog.

Define limit lines

A limit line draws a value as a horizontal line across the entire graph. The value can either be constant or fetched from a data point.

1. Right-click on the chart view and select **Properties** from the context menu. The same dialog which appears when a new char view is created is shown and allows configuring the chart view.

Note	*Of course, this step can also be done directly when the object is created.*

2. Switch to the **Limit Lines** tab.

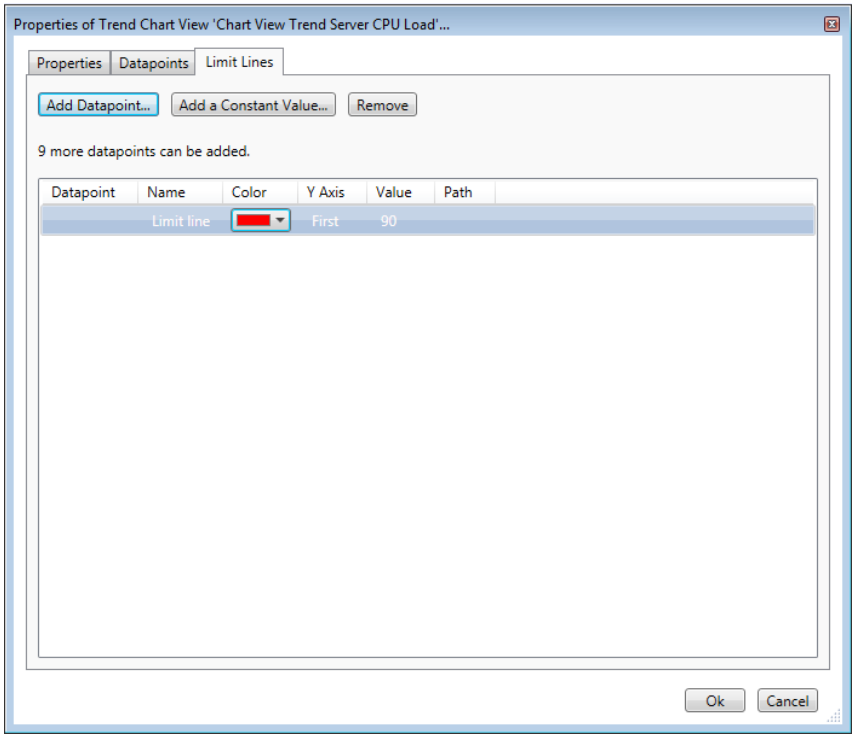


Figure 182: Chart View Limit Lines

3. To add a constant value limit line, click on the **Add a Constant Value…** button. The limit line appears in the list.

4. To add a limit line based on a data point value, click on the **Add Datapoint** button. A data point selector window is opened. Select the data point and click **OK**. The limit line appears in the list.

5. Limit lines can be removed from the chart view by clicking **Remove**.

6. For limit lines the following parameter can be configured:

   - **Color**: Color used to draw the limit line.
   - **Y-Axis**: Select **First** to display the limit line on the primary y-axis or **Second** to display the limit line on the secondary y-axis.
   - **Value:** Value displayed for constant value limit lines.

7. When done with the data point setup, click **OK** to leave the dialog.

Shortcut to create a new trend log and chart view

A shortcut to creating a LWEB-900 Server trend log and a corresponding chart view is to select a data point in the object list view, right click on it and choose **Show the Datapoint in a new Chart View** (see Figure 183) . The trend log is created with default settings in the folder **System/Trending** and the chart view is placed in the home directory of the user (see Figure 184).

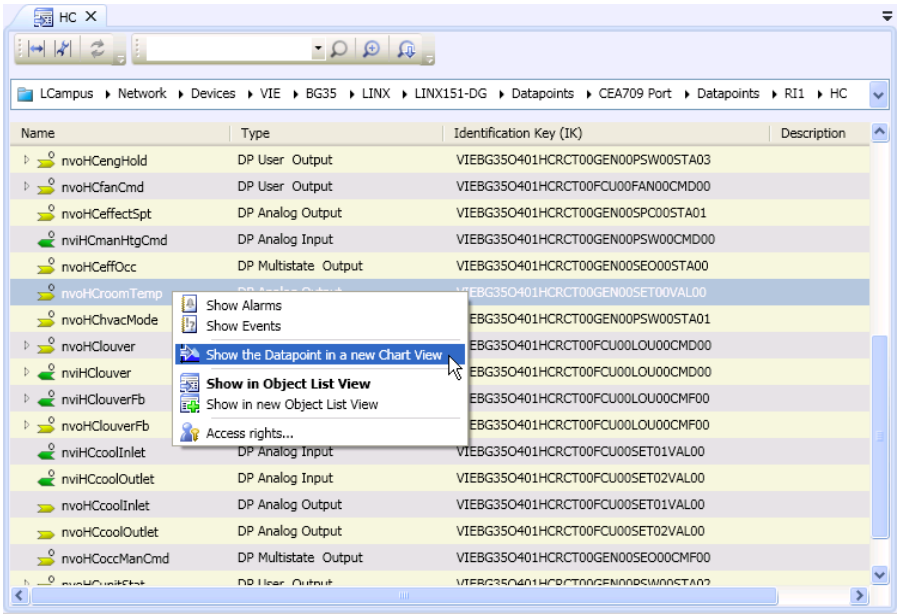


Figure 183: Create Chart View Directly From Data Point

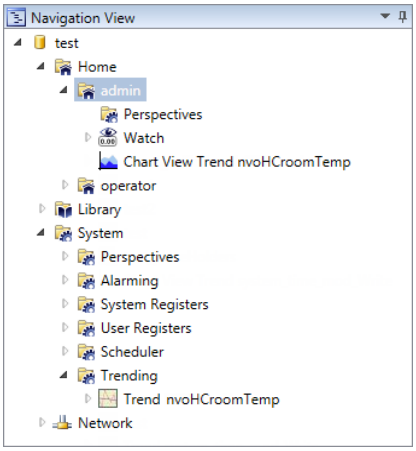


Figure 184: LWEB-900 Trend Log and Chart View Created in Home Directory

Print Trend Chart

Use the print button in the toolbar to print the trend chart. The print dialog allows adjusting the page margins and the scale factor.

6.17 Reporting

LWEB-900 can create reports based on trend logs or alarm logs. Reports can be used, for example, to document the energy consumption in a building. Figure 185 shows an example report.

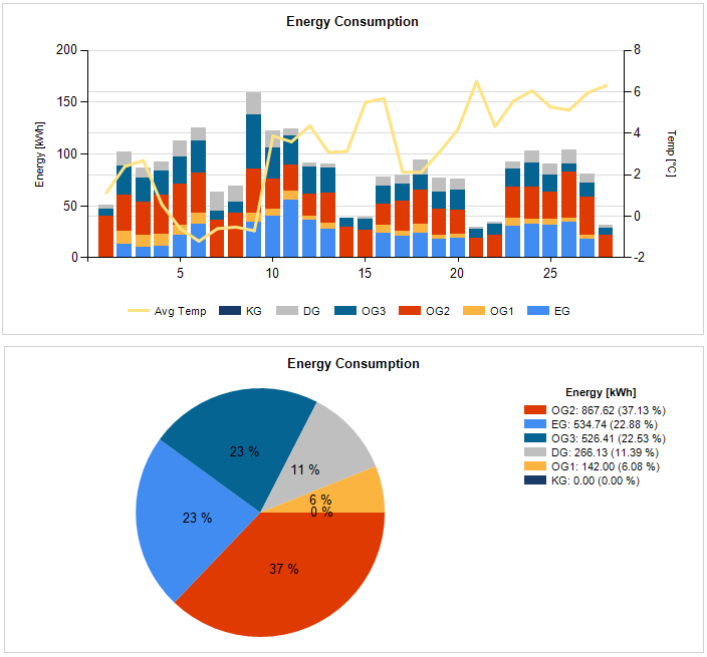


Figure 185: Example Report

The default locale used for date and number formatting in reports can be overridden in the the **Project Settings -> Reporting** panel.

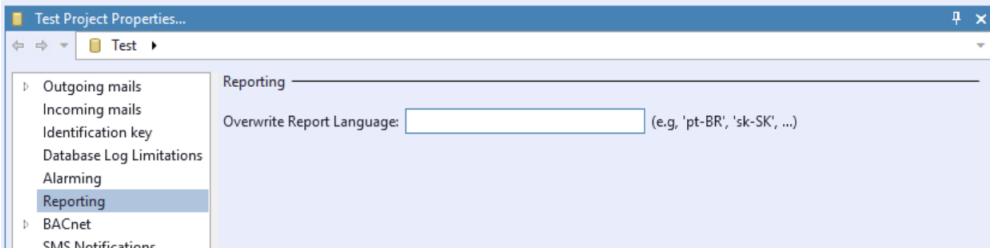


Figure 186: Reporting Language Setting

6.17.1 Report View

A report is displayed in the navigation view and in the object list view with a special icon (see Figure 187). Each time a report is triggered, for example on the first day of each month, the generated data is stored as child object of the report. Double-clicking on the report data opens the report view with the selected data. If you double-click on the report itself, the report view opens with the latest generated data. The report view includes a toolbar that provides navigation, search, and print functionality. The report can be exported to an Excel, PDF, or Word file.

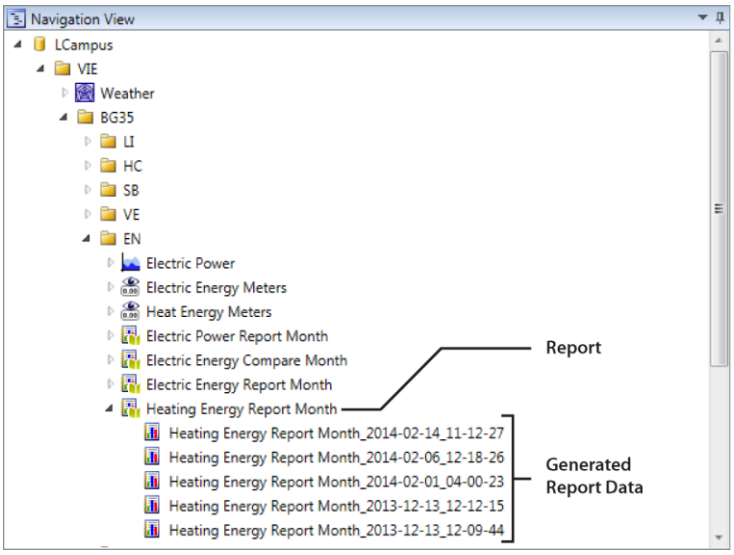


Figure 187: Reports in Navigation View

6.17.2 Configure Reports

Create a new report

Right click on a folder in the navigation view and select **New → New Report** from the context menu. A report can be created in the root folder (the project node), in the home folder of the user, or in any user defined folder.

Define report properties

When creating a new report, the report properties dialog (see Figure 188) is opened. To change the properties of an existing report, right click on the report and select **Properties** from the context menu.

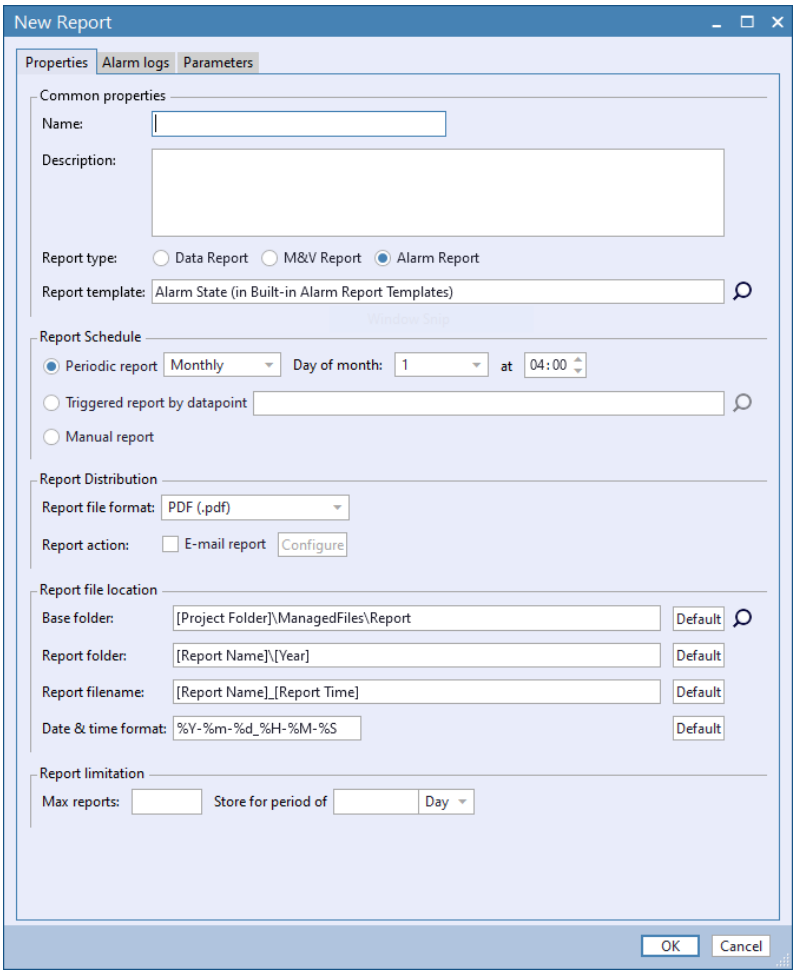


Figure 188: Report Properties

1. Enter a name and a description for the report.

2. Select a report type: Select **M&V Report** (measurement and verification) if you want to quantifying savings delivered by an energy conservation measure. Select **Alarm Report** if you want to generate reports based on Alarm logs. For all other reports, select **Data Report**.

3. Select a report template from the drop-down list. Depending on the report type, different templates are available. The report template defines how the data from the trend logs is presented. Refer to section 6.17.4 for details.

4. Configure the report schedule: The report schedule defines when LWEB-900 generates a report. LWEB-900 offers the following options:

   - **Periodic report:** The report is generated automatically each day, week, month, or year.

   - **Triggered report by datapoint:** The report is generated if the attached data point changes to a value other than zero. This feature is useful to e.g. generate a report when an alarm occurs.

   - **Manual report:** The report is generated only when the user triggers it manually.

5. Configure how the generated report will be distributed. The report can be generated in PDF, Excel, or Word format. If the **E-mail report** checkbox is active, the report will be

distributed via e-mail. A prerequisite to sending e-mails is the configuration of the outgoing e-mail server as described in Section 0. The following parameters need to be specified for e-mail distribution:

- **E-mail to:** Select the e-mail addresses which should receive the generated reports.

Note *The list of available e-mail addresses contains all users for which an e-mail address has been specified (see Section 6.27). If you want to send a report to an e-mail address which does not belong to an LWEB-900 user, you can add this e-mail address in the project properties: Select **Properties** from the context menu of the project node in the navigation view and switch to the **Outgoing mails** tab.*

- **E-mail subject:** The e-mail subject can contain the place holders described in Table 25. To add a place holder, use the right mouse button and select the place holder from the context menu.

- **E-mail body:** The body can contain the same place holders as the e-mail subject.

6. Configure the folder and file name for the generated report:

   - **Base folder:** Base folder for all generated report files.

   - **Report folder:** Subfolder for generated report files. The report folder can contain the place holders described in Table 26. To add a place holder, use the right mouse button and select the place holder from the context menu.

   - **Report filename:** The report filename can contain the place holders described in Table 25. To add a place holder, use the right mouse button and select the place holder from the context menu.

   - **Date & time format:** The date and time format can contain the format specifier described in Table 27. To add a format specifier, use the right mouse button and select the format specifier from the context menu.

7. Configure how many generated reports the LWEB-900 Server stores:

   - **Max. reports:** If a value different from 0 is specified, the LWEB-900 Server will delete the oldest report when this number is exceeded.

   - **Store for a period of:** If a value different from 0 is specified, the LWEB-900 Server deletes reports which have been generated before the specified period.

Place holder	Description
ReportName	Name of the Report
ReportType	Type of the report: • Periodic: Report was generated based on a periodic schedule • Triggered: Report was triggered by a data point • Manual: Report was generated by manual request
TriggerName	The value of this place holder depends on the trigger type: • Periodic: “System” • Triggered: Name of the data point which triggered the report • Manual: Name of the user who requested the report
ReportTime	Date and time when the report was generated
ReportIndex	The report index starts with 1 and is incremented for each generated report

Table 25: Place Holders for E-Mail Subject, E-Mail Body, and Report File Name

Place holder	Description
ReportName	Name of the Report
ReportType	Type of the report: • Periodic: Report was generated based on a periodic schedule • Trigger: Report was triggered by a data point • Manual: Report was generated by manual request
TriggerName	The value of this place holder depends on the trigger type: • Periodic: “System” • Triggered: Name of the data point which triggered the report • Manual: Name of the user who requested the report
Year	Year when the report was generated
Month	Month when the report was generated

Table 26: Place Holders for Report Folder

Format Specifier	Description
%Y	Year
%m	Month
%d	Day
%H	Hour
%M	Minute
%S	Second

Table 27: Format Specifiers for Date and Time

Define report data for data reports

Figure 189 shows the **Datalogs** tab of the report properties dialog. This dialog allows you to configure the data source for your report. Depending on the report template, you can have one or multiple data groups. The template “Stacked Column Chart“, for example, has the following two data groups:

- Group 1: All trend logs in group 1 are displayed on the primary y-axis as stacked column chart. Typically trend logs which represent energy meters are added to group 1.

- Group 2: All trend logs in group 2 are displayed on the secondary y-axis as line chart. Group 2 can be used to display data which influences the energy consumption reported by group 1 (e.g. outside temperature, solar irradiation).

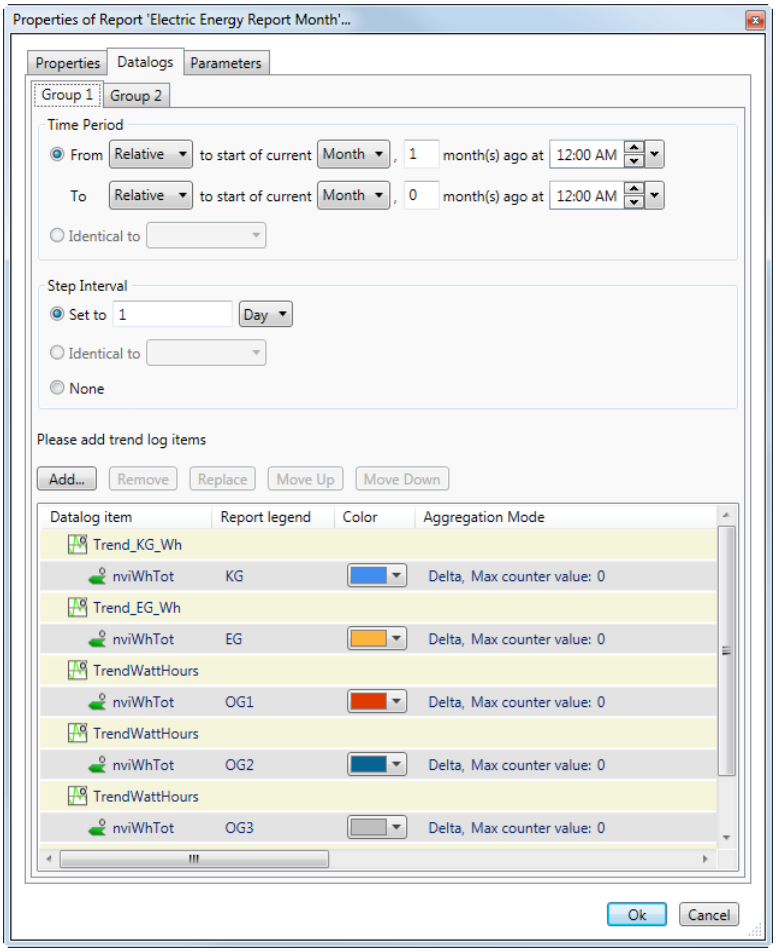


Figure 189: Report Properties, Datalogs Tab

For each data group the following information needs to be configured:

1. Define the time period: All data records with a timestamp inside the time period will be selected for the report. You have to specify a start date (**From**) and an end date (**To**). Both can be absolute or relative:

   - **Absolute**: An absolute date and time is independent of the time when the report is generated.
     Example: 1.1.2014 at 12:00 AM

   - **Relative**: If you want to create a periodic report or a triggered report, the time period should be relative to the time when the report is generated.
     Example: Relative to start of current month, 1 month ago at 12:00 AM

   If the report template has multiple data groups, you can link the time periods of the different groups by using the **Identical to** option**.** For example, after you have defined

the time period for group 1, you can select **Identical to Group 1** for the time period of group 2.

2. Define step interval: The step interval defines the resolution of the report. All data during the step interval will be aggregated. The aggregation algorithm can be configured for each data point separately (see Table 28).
   Example: To report the daily energy consumption, set the step interval to 1 day and the aggregation mode to "Delta".

3. Click on **Add…** to attach a trend log to the report. A trend log selector window is opened.

4. Select the trend log and click **OK**. The trend log and the logged data point(s) appear in the list below the add button.

5. Trend logs can be removed from the chart view by clicking **Remove**.

6. For each logged data point the following parameters can be configured:

   - **Report legend**: Name displayed in the report. If you leave this field empty, the data point name will be displayed per default.

   - **Color**: Color used to display the logged data point in the report.

   - **Aggregation Mode**: The aggregation mode defines how a value for the step interval is calculated (see Table 28).

   - **Scale Factor**: Each calculated value is multiplied with the scale factor.
     Example: To convert Wh to kWh, enter a scale factor of 0.001.

Aggregation Mode	Description
Average	Average value during the step interval
First value	First value in the step interval
Last value	Last value in the step interval
Min value	Minimum value in the step interval
Max value	Maximum value in the step interval
Sum	Sum of all values in the step interval
Delta	Calculate the difference between the last value of the current step interval and the last value of the previous step interval. This aggregation mode is used for energy counters. To take a wraparound of the energy counter into account, specify the parameter **Max counter value**
On counter	Counts how often the value changed from zero to non-zero during the step interval.
Off counter	Counts how often the value changed from non-zero to zero during the step interval.
Pulse counter	Count how many occurrences of the following sequence is detected during the step interval: change from zero, to non-zero and then change back to zero.
Running time	Time during which the value is non-zero
Down time	Time during which the value is zero
Availability	RunningTime/(RunningTime+DownTime) in percent

Table 28: Aggregation Mode

Define report data for M&V report

The M&V (Measurement and Verification) report calculates a model of the energy consumption based on the data collected during a baseline period. This model estimates how the energy consumption depends on one or more independent variables (e.g. outside air temperature). To quantify the impact of an energy conservation measure, the actual energy consumption after the measure is compared to the consumption predicted by the model.

The configuration of an M&V report is similar to a data report. On the **M&V Model** tab, the following parameters can be configured:

- **Baseline Period:** Period before the energy conservation measure which is used to calculate the model
- **Reporting Period:** Period after the energy conservation measure
- **Step Interval**: The step interval defines the resolution of the report. All data during the step interval will be aggregated.
- **M&V Parameters**: The confidence level describes how good the model fits the measured data during the baseline period. If the confidence level is too low, the model cannot be used to predict the energy consumption. If you activate the checkbox **Correct predicted negative values**, all negative values calculated by the model are corrected to zero.

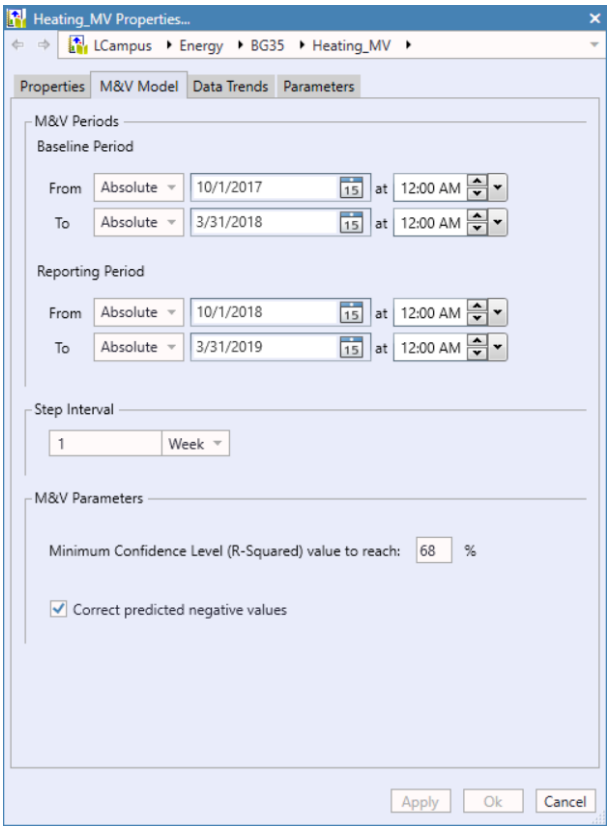


Figure 190: M&V Model Properties

The **Data Trends** tab allows adding a trend log for the energy consumption and one or multiple trend logs for independent variables (e.g. outdoor air temperature).

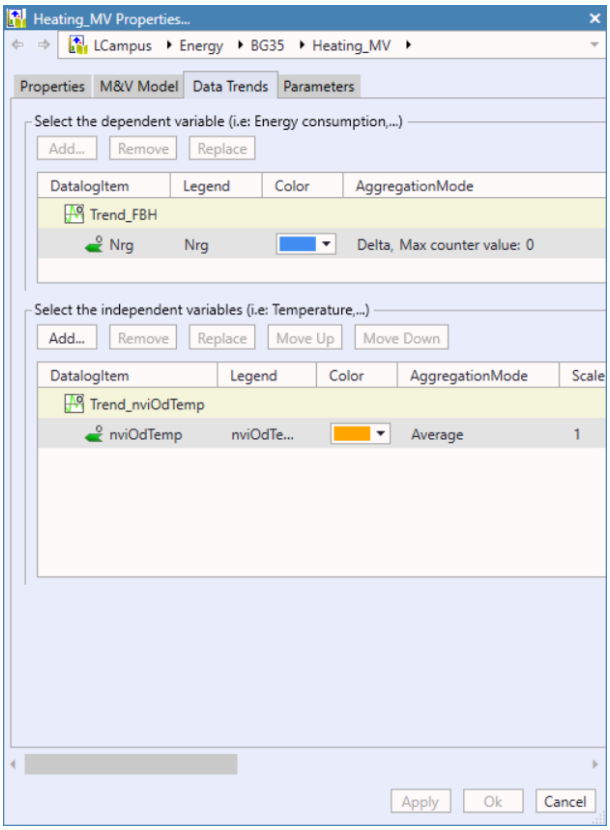


Figure 191: M&V Data Trends

Configure report template specific parameters

Figure 192 shows the **Parameters** tab of the report properties dialog. This dialog allows configuring report template specific parameters. Each report template can be customized using parameters. The parameters for the different built-in report templates are described in Section 6.17.4.

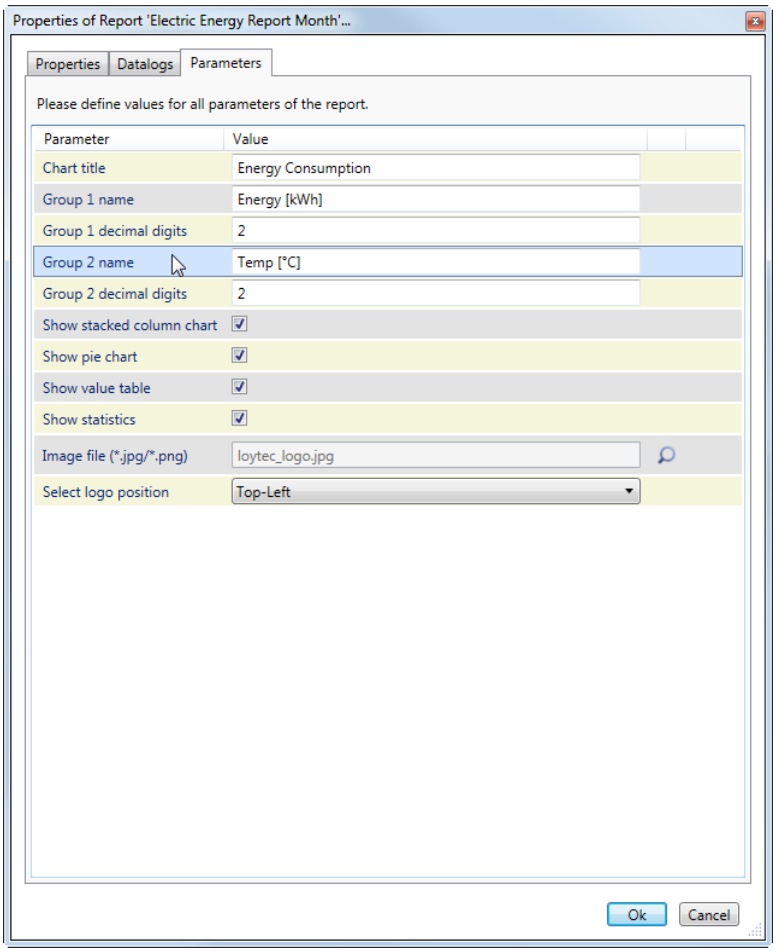


Figure 192: Report Properties, Parameters Tab

6.17.3 Trigger a report manually

To trigger a report manually, right-click on the report and select **Generate report** from the context menu. When you trigger the report generation manually, you can override the standard values for time period and step interval. The default values are determined by the report properties (see Figure 193). Set the checkbox **Send E-mail** if you want to send the report to the configured e-mail addresses.

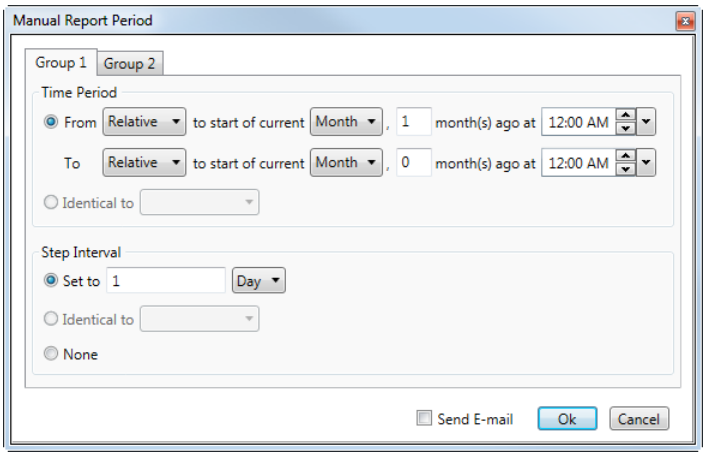


Figure 193: Trigger Report Manually

6.17.4 Report Templates

Reports are based on report templates which are displayed in the **Library/Report Templates** folder. Standard report templates are provided by LOYTEC.

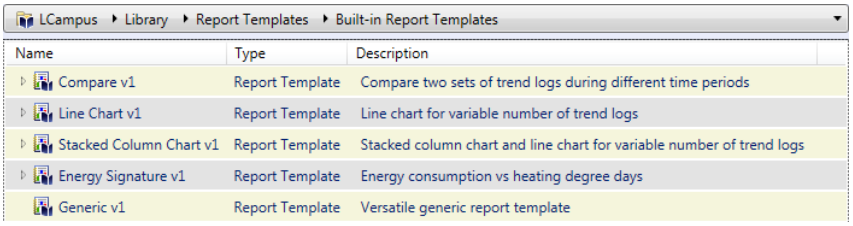


Figure 194: Built-In Report Templates

The following sections describe the standard report templates provided by LOYTEC. For information on how to create your own custom user report templates refer to Section 8.5.

Stacked Column Chart

The stacked column chart template contains two data groups. If the second data group is used, the time period and the step interval for group 2 should be set identical to group 1.

The stacked column chart contains the following report items:

- Header: The report header displays the report name, description, the time period for group 1, the date and time when the report was created, and the page number.
- Column Chart: All trend logs in group 1 are displayed on the primary y-axis as stacked column chart. All trend logs in group 2 are displayed on the secondary y-axis as line chart.

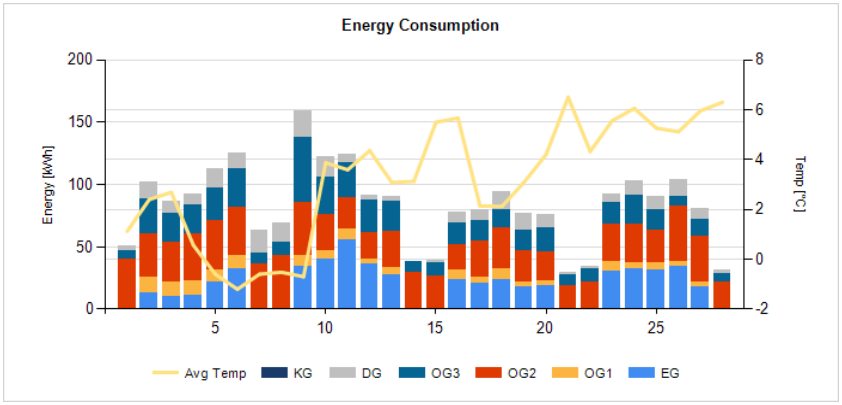


Figure 195: Stacked Column Chart, Column Chart

- Pie Chart: The pie chart is displayed only if more than one trend logs are added to group 1. It displays the sum of values for each trend log.

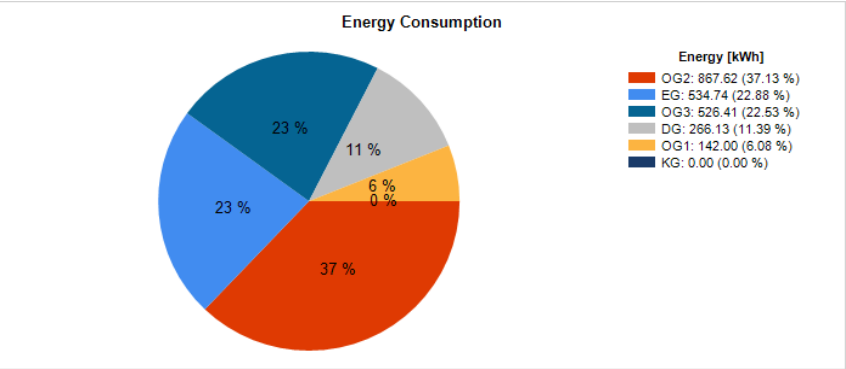


Figure 196: Stacked Column Chart, Pie Chart

- Step table: The step table contains the same information as the line chart in tabular form. Each row contains the aggregated data for the corresponding step interval. The minimum and maximum values are highlighted in bold.

- Statistics table: The statistics table provides a summary of the report data.

The following parameters can be configured for the stacked column chart template:

Parameter	Description
Chart title	Title displayed in the chart
Group 1 name	Text used for the primary y-axis in the chart and as table header in the step and statistics tables
Group 1 decimal digits	Number of decimal digits used to display values of group 1
Group 2 name	Text used for the secondary y-axis in the chart and as table header in the step and statistics tables
Group 2 decimal digits	Number of decimal digits used to display values of group 2
Show stacked column chart	This checkbox defines if the stacked column chart is displayed or not
Show pie chart	This checkbox defines if the pie chart is displayed or not.
Show step table	This checkbox defines if the step table is displayed or not.
Show statistics	This checkbox defines if the statistics table is displayed or not.
Image file (*.jpg/*.png)	The report can be customized with a custom bitmap
Select logo position	This parameter defines the position of the image file in the report

Table 29: Parameters of Report Template Stacked Column Chart

Line Chart

The line chart contains the following report items:

- Header: The report header displays the report name, description, the time period, the date and time when the report was created, and the page number.

- Line Charts: Depending on the time period, the data of the attached trend logs is displayed in one or multiple line charts. The following screenshot shows an example of the electric power for the time period of one month. Each line chart shows one complete week starting with Monday. Therefore, data from corresponding weekdays is displayed above each other.

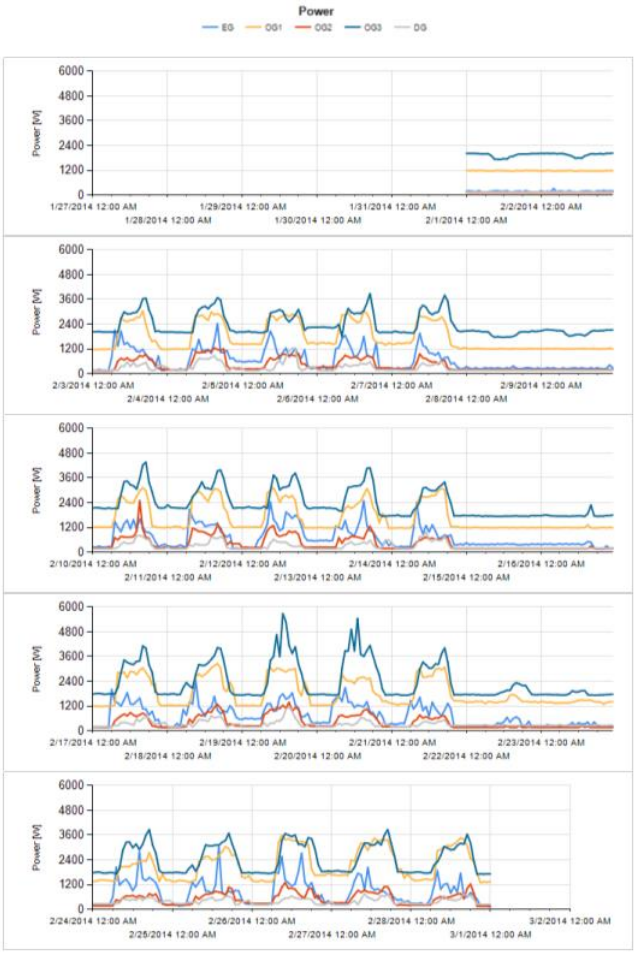


Figure 197: Line Chart Template, Chart

- Step table: The step table displays the same information as the line chart in tabular form. Each row contains the aggregated data for the corresponding step interval. The minimum and maximum values are highlighted in bold.

- Statistics table: The statistics table provides a summary of the report data.

The following parameters can be configured for the line chart template:

Parameter	Description
Chart title	Title displayed in the chart
Y-Axis label	Text used for the y-axis in the chart
Decimal digits	Number of decimal digits used to display values in the step table and statistics table
Show chart	This checkbox defines if the line chart is displayed or not
Show step table	This checkbox defines if the step table is displayed or not.
Show statistics	This checkbox defines if the statistics table is displayed or not.
Image file (*.jpg/*.png)	The report can be customized with a custom bitmap
Select logo position	This parameter defines the position of the image file in the report

Table 30: Parameters of Report Template Line Chart

Compare

This report template is intended to compare two groups of trend logs during different time periods. It can be used to e.g. compare the energy consumption in the current time period with a baseline. It is possible to add multiple trend logs to each data group. The report template compares the total of group 1 will the total of group 2. Additionally, each pair of trend logs is compared separately.

The compare report template contains the following report items:

- Header: The report header displays the report name, description, the time periods for group 1 and for group 2, the date and time when the report was created, and the page number.

- Gauge: The gauge displays the difference between the sum of all data in group 1 and group 2 in percent.

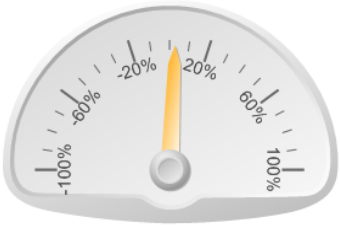


Figure 198: Compare Template, Gauge

- Summary table: This table compares each pair of trend logs (trend log n in group 1 and trend log n in group 2). For each pair of trend logs the following information is displayed: sum of values for trend log in group 1, sum of values for trend log in group 2, absolute delta, and delta in percent.

- Line chart: This chart displays a pair of trend logs (trend log n in group 1 and trend log n in group 2) over time. The x-axis labels display the timestamp of group 1. Data from group 2 is displayed with a time offset so that both data lines start at the same x-axis position.

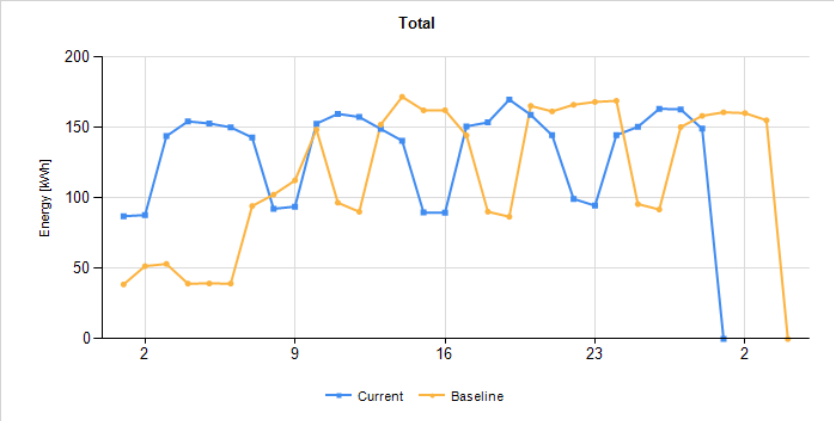


Figure 199: Compare Template, Chart

- Step table: The step table displays the same information as the line chart in tabular form. Each row contains the aggregated data for the corresponding step interval.

The following parameters can be configured for the compare template:

Parameter	Description
Y-Axis label	Text used for the y-axis in the chart
Group 1 name	Name for data in group 1
Group 2 name	Name for data in group 2
Unit	Unit displayed in chart view and in tables
Decimal digits	Number of decimal digits used to display values in the tables
Show compare gauge	This checkbox defines if the compare gauge is displayed
Show summary table	This checkbox defines if the summary table is displayed
Show total line chart	This checkbox defines if the line chart is displayed for the total of all trend logs
Show total step table	This checkbox defines if the step table is displayed for the total of all trend logs
Show separate line charts	This checkbox defines if the line chart is displayed for each pair of trend logs
Show separate step tables	This checkbox defines if the step table is displayed for each pair of trend logs
Image file (*.jpg/*.png)	The report can be customized with a custom bitmap
Select logo position	This parameter defines the position of the image file in the report

Table 31: Parameters of Report Template Compare

Energy Signature

The energy signature report gives a quick overview of the energy performance of a building. It shows the correlation between energy consumption and heating degree days. Heating degree days (HDD) are calculated from the outside temperature and are a measure of how much the outside air temperature was below a certain base temperature.

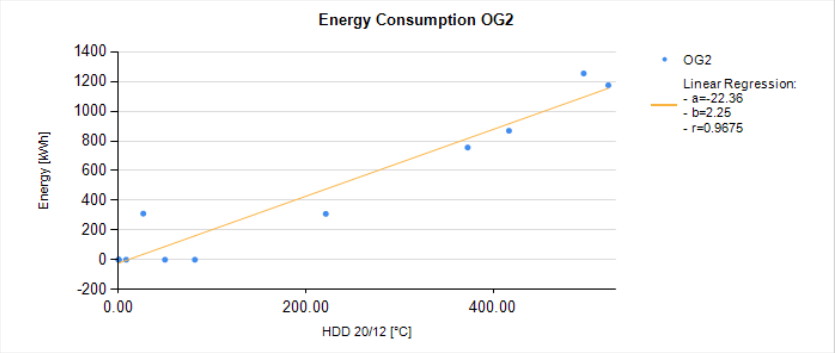


Figure 200: Energy Signature

The heating degree days are calculated using the following formula:

$HDD_{TIndoor/TBase} = \sum$ If (TOutdoor < TBase, TIndoor –TOutdoor, 0)

TIndoor: Average room temperature

TBase: Outside temperature below which the building needs heating

TOutdoor: Outdoor temperature

The values TIndoor and TOutdoor are the parameters for the calculation, the values TOutdoor are the measured values.

The energy signature report performs a simple linear regression and shows the following parameters:

Energy Consumption ≈ a + b*HDD

a: Energy consumption for HDD=0

b: Slope

r: The product-moment correlation coefficient r is a measure of the linear dependence between the energy consumption and heating degree days. The value 1 is total positive correlation, 0 is no correlation, and −1 is total negative correlation.

The energy signature report template contains two data groups. Group 1 contains the energy meter data. Figure 201 shows an example configuration. If multiple energy meter trend logs are added, a separate chart is displayed for each energy meter. Group 2 contains the trend log for the outside temperature (see Figure 202). The step interval for Group 2 has to be set to 1 day for calculation of the heating degree days.

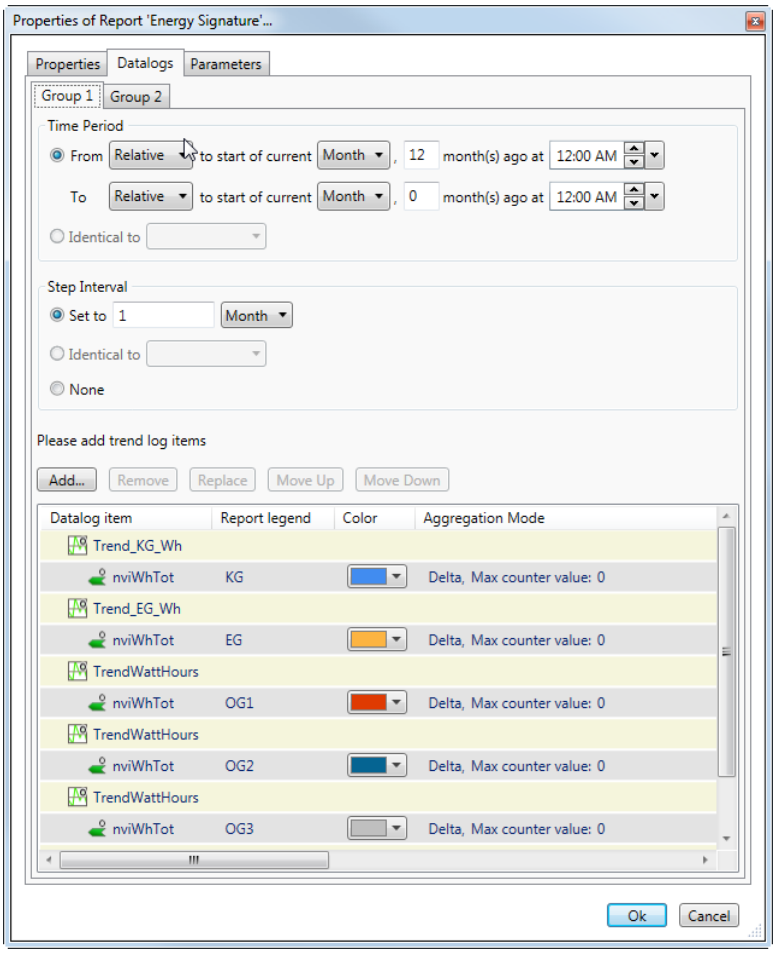


Figure 201: Energy Signature Report, Group 1 Configuration

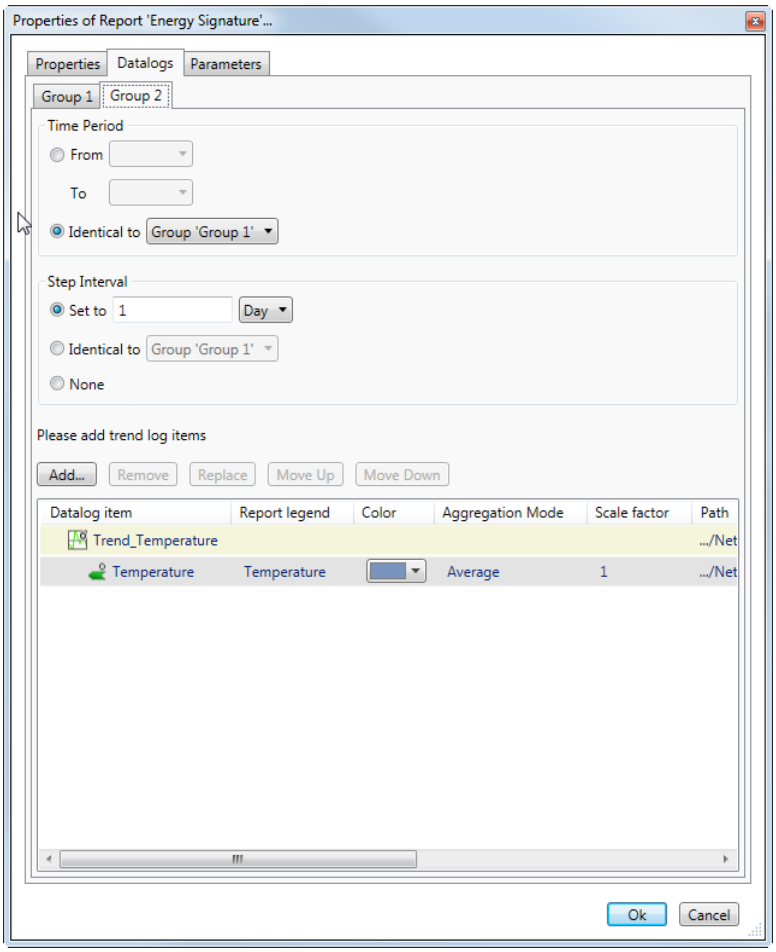


Figure 202: Energy Signature Report, Group 2 Configuration

The following parameters can be configured for the energy signature template:

Parameter	Description
Chart title	Text used for the chart title
Group 1 name	Label displayed on y axis of chart and for table header
Group 2 name	Label displayed on x axis of chart and for table header
Group 1 decimal digits	Number of decimal digits used to display values of group 1 (energy consumption)
Group 2 decimal digits	Number of decimal digits used to display values of group 2 (outside temperature)
Base Temperature	The base temperature of a building is the temperature below which that building needs heating
Indoor Temperature	Average indoor temperature
Show total chart	This checkbox defines if the compare gauge is displayed
Show separate charts	This checkbox defines if the line chart is displayed for the total of all trend logs
Show step table	This checkbox defines if the summary table is displayed
Show statistics	This checkbox defines if the step table is displayed for the total of all trend logs
Image file (*.jpg/*.png)	The report can be customized with a custom bitmap
Select logo position	This parameter defines the position of the image file in the report

Table 32: Parameters of Energy Signature Report Template

Generic

The generic report template contains one data group. It allows specifying what charts and tables are used to display data. The following parameters can be configured for the generic report template:

Parameter	Description
Chart title	Text used for the chart title
Y-Axis label	Text used for the y-axis in the chart
Decimal digits	Number of decimal digits used to display values in the step table and statistics table
Show line chart	This checkbox defines if the line chart is displayed or not
Show stacked column	This checkbox defines if the stacked column chart is displayed or not
Show pie chart	This checkbox defines if the pie chart is displayed or not
Show vertical bar	This checkbox defines if the vertical bar chart is displayed or not
Show horizontal bar	This checkbox defines if the horizontal bar chart is displayed or not
Show scatter chart	This checkbox defines if the scatter chart is displayed or not
Show step table	This checkbox defines if the step table is displayed or not.
Show statistics	This checkbox defines if the statistics table is displayed or not.
Image file (*.jpg/*.png)	The report can be customized with a custom bitmap
Select logo position	This parameter defines the position of the image file in the report

Table 33: Parameters of Generic Report Template

M&V Report Line Chart

The M&V report line chart contains the following report items:

- Header: The report header displays the report name, description, the baseline and reporting time period, the date and time when the report was created, and the page number.

- M&V analysis: The report displays the energy saving achieved by the conservation measure. It displays the measured consumption during the reporting period and compares it to the prediction by the model. If the value **Model Baseline Fit** is low, the model cannot accurately predict the energy consumption. Check if an independent variable needs to be added to the report.

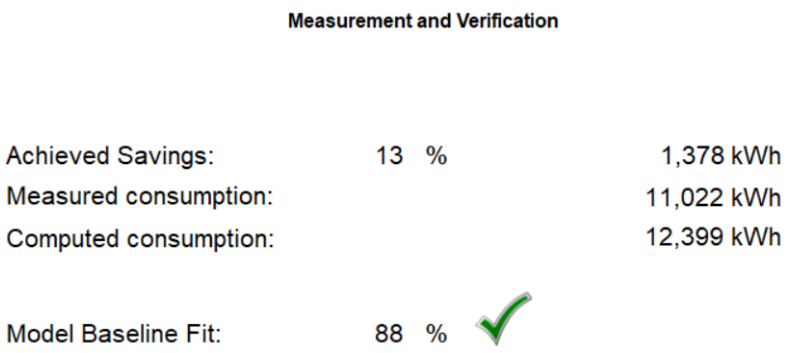


Figure 203: M&V Analysis

- Baseline period chart: The line chart shows the energy consumption measured during the baseline period as well as the approximation by the model. This chart visualizes how well the model fits the baseline data.

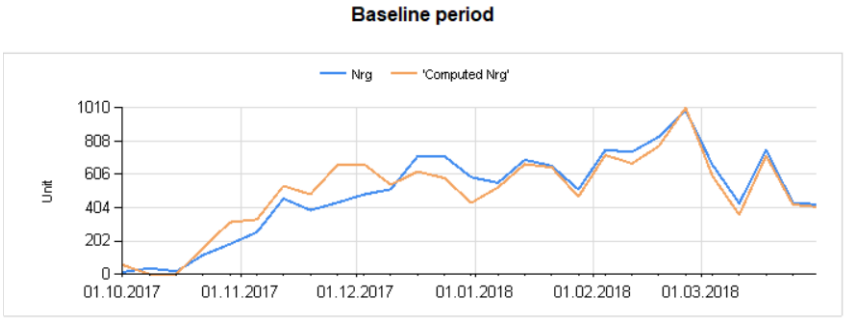


Figure 204: Baseline Period Chart

- Reporting period chart: The line chart shows the energy consumption measured during the reporting period as well as the prediction by the model. This chart shows the effect of the energy conservation measure.

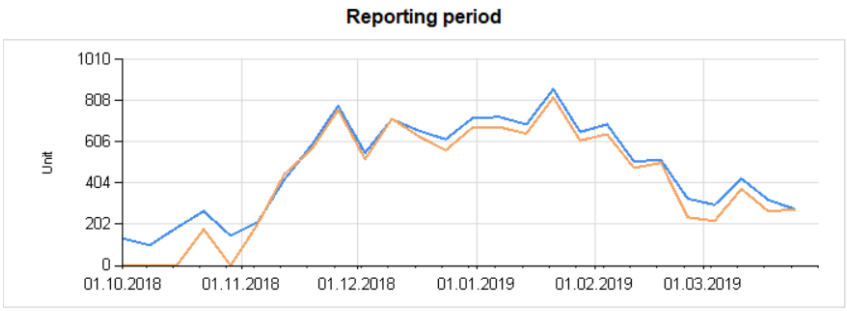


Figure 205: Reporting Period Chart

- Original Data: These line charts display the measured data on which the analysis is based.

- Step table: The step table displays the same information as the line charts in tabular form. Each row contains the aggregated data for the corresponding step interval. The minimum and maximum values are highlighted in bold.

- Statistics table: The statistics table provides a summary of the report data.

The following parameters can be configured for the M&V report:

Parameter	Description
Chart title	Title displayed in the report
Y-Axis label	Text used for the primary y-axis in the charts
Decimal digits	Number of decimal digits used to display values
Unit	Engineering unit for the consumption
Show chart	This checkbox defines if the line charts are displayed or not
Show step table	This checkbox defines if the step table is displayed or not.
Show statistics	This checkbox defines if the statistics table is displayed or not.
Invert columns and rows	This checkbox inverts columns and rows for the step table. This can make sense, if there are more independent variables than step intervals
Show analysis of variance (ANOVA table)	If this checkbox is enabled, detailed statistics of the model are displayed
Difference text	Text label used in the report to display the energy savings
Measured value text	Text label used in the report to display the measured energy consumption for the report period
Computed value text	Text label used in the report to display the energy consumption calculated by the model for the report period
Image file (*.jpg/*.png)	The report can be customized with a custom bitmap
Select logo position	This parameter defines the position of the image file in the report

Table 34: Parameters of Report Template M&V Report Line Chart

6.17.5 Alarm Report

The LWEB-900 Server can generate reports based on Alarm Log data. Alarm reports allow you to easily analyze and review alarm activity over a previous interval.

Alarm Reports do not display each individual alarm. Instead, they group alarms by priority ranges. These priority ranges must be configured in the project beforehand. You also need to select the Base object, which will include all underlying Alarm logs to gather the data.

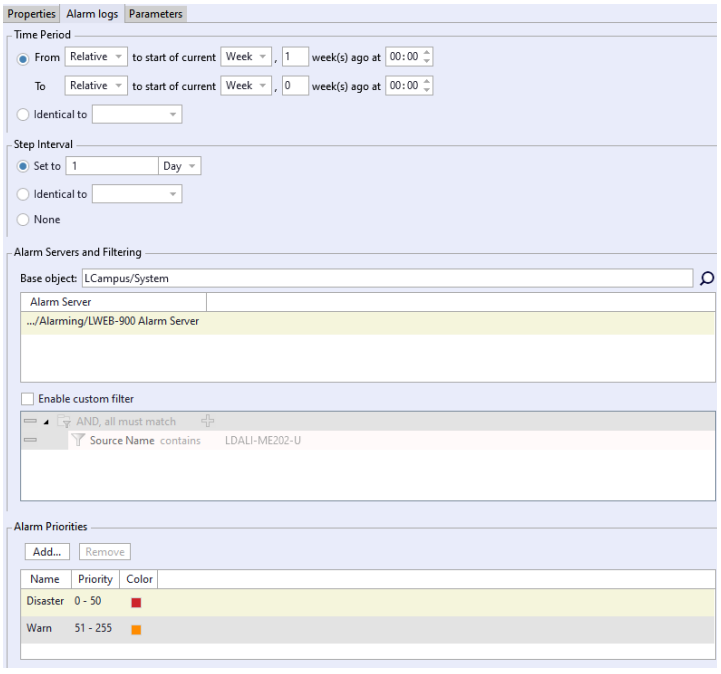


Figure 206: Alarm report properties

Two different alarm report templates are currently available: Alarm Count and Alarm State.

Alarm Count allows you to count the number of alarms for each selected alarm priority within the chosen time period and step interval.

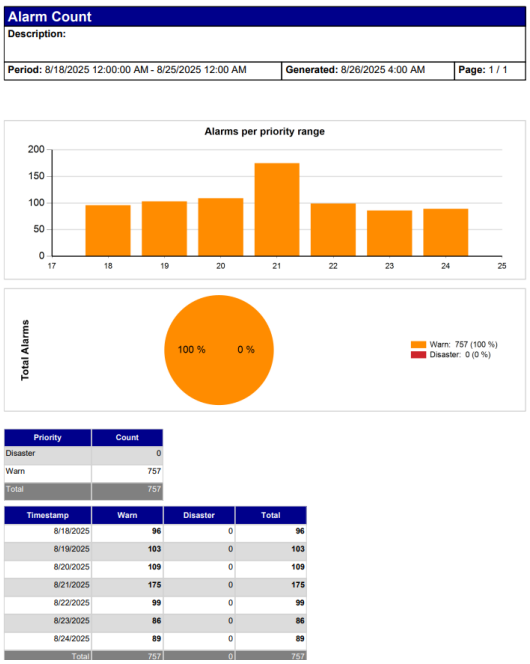


Figure 207: Alarm count report instance

Alarm State allows you to count the number of alarms per state for each selected alarm priority within the chosen time period. For each alarm priority, the average, fastest, and slowest state transitions after the alarm occurred are also provided.

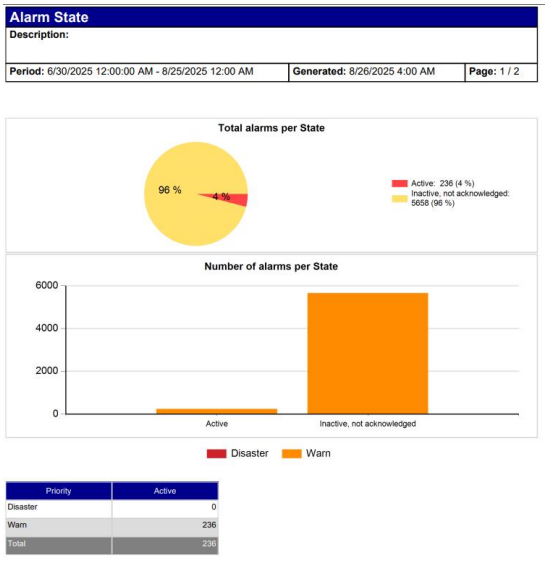


Figure 208: Alarm state report instance

The report also includes a timing overview table of the alarm state transitions, such as the durations from Active to Acknowledged and from Active to Inactive.

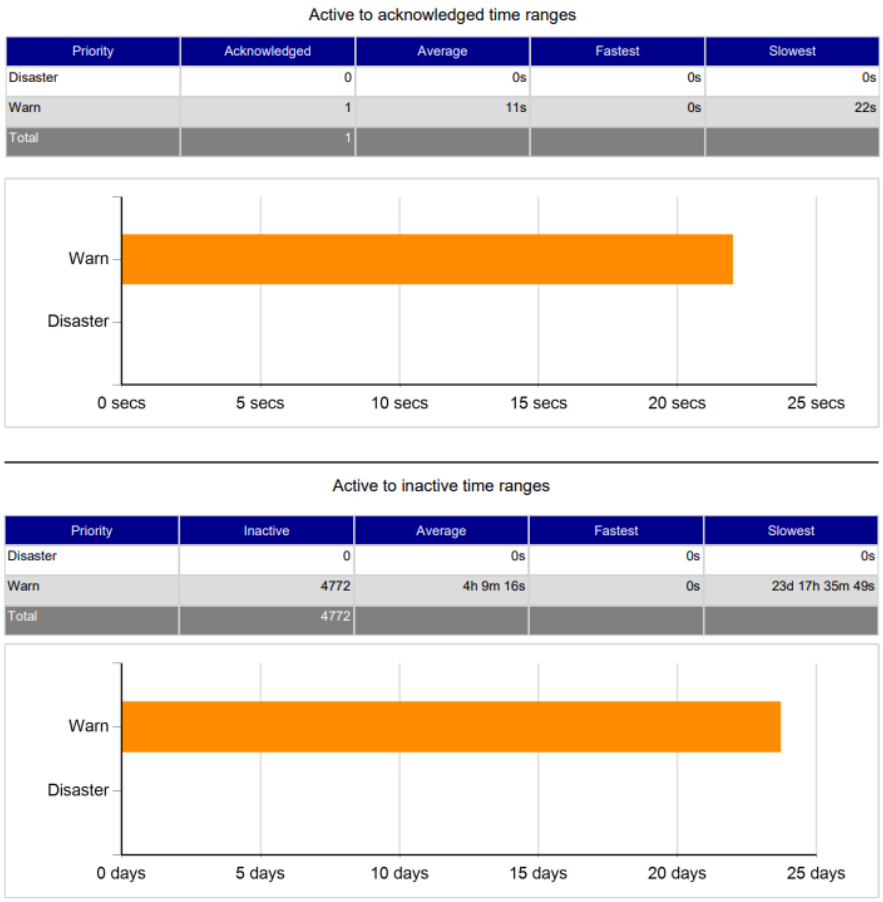


Figure 209: Alarm state report transition time

6.18 E-Mail Notification

The LWEB-900 Server can send e-mail notification in case of an alarm (see Section 6.14.3) or if a report is generated (see Section 6.17). The prerequisite to sending e-mails is the configuration of the outgoing e-mail server. Select **Properties** from the context menu of the project node in the navigation view and open the **Outgoing mails** tab.

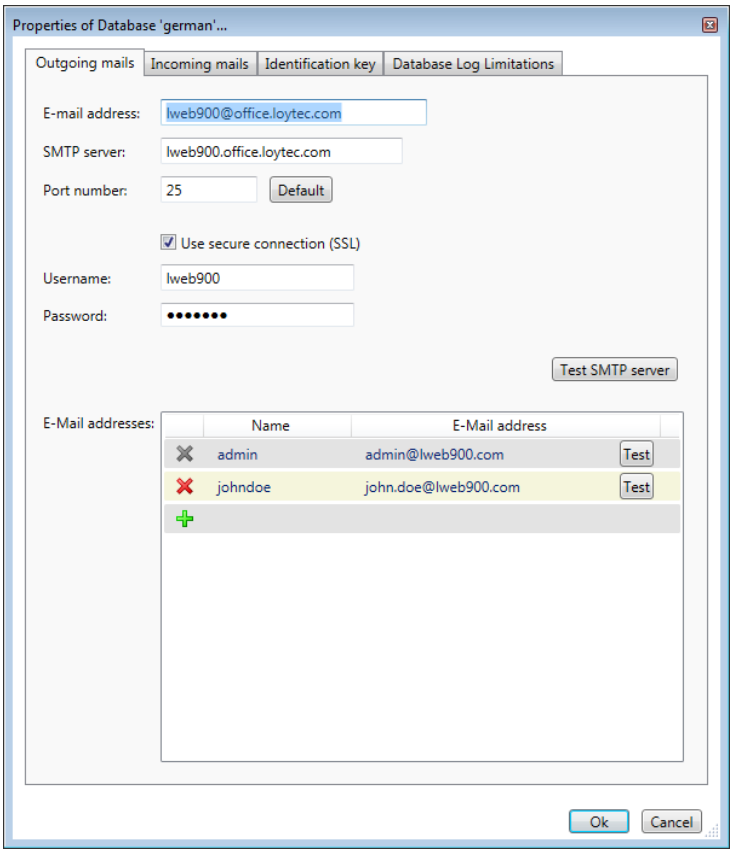


Figure 210: Configure Outgoing Mails

- **E-mail address:** Enter the e-mail address of the LWEB-900 server's e-mail account.
- **SMTP server:** SMTP server of your Internet provider.
- **Port number:** Typically, the SMTP server port can be left at 25.
- **User secure connection (SSL)**: Enable secure socket layer.
- **Username** and **Password**: If the provider's SMTP server requires authentication, specify the user name and password.
- **E-Mail addresses**: The list automatically contains all users for which an e-mail address has been specified (see Section 6.27). If you want to add e-mail addresses which do not belong to LWEB-900 users, you can add them explicitly to the list by pressing the plus icon.

6.19 Event View

The event view helps you to keep track of what is going on in LWEB-900. It can be opened by selecting **Show Events** from the context menu of a folder. An example is shown in Figure 211.

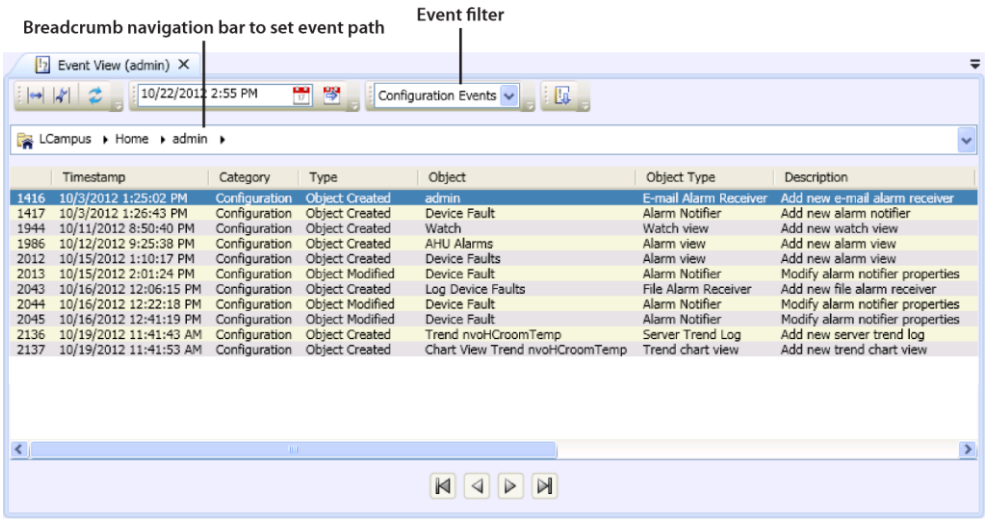


Figure 211: Event View

Event path

Each event is associated with an LWEB-900 object. LWEB-900 objects are organized hierarchically and can be explored using the navigation view and the object list view. The event view displays only events related to objects which are inside the path set in the breadcrumb navigation bar. To see all events, select the top folder. Select a specific folder to see only events which are associated with objects inside this folder.

Event filter

The event filter lets you drill down to the specific events you want to see. The event view offers a number of predefined filters described in Table 35 or you can use the powerful custom filter.

Column	Description
All Events	Display all events.
Alarm Events	Display alarm events only.
Configuration Events	Display configuration events only. Configuration events include the creation and deletion of objects and the modification of their properties.
Set Value Events	Display events which change the value of an object. This includes modification of a data point value, modification of schedulers (scheduler events, calendar patterns, date entries), and modification of trend logs (edit trend log records, clear trend log) done by LWEB-900 users.
Device Management Events	Display events related to device management. This includes the upload and download of files from/to the device.
User Management Events	Display user management events. This includes login and logout events, configuration of users and groups, and setting access rights.
System Events	System events are generated by the LWEB-900 Server if an LWEB-900 project is started or stopped, a project backup or restore operation is executed, or if an error occurs.

Table 35: Predefined Event Filters

Figure 212 shows an example of a custom filter definition. As you can see, the custom filter allows to combine multiple conditions with **AND** and **OR** operators.

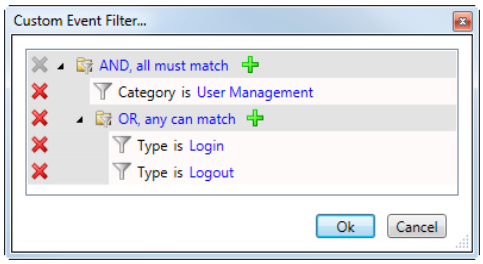


Figure 212: Custom Filter

Column Configuration

The columns of the event view can be customized. To add columns or to change the column order, click on the **Configure columns** toolbar button.

The column configuration is stored for each event view separately. To change the column configuration for the current event view only, deactivate the **Apply to all 'Event view' objects** checkbox and click the **Apply** button. To save the configuration for all event views, activate the checkbox and press the **Apply** button.

Column	Description
Timestamp	Date and time when the event occurred.
Category	Event main category: • **Alarm**: Alarm events. • **Set Value**: Object value changed. • **Configuration**: Object created, deleted, or properties modified. • **User Management**: User management related events. • **System**: System events like project start/stop, project backup/restore, and error events. • **Device Management**: Upload and download of files from/to the device.
Type	Type of event inside the main category.
Description	Description of the event.
Object	Name of the object associated with the event.
Object Type	Type of the object associated with the event.
Object Identification Key	Identification key of the object associated with the event. Section 6.8 describes how to assign identification keys to data points.
Path	Path of the object.
User	If the event was triggered by a user, this field contains the user name.
Access Level	User access level required to trigger the event.
Comment	For some events (e.g. disable alarms, edit trend log records), the user can enter a comment.
Item (Index)	Some objects contain sub items (e.g. a graphical view object has data point items in its data point interface, a trend log has attached data points). If such a sub item is affected by the event, the **Item (Index)** field contains its name.
Item Identification Key	Identification key of the sub item associated with the event. Section 6.8 describes how to assign identification keys to data points.
Item Path	Path of the sub item.
Value	New value of the object after the event.
Old Value	Old value of the object before the event.
State	In case of an alarm event, this field contains the alarm state: • **Active, not acknowledged** • **Active, acknowledged** • **Inactive, not acknowledged** • **Inactive acknowledged**
Priority	In case of an alarm event, this field contains the priority.
Alarm Time	Date and time when the alarm occurred.
Clear Time	Date and time when the alarm condition was cleared. If the alarm is still active, this field is empty.
Ack. Time	Data and time when the alarm was acknowledged. If the alarm has not yet been acknowledged, this field is empty.
XAID	On a LOYTEC device, each alarm is uniquely identified by the XAID. The XAID is used in the acknowledgement to identify the alarm.

Table 36: Event View Columns

Save event view

If you regularly need to filter for certain events, it might be useful to save your event view: click the **Save event view** button, enter the view name and its optional description. A new event view with the current path and filter settings is created in your home directory. The next time you want access the event view, just double click it, and you will see the most current events matching your path and filter.

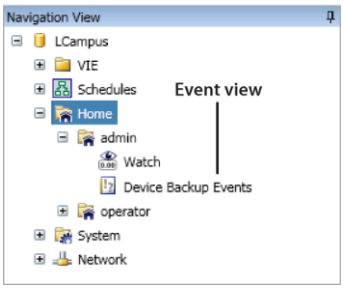


Figure 213: Event View Icon

Print event view

Use the print button in the toolbar to print the event view. You can print all event records or only events logged during a configurable time interval. The print dialog allows adjusting the page margins and the font size.

Event log size limitation

Even on a server with a large hard drive, the disk space is limited. Therefore, you need to configure for how long the LWEB-900 Server keeps old events.

1. Select **Properties** from the context menu of the project node in the navigation view and switch to the **Database Log Limitations** tab.

2. The event log size is limited by the following parameters:

   - **Size limit**: The event log is organized as a ring buffer. As soon as the maximum number of log items has been reached, new log entries will overwrite the oldest entries.

   - **Duration limit**: This parameter defines the maximum time span for which old data is kept before deleting it from the database.

6.20 Global Connections

Global connections are an easy way to connect data points from different LOYTEC devices. The data is transferred over an IP-based network. Global connections are especially useful to distribute certain global data (e.g. weather station data, wind alarms, global on/off) in a system.

To configure such communication, all devices need to be member of a CEA-852 channel. The configuration of the CEA-852 channel is done by adding devices to a configuration server using the web UI. Refer to device specific manuals for more details.



Figure 214: CEA-852 Channel List Setup

Create a global connection

1. Use your right mouse button to click on the **Global connections** folder in the navigation view and select **New → New Global Connection** from the context menu.

Note	*You can organize global connections in sub folders. To create a sub folder, right click on the **Global connections** folder and select **New → New Folder** from the context menu.*

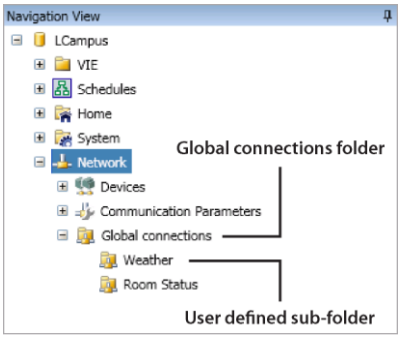


Figure 215: Global Connections Folder

2. Define a name and description for the global connection. The name is required to be unique.

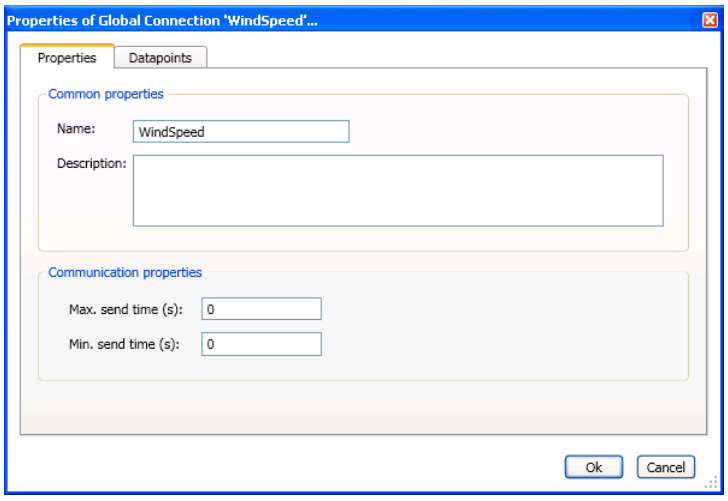


Figure 216: Global Connection Properties

3. Define timing parameters for the global connection:

   - **Max Send Time**: This timing parameter of the global connection specifies a time in seconds, in which a value update is transmitted into the connection, even if the value has not changed. This is typically used for heartbeat functions.

   - **Min Send Time**: This timing parameter of the global connection specifies a time in seconds, for which transmissions will be delayed after sending out a value into the connection. This setting can be used to limit the transmission rate to the connection.

4. Switch to the **Datapoints tab**

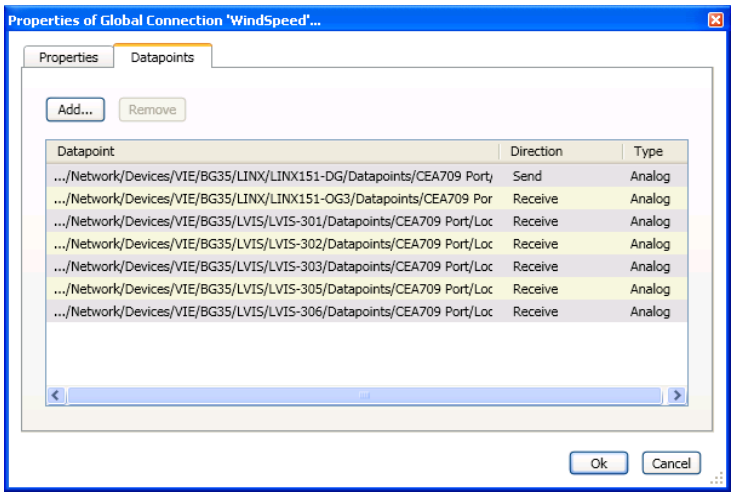


Figure 217: Global Connection Datapoints

5. Add data points to the global connection. Click on **Add…** to open a data point selector window.

6. Select the data points and click **OK**. For each of the attached data points, a line appears in the list below the add button.

7. Data points can be removed from the global connection by clicking **Remove**.

8. As a default, output data points will be added with the direction **Send**, input data points with the direction **Receive**. Change the direction by modifying **Send** or **Receive**.

9. When done with the global connection setup, click **OK** to leave the dialog. The global connection is displayed in the navigation view. All datapoints which are member of the connection are displayed in the object list view.

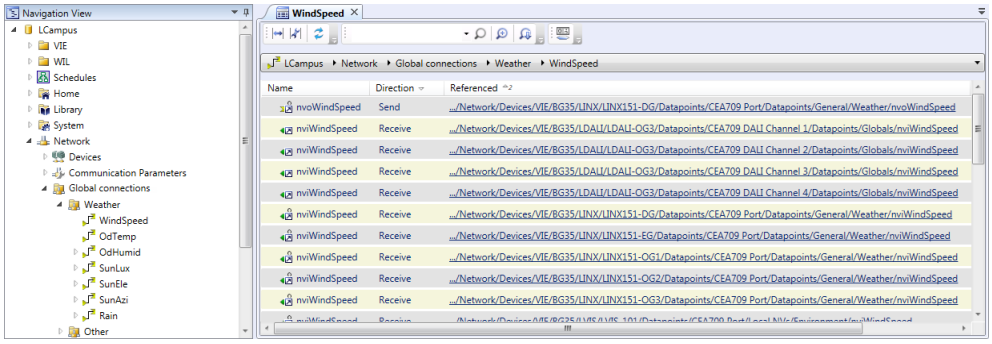


Figure 218: Global Connections in Object List View

Download global connections

After the connections have been created in LWEB-900, the LOYTEC devices need to be configured accordingly. This is done by downloading the connection information to the devices.

1. Use your right mouse button to click on the **Global connections** folder in the navigation view and select **Download Global Connections** from the context menu.

2. Select the devices to which the global connection information should be downloaded. Per default only devices for which the global connection configuration changed since the last download are selected. You can change the selection by activating/deactivating the checkboxes beside the devices (see Figure 219).

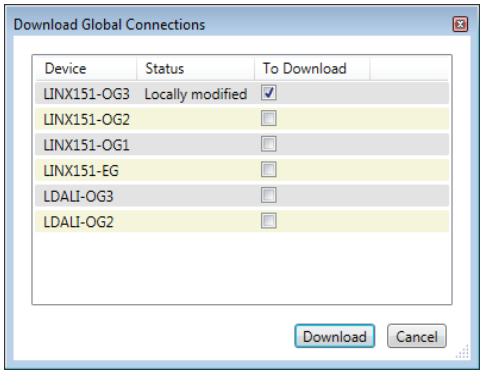


Figure 219: Download Global Connections

3. Click on the **Download** button

Upload global connections

If global connections have been configured using a different tool (e.g. device configuration software), those existing global connections can be uploaded into LWEB-900:

1. Use your right mouse button to click on the **Global connections** folder in the navigation view and select **Upload Global Connections** from the context menu.

2. The existing global connections of all devices are checked and the current status is displayed. You can select from which devices you want to upload the global connections and import them into LWEB-900.

6.21 File Objects

LWEB-900 allows you to store files on the server and to link them to other objects or to alarms. File objects can be added below the folder **Library/Files**. Files can be organized in user defined folders. Note objects are special file objects that contain formatted text. They can be edited directly in LWEB-900.

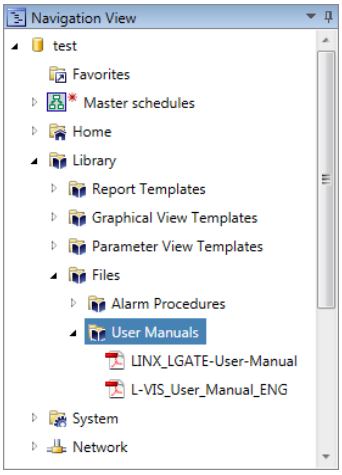


Figure 220: File Objects

File and note objects support the following types of links:

- Direct link: The file or note object can be linked directly to any other object in the navigation view. The file or note object appears as attached file in the context menu of the linked object.

- Object filter: The file or note object can be linked to multiple other objects in the navigation view by specifying an object filter condition. The file or note object appears as attached object in the context menu of any object that passes the filter condition.

- Alarm filter: The file or note object can be linked to alarms by specifying an alarm filter condition. The file or note object appears as attached file in the context menu of any alarm in the alarm view that passes the filter condition.

Create new file object

1. Right click on a folder in the navigation view and select **New → New File** from the context menu. A file object can be created in **Library/Files** folder or any user defined subfolder.

2. Enter a name, description, and select a file by clicking on the browse button.

3. After clicking the **OK** button, the new file object is created and displayed in the navigation view.

Create new note object

1. Right click on a folder in the navigation view and select **New → New Note** from the context menu. A Note object can be created in **Library/Files** folder or any user defined subfolder.

2. Enter a name and type a text for the note. The text input field contains a toolbar to format the text.

3. After clicking the **OK** button, the new file object is created and displayed in the navigation view.

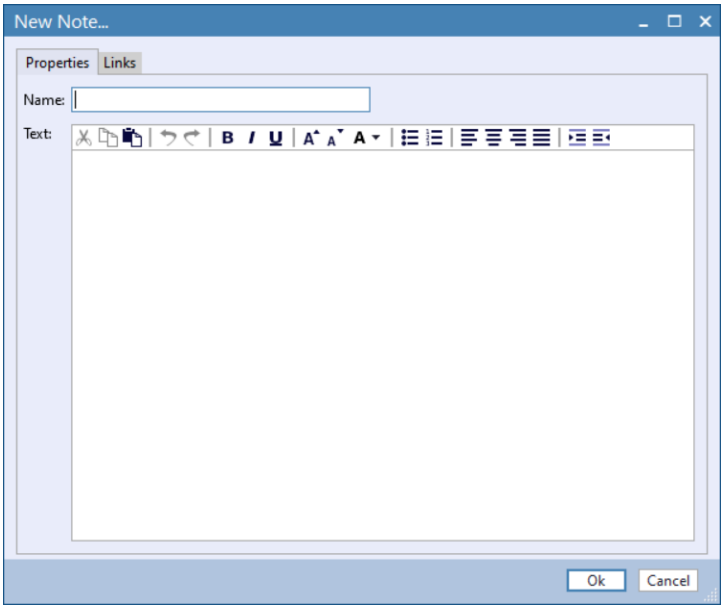


Figure 221: New Note

Link file or note object using a direct link

1. Right click on the file object and select **Properties** from the context menu.

2. Activate the **Links** tab and click on the Plus icon to add a new link.

3. Give the link a name, select the **Link Type** "Direct Link to Object" and press on the Browse button to select the object to which you want to link.

4. You can create multiple links for a file object.

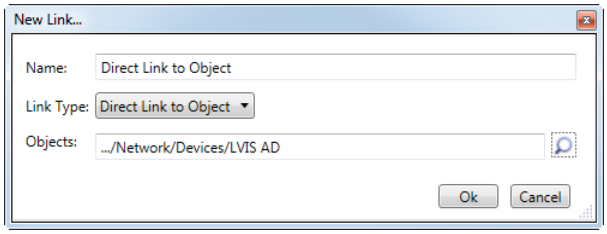


Figure 222: Create Direct Link

Note	*An alternative way to create a direct link is to drag the file or note object and drop it on the object to which you want to link it.*

Link file or note object using an object filter

1. Right click on the file object and select **Properties** from the context menu.
2. Activate the **Links** tab and click on the Plus icon to add a new link.
3. Give the link a Name, select the **Link Type** "Link Filter to Object" and define a filter condition. You can combine multiple parameters using **AND**, **OR**, and **NOT** operators.

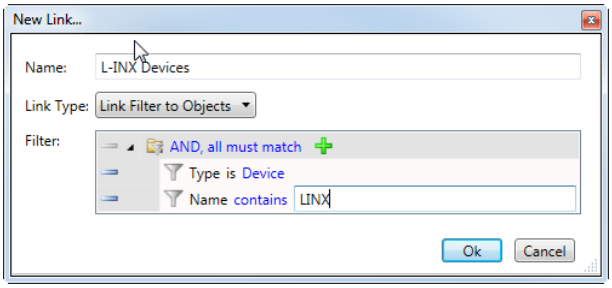


Figure 223: Create Link Using Object Filter

Link file or note object using an alarm filter

1. Right click on the file object and select **Properties** from the context menu.
2. Activate the **Links** tab and click on the Plus icon to add a new link.
3. Give the link a Name, select the **Link Type** "Link Filter to Alarm" and define a filter condition. You can combine multiple parameters using **AND**, **OR**, and **NOT** operators.

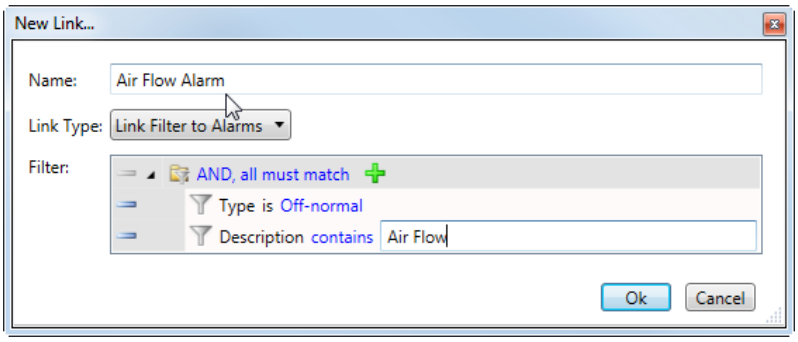


Figure 224: Create Link Using Alarm Filter

Edit file object

1. Right click on the file object and select **Download for editing** from the context menu.
2. Edit the local version of the file
3. Right click on the file object and select **Upload new version** from the context menu.

6.22 Device Management View

The device management view provides functionality to upgrade the firmware of multiple LOYTEC devices in parallel. It checks periodically if a new firmware has been published on the LOYTEC web site and informs the user if an update is available.

Using the device management view, the configuration and parameterization of LOYTEC devices can be managed. In a typical installation multiple devices have the same data point configuration but are parameterized differently. LWEB-900 can assign configuration and parameter files to devices and download them in parallel. Furthermore, LWEB-900 can manage program (logi.CAD) files.

The backup feature allows defining regular backup schedules for LOYTEC devices. It is also possible to backup selected devices on request.

To open the device management view, right click on the **Network/Devices** folder in the navigation view and select **Open in Device Management View** (see Figure 225).

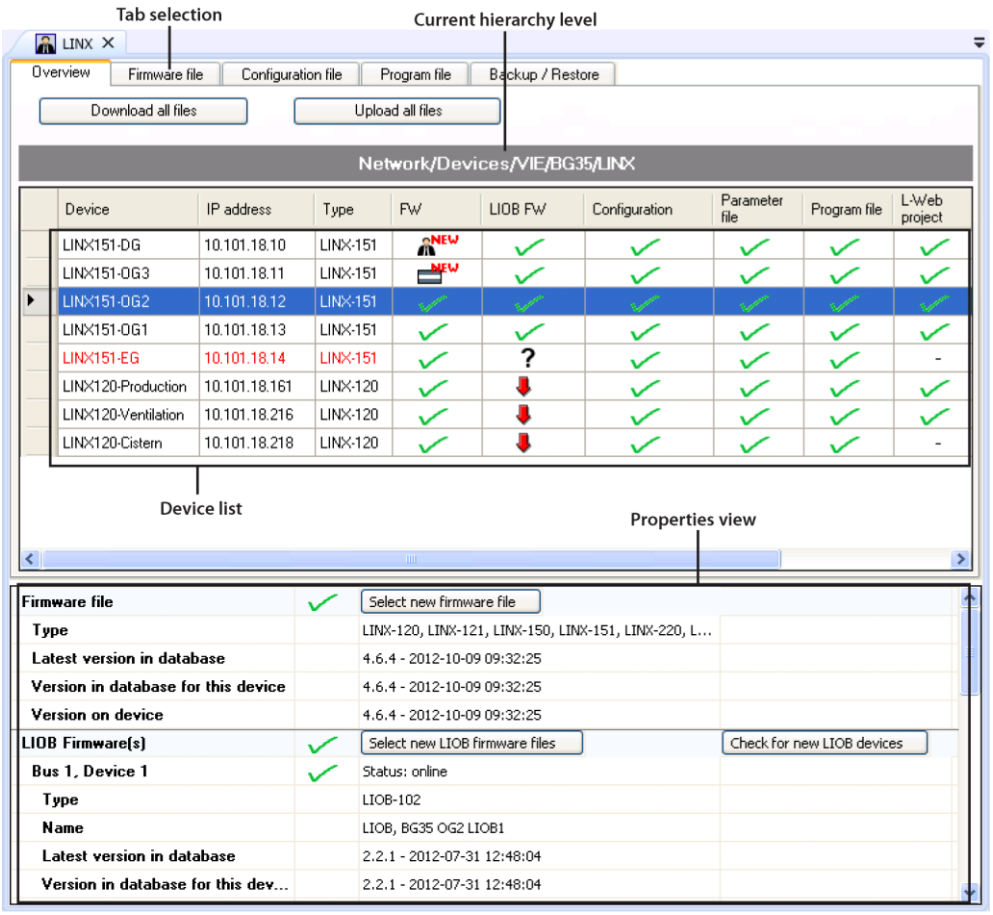


Figure 225: Device Management View

Current hierarchy level:

The device management view is linked to the navigation view. The selected folder in the navigation view determines which devices are displayed. If you select the **Network/Devices** folder, you see all devices in the project. If you select a sub-folder all devices in or below this folder are displayed.

Device list:

The device list displays all devices which are in or below the currently selected folder in the navigation view. Each line in the device list describes one device. If a line is displayed in red, the LWEB-900 Server cannot communicate with the device.

The first three columns in the device list always show the device name, IP address, and device type. The remaining columns are depending on the selected tab. By clicking on the column header, the list can be sorted. It is possible to filter the list to display only a certain device type by right-clicking on the **Type** column header as shown in Figure 226.

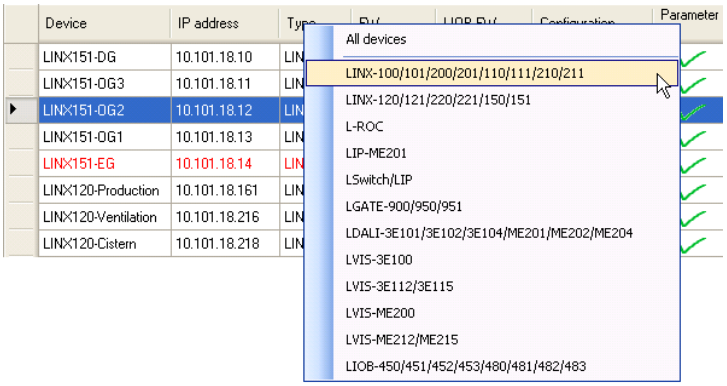


Figure 226: Filter Device List

One or multiple devices can be selected in the list view. The buttons above the device list (e.g. **Download all files**, **Upload all files**) execute actions on all selected devices. Additional actions are available in the context menu of the selected devices.

Property view

The property view displays the properties of the device(s) selected in the device list. Which properties are displayed depends on the selected tab.

Tab selection

Each tab provides different information about the devices. The following tabs are available:

- **Overview**: On the overview tab you can see the complete status of the devices at one glance. It combines the most important information of the **Firmware file**, **Configuration file**, and **Program file** tabs.
- **Firmware file**: This tab allows upgrading the firmware of LOYTEC devices including L-IOB devices attached to programmable controllers. A detailed description is given in Section 6.22.2.
- **Configuration file**: This tab allows managing configuration and parameter files. Refer to Section 6.22.3 for a detailed description.
- **Program file**: This tab is used to manage logi.CAD files for programmable controllers. See Section 6.22.4 for more information.
- **Backup/Restore**: This tab is used to backup and restore LOYTEC devices. It is also possible to define periodic backup schedules. The backup and restore features are described in Section 6.22.6

6.22.1 Device Overview

Figure 227 shows the overview tab which displays the status of LOYTEC devices at one glance. On this tab you can see if the device firmware, L-IOB firmware, configuration file, parameter file, program file, and LWEB-800/802 projects are up-to-date. The following sections describe each of those configuration elements in detail.

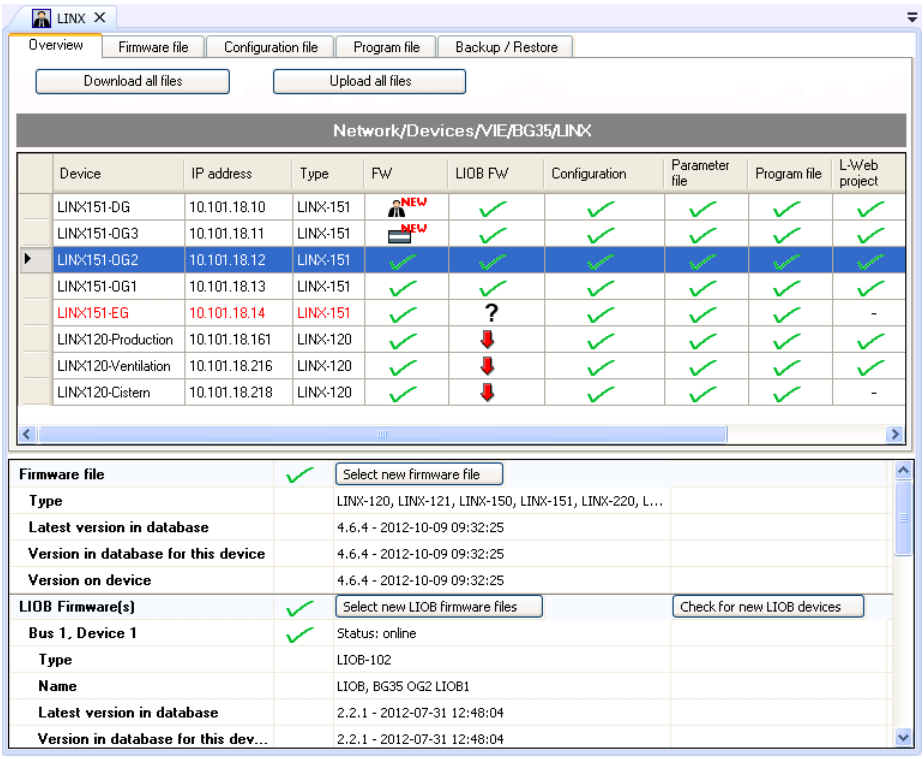


Figure 227: Overview Tab

The columns of the device list are described in Table 37. The property view contains detailed information about the selected device(s). This information is described in the following sections (see Table 38).

Column	Description
Device	Name of the device as configured in LWEB-900 navigation view.
IP address	IP address of the device.
Type	Device type (e.g. LINX-120).
FW	Status of device firmware. Refer to Table 40 for a list of possible status symbols.
L-IOB FW	Status of L-IOB firmware. Refer to Table 40 for a list of possible status symbols.
Configuration	Status of configuration file. Refer to Table 44 for a list of possible status symbols.
Parameter file	Status of parameter file. Refer to Table 44 for a list of possible status symbols.
Program file	Status of program file. Refer to Table 47 for a list of possible status symbols.
L-Web project	Status of LWEB-800/802 projects. Refer to Table 49 for a list of possible status symbols.
Location	Location of the device in the tree view using the format Devices/<folder>/…

Table 37: Device List on Overview Tab

Property View Header	Description
Firmware file	Refer to Section 6.22.2
L-IOB firmware(s)	Refer to Section 6.22.2
Configuration file	Refer to Section 6.22.3
Parameter file	Refer to Section 6.22.3
Program file	Refer to Section 6.22.4
LWEB-800/802 projects	Refer to Section 6.22.5

Table 38: Property View on Overview Tab

6.22.2 Firmware Update

A special tab is available to manage the firmware as shown in Figure 228. Some devices (LINX-12x, LINX-22x, LINX-15x, and LINX-11x) can be extended by attaching one or multiple I/O modules (L-IOB devices). The device management view allows upgrading the firmware of the base device and of the attached L-IOB devices.

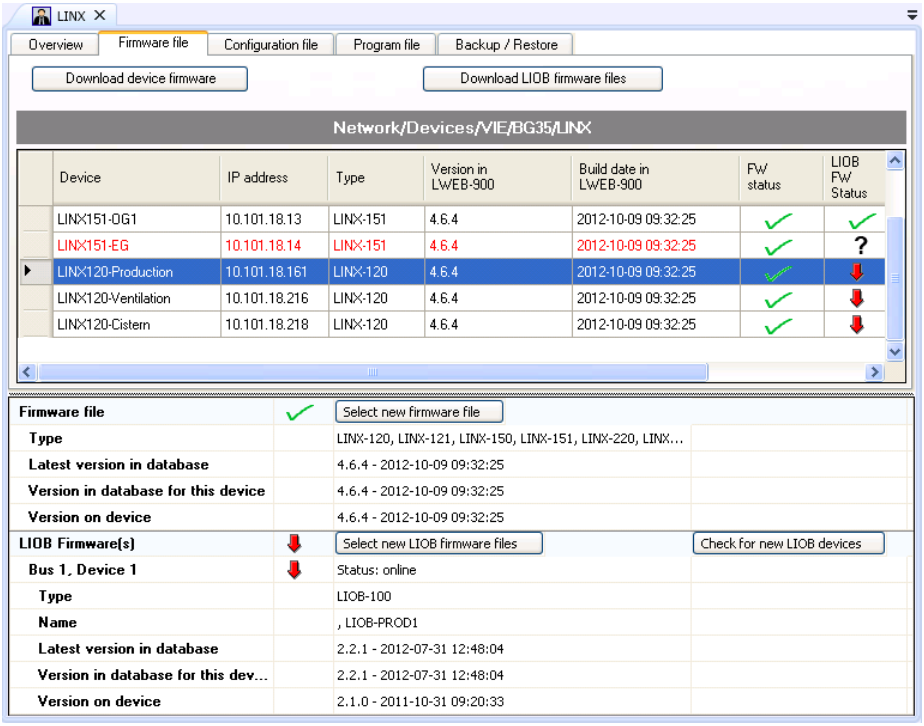


Figure 228: Firmware File Tab

The columns of the device list are described in Table 39. The status of the firmware (up-to-date, new on web, etc.) is visualized in the column **FW status**. If L-IOB devices are attached to the base device, the column **L-IOB FW status** displays the summary status of the connected L-IOB devices. The status of device firmware and L-IOB firmware is visualized using the symbols described in Table 40.

Column	Description
Device	Name of the device as configured in LWEB-900 navigation view.
IP address	IP address of the device.
Type	Device type (e.g. LINX-120).
Version in LWEB-900	Firmware version assigned to the device.
Build date in LWEB-900	Build date of the firmware assigned to the device.
FW status	Status of device firmware. Refer to Table 40 for a list of possible status symbols.
L-IOB FW Status	Status of L-IOB firmware. Refer to Table 40 for a list of possible status symbols.
Location	Location of the device in the tree view using the format Devices/<folder>/…

Table 39: Device List on Firmware Tab

Symbol	Name	Description
	Up-to-date	The firmware of the device is up to date.
	New on web	There is a new firmware version available on the LOYTEC web site.
	Download	The firmware version assigned to the device is newer than the firmware which is currently installed on the device. The firmware needs to be downloaded to the device.
	New on device	The firmware in the device is newer than the firmware in the database. This happens if the firmware of the device is updated with a different tool or if a new device is added to the database and no firmware is assigned yet.
	New in database	There is a new firmware version available in the database which is not yet assigned to the device. You should consider assigning the new firmware version to the device.
	File missing	This is an error state. The device is assigned a firmware file which no longer exists on the server.
Status symbols for L-IOB firmware only		
?	Undefined	This status symbol is only used for the L-IOB firmware in the device list. It is displayed if there are multiple L-IOB devices connected to the L-INX device and the L-IOB firmware status is not the same for all attached devices.
N/A	Not available	This status symbol is displayed if the device does not support L-IOB devices.
-	No L-IOB devices	This status symbol is displayed if no L-IOB devices are attached to the L-INX device.

Table 40: Firmware Status

The property view contains detailed information about the selected device(s). Table 41 describes the information displayed in the **Firmware file** section of the property view. A new firmware can be assigned to the selected device(s) by clicking on the button **Select new firmware file**.

Line	Description
Type	List of device types which are supported by the firmware file.
Latest version in database	Version and timestamp of the newest firmware file in the database which fits the selected device.
Version in database for this device	Version and timestamp of the firmware file which is assigned to the device.
Version on device	Version and timestamp of the firmware installed on the device.

Table 41: Device Firmware Properties

If the device supports L-IOB devices, the property view contains a **L-IOB firmware** section. This section displays a list of all connected L-IOB devices. For each L-IOB device, the information described in Table 42 is displayed.

A new L-IOB firmware can be assigned by clicking on the button **Select new L-IOB firmware files**. The same L-IOB firmware file will be assigned to all connected L-IOB devices which are compatible with this firmware. Before downloading a new L-IOB firmware, it is recommended to click on the button **Check for new L-IOB devices.** This ensures that all L-IOB devices (even devices which are not yet configured) are detected.

Line	Description
Bus x, Device y	This line displays the firmware status symbol for the individual L-IOB device (refer to Table 40) and live status of the device (e.g. online, offline, not detected, etc.). The last contact timestamp informs the user when this information has been updated by LWEB-900.
Name	Name of the L-IOB bus and of the L-IOB device in the format <L-IOB bus name>, <L-IOB device name>.
Latest version in database	Version and timestamp of the newest L-IOB firmware file in the database.
Version in database for this device	Version and timestamp of the L-IOB firmware file which is assigned to the device.
Version on device	Version and timestamp of the firmware installed on the L-IOB device.

Table 42: L-IOB Firmware Properties

6.22.2.1 Upgrade Device Firmware

Firmware updates can be done either in the **Overview tab** or in the **Firmware file** tab.

Upgrading the device firmware is done in two steps: First a new firmware has to be assigned to the devices. Different device types require different firmware files. This means that you need to assign a different firmware file to e.g. an LVIS-3E100 device or a LINX-100 device. In a second step the firmware is downloaded to the devices. This can be done in parallel for all devices independent of the device type.

Assign new device firmware

1. In the device list, select one or more devices which you want to upgrade. All selected devices have to belong to the same product family. To select all devices of a product family, right click on a device and choose **Select devices with compatible firmware** from the context menu.

2. Click on the **Select new firmware file** button in the property view.

Note: *An alternative method is to choose **Select firmware file** from the context menu in the list view.*

3. The **Select Firmware** dialog opens as shown in Figure 229. The dialog displays a list of compatible firmware files available in the LWEB-900 database. If the desired firmware version is already available in the list, select it and press **OK**. You can either import a new firmware file from the hard disk or check if a new firmware is available on the LOYTEC web site:

   - **Hard disk**: If you have the firmware file available on your hard disk, click on the **Import new file…** button, which opens a file selection dialog.

   - **LOYTEC web-site**: You can download the newest released firmware directly from the LOYTEC web-site by clicking on the **Check for new version on LOYTEC web-site…** button. If a new firmware version is available, LWEB-900 downloads it from the web-site and displays the Readme file.

4. Repeat the previous steps for other devices which require a different firmware file.

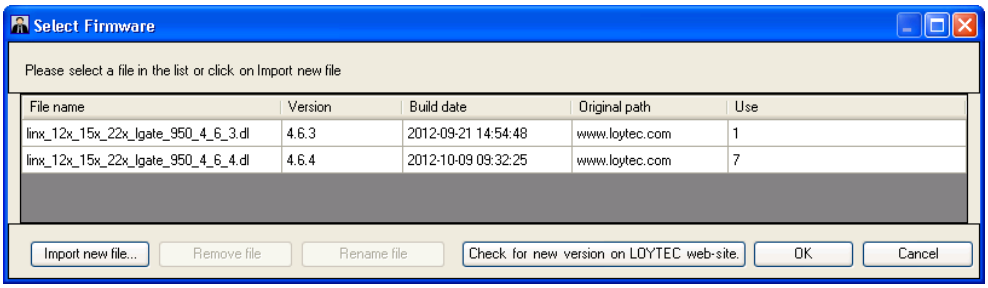


Figure 229: Select Firmware Dialog

Download device firmware file

1. In the device list, select all devices. Press the button **Download device firmware** on the top of the **Firmware file** tab.

Note: *An alternative method is to choose **Download device firmware** from the context menu in the list view.*

2. The **Download firmware file** dialog opens as shown in Figure 230. This dialog displays a list of devices and the firmware files which will be downloaded. To start the download, press the **Start download** button.

3. During the download, the **Status** column is updated with current information. LWEB-900 first checks if the firmware in the devices is already up-to-date. If this is the case, the status “Up-to-date” is displayed and the firmware will not be downloaded.

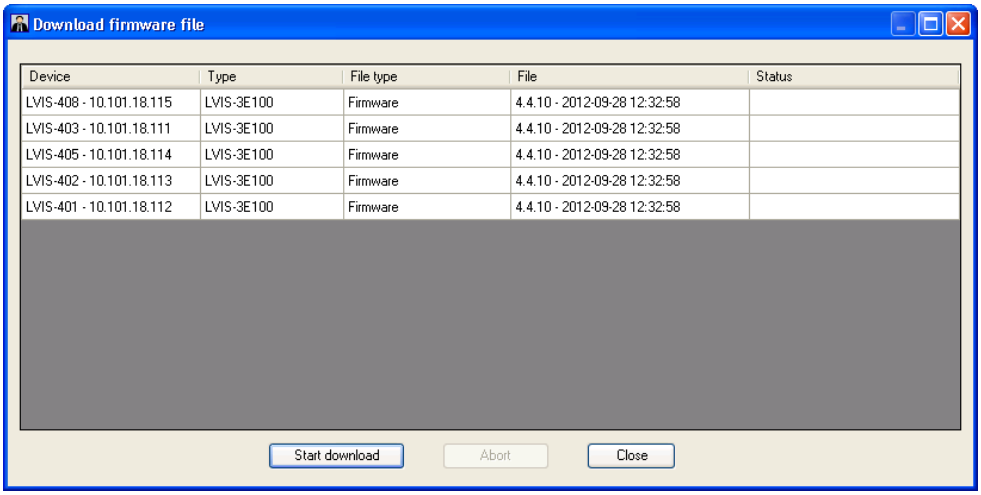


Figure 230: Download Firmware File Dialog

6.22.2.2 Upgrade L-IOB Firmware

Upgrading the L-IOB firmware is very similar to upgrading the device firmware described in the previous section.

Assign new L-IOB firmware

1. In the device list, select one or more L-INX devices with attached L-IOB devices.

2. Click on the button **Check for new L-IOB devices.** This ensures that all L-IOB devices (even devices which are not yet configured) are detected.

3. Click on the **Select new L-IOB firmware files** button in the property view.

Note: *An alternative method is to choose **Select L-IOB firmware files** from the context menu in the list view.*

4. The **Select Firmware** dialog opens as shown in Figure 231. The dialog displays a list of available L-IOB firmware files. The list is split into separate sections for L-IOB devices which require different firmware files. If the desired L-IOB firmware version is already available in the list, select it and press **OK**. You can either import a new L-IOB firmware file from the hard disk or check if a new firmware is available on the LOYTEC web site:

   - **Hard disk**: If you have the L-IOB firmware file available on your hard disk, click on the **Import new file…** button, which opens a file selection dialog.
   - **LOYTEC web-site**: You can download the newest released firmware directly from the LOYTEC web-site by clicking on the **Check for new version on LOYTEC web-site…** button. If a new L-IOB firmware version is available, LWEB-900 downloads it from the web-site and displays the Readme file.

   The selected firmware is assigned to all L-IOB devices which are attached to the selected L-INX device(s).

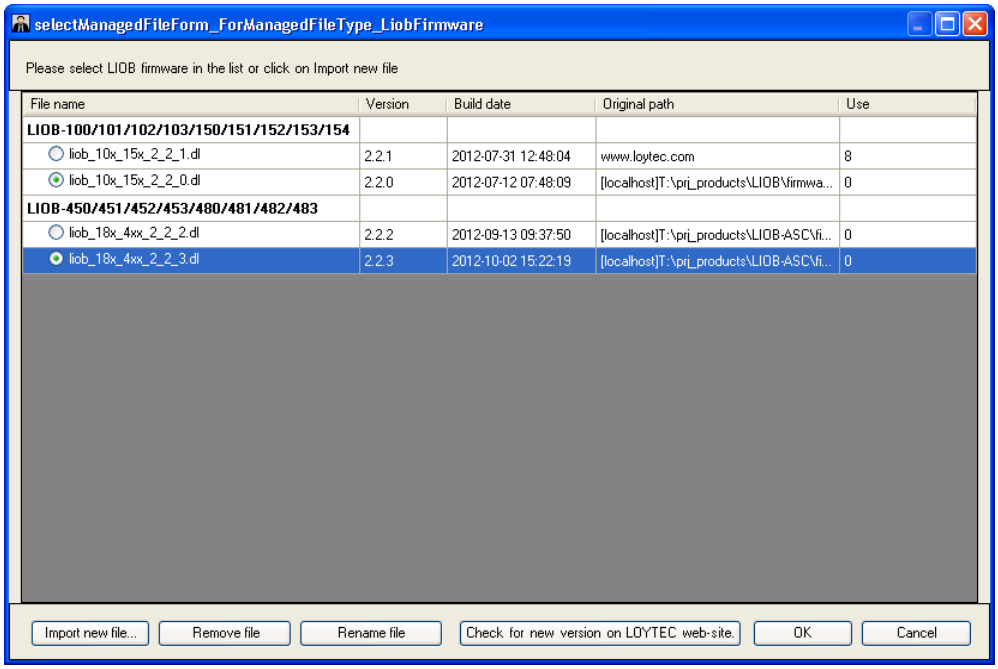


Figure 231: Select Firmware for L-IOB Devices Dialog

Download L-IOB firmware file

1. In the device list, select all devices. Press the button **Download L-IOB firmware files** on the top of the **Firmware file** tab.

Note: *An alternative method is to choose **Download L-IOB firmware files** from the context menu in the list view.*

2. The **Download L-IOB firmware files** dialog opens as shown in Figure 232. This dialog displays a list of L-INX devices and the L-IOB firmware files which will be downloaded. To start the download press the **Start download** button.

3. During the download, the **Status** column is updated with current information. LWEB-900 downloads the L-IOB firmware to the L-INX device and then tells the L-INX device to upgrade the attached L-IOB devices with this firmware.

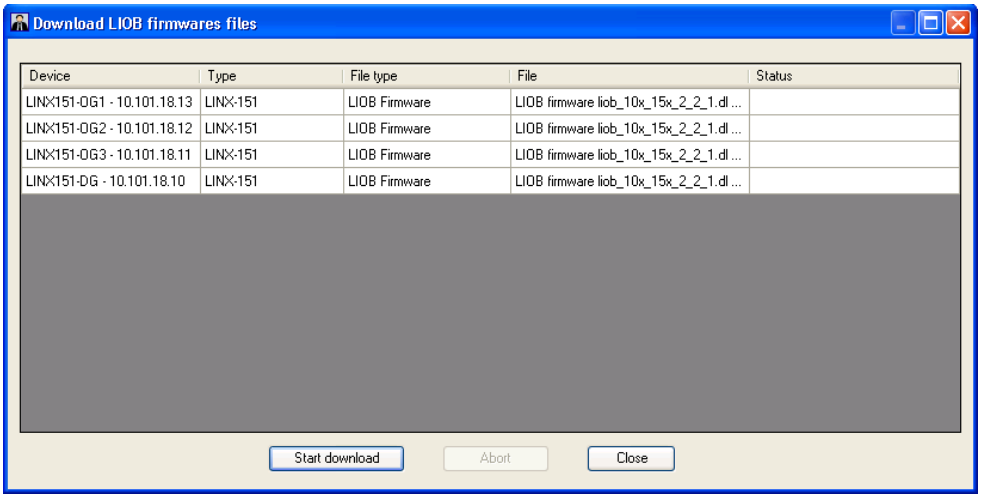


Figure 232: Download L-IOB Firmware File Dialog

6.22.3 Device Configuration

A special tab is available to manage the configuration of LOYTEC devices as shown in Figure 233. The configuration of a LOYTEC device is defined by the following two files:

- **Configuration file**: The configuration file defines the data points on the device (e.g. user registers, CEA-709 network variables, BACnet server objects and client mappings, M-Bus registers, Modbus registers, etc.). The configuration file is created by the configuration software of the device.

- **Parameter file**: In the configuration file some data points are marked as parameters. The parameter file defines the values of these parameters. Not all LOYTEC devices have a parameter file.

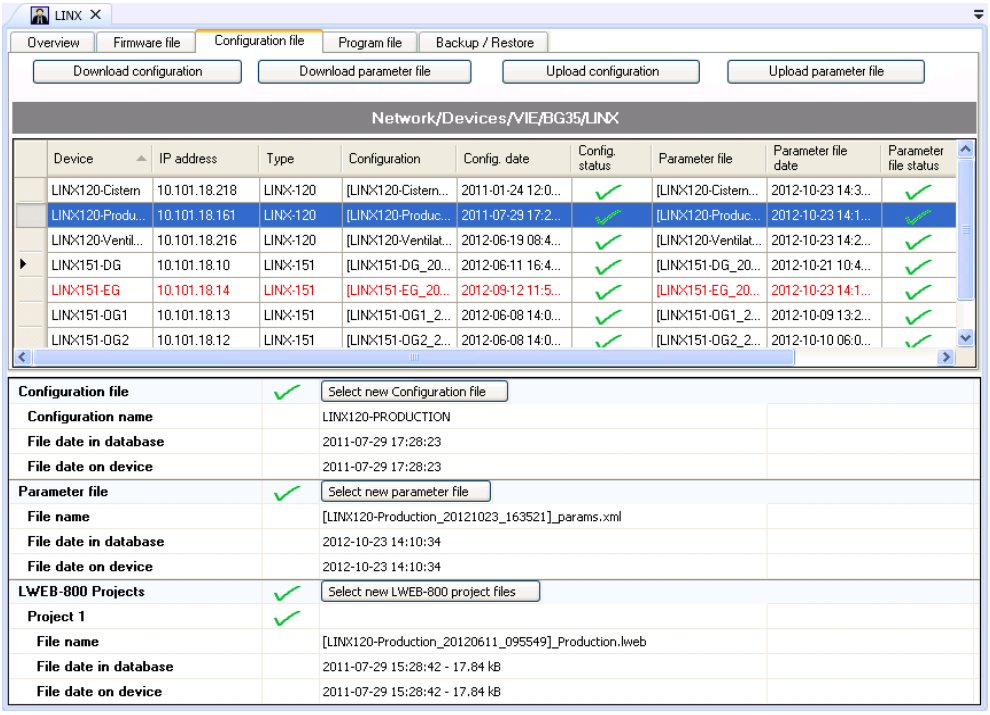


Figure 233: Configuration File Tab

The columns of the device list are described in Table 43. The status of the configuration file (up-to-date, download, etc.) is visualized in the column **Config. status**. If the device supports a parameter file, the column **Parameter file status** displays the status of the parameter file. The status of configuration and parameter file is visualized using the symbols described in Table 44.

Column	Description
Device	Name of the device as configured in LWEB-900 navigation view.
IP address	IP address of the device.
Type	Device type (e.g. LINX-120).
Configuration	File name of the configuration file assigned to the device.
Config. date	Modification date of the configuration file assigned to the device.
Config. Status	Status of configuration file. Refer to Table 44 for a list of possible status symbols.
Parameter file	File name of the parameter file assigned to the device.
Parameter file date	Modification date of the parameter file assigned to the device.
Parameter file status	Status of parameter file. Refer to Table 44 for a list of possible status symbols.
Location	Location of the device in the tree view using the format Devices/<folder>/…

Table 43: Device List on Configuration File Tab

Symbol	Name	Description
	Up-to-date	The configuration/parameter file on the device is up to date. This is the case if the configuration/parameter file on the device is identical to the file assigned to the device in the database.
	Download	A new configuration/parameter file has been assigned to the device but has not yet been downloaded. The configuration/parameter file needs to be downloaded to the device.
	New on device	The configuration/parameter file has changed on the device since the last download. Configuration file: The “New on device” symbol is displayed if the configuration is updated with a different tool (e.g. the device configuration software) or if a new device is added to the database and no configuration is assigned yet. Parameter file: The parameter file will change during normal operation of the device whenever the value of a parameter is modified using e.g. the Web UI of the device or by sending an update via the fieldbus interface.
	File missing	This is an error state. The device is assigned a configuration/parameter file which no longer exists on the server.
N/A	Not available	This status symbol is displayed if the device does not support a configuration/parameter file.
-	No file	This status symbol is displayed if the device is not configured/has no parameter file.

Table 44: Configuration/Parameter File Status

The property view contains detailed information about the selected device(s). Table 45 describes the information displayed in the **Configuration file** and **Parameter file** sections of the property view. A new configuration can be assigned to the selected device(s) by clicking on the button **Select new configuration file**. A new parameter file is assigned by clicking on the button **Select new parameter file**.

Line	Description
Configuration Name/File name	Name of the configuration/parameter file Configuration file: Name given to the configuration in the configuration software. This name is different from the file name. Parameter file: File name of the parameter file
File date in database	Timestamp of the configuration/parameter file which is assigned to the device.
File date on device	Timestamp of the configuration/parameter file installed on the device.

Table 45: Configuration File and Parameter File Properties

6.22.3.1 Upload a configuration file

To upload the current configuration file from one or more devices perform the following steps:

1. In the device list, select one or more devices for which you want to upload the configuration file.

2. Press the button **Upload configuration** on the top of the **Configuration file** tab.

Note: *An alternative method is to choose **Upload configuration** from the context menu in the list view.*

3. The **Upload configuration file dialog** opens as shown in Figure 234. This dialog displays a list of devices and the configuration files which will be uploaded. To start the upload, press the **Start upload** button.

4. During the upload, the **Status** column is updated with current information. The uploaded configuration files get default names. Default names for configuration files have the following format:

   [<device name>_<date>_<time>]_config.zml

   The configuration file name can be changed in the **Select Configuration File** dialog (see Section 6.22.7).

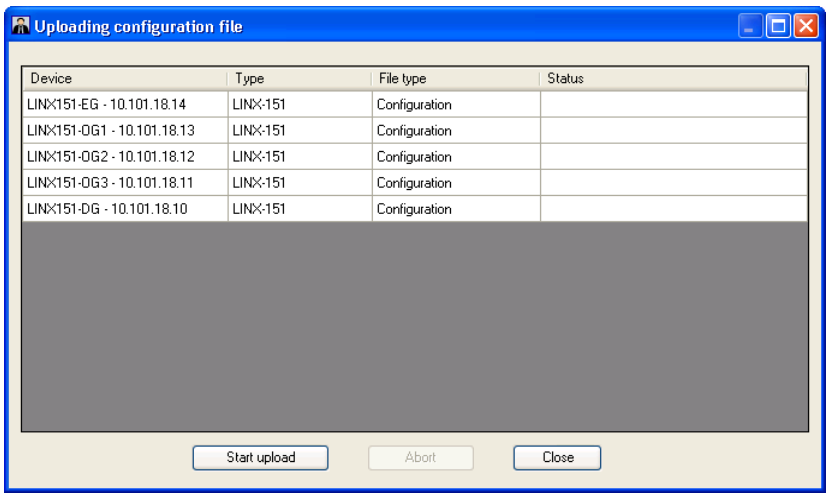


Figure 234: Upload Configuration File Dialog

6.22.3.2 Assign a configuration file

To assign a new configuration file to one or more devices, perform the following steps:

1. In the device list, select one or more devices to which you want to assign the same configuration. To select all devices which have identical configuration assigned, right-click on a device and choose **Select devices with identical configuration** from the context menu.

2. Click on the **Select new configuration file** button in the property view.

Note: *An alternative method is to choose **Select configuration file** from the context menu in the list view.*

3. The **Select configuration** dialog opens as shown in Figure 235. The dialog displays a list of compatible configuration files available in the LWEB-900 database. If the desired configuration file is already available in the list, select it and press **OK**.

   To get a configuration file into LWEB-900 you have two possibilities:

   - Upload the configuration from a device as described in Section 6.22.3.1.

Note: *Uploading a configuration file from one device and then assigning this configuration to multiple other devices is a quick way to copy the configuration of a device to other devices.*

- If you have the configuration file available on your hard disk, click on the **Import new file…** button which opens a file selection dialog.

Note: *Configuration files can be exported from the device configuration software.*

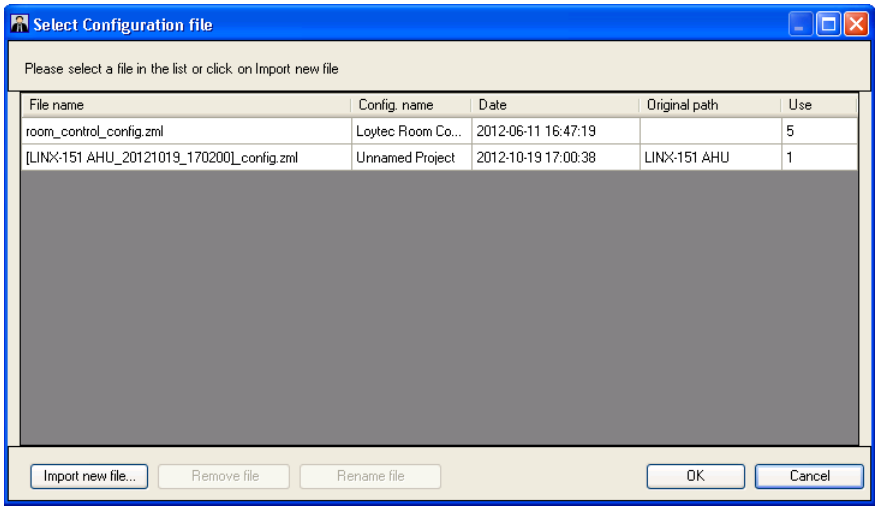


Figure 235: Select Configuration Dialog

6.22.3.3 Downloading a configuration file

To download a configuration file to one or more devices, perform the following steps:

1. In the device list, select the devices to which you want to download the assigned configuration. Press the button **Download configuration** on the top of the **Configuration file** tab.

Note: *An alternative method is to choose **Download Configuration** from the context menu in the list view.*

2. The **Download configuration file** dialog opens. This dialog displays a list of devices and the configuration files which will be downloaded. To start the download, press the **Start download** button.

6.22.3.4 Parameter files

Parameter files can be uploaded, assigned, and downloaded in the same way as configuration files (see Section 6.22.3.1, 6.22.3.2, and 6.22.3.3).

6.22.4 Program Files

The LOYTEC LINX-11x, LINX-21x, LINX-12x, LINX-15x, LROC-100, and LIOB-48x device families are programmable controllers. Those devices contain a program file which is created using the logi.CAD software supplied by LOYTEC. A special tab is available to manage program files as shown in Figure 236.

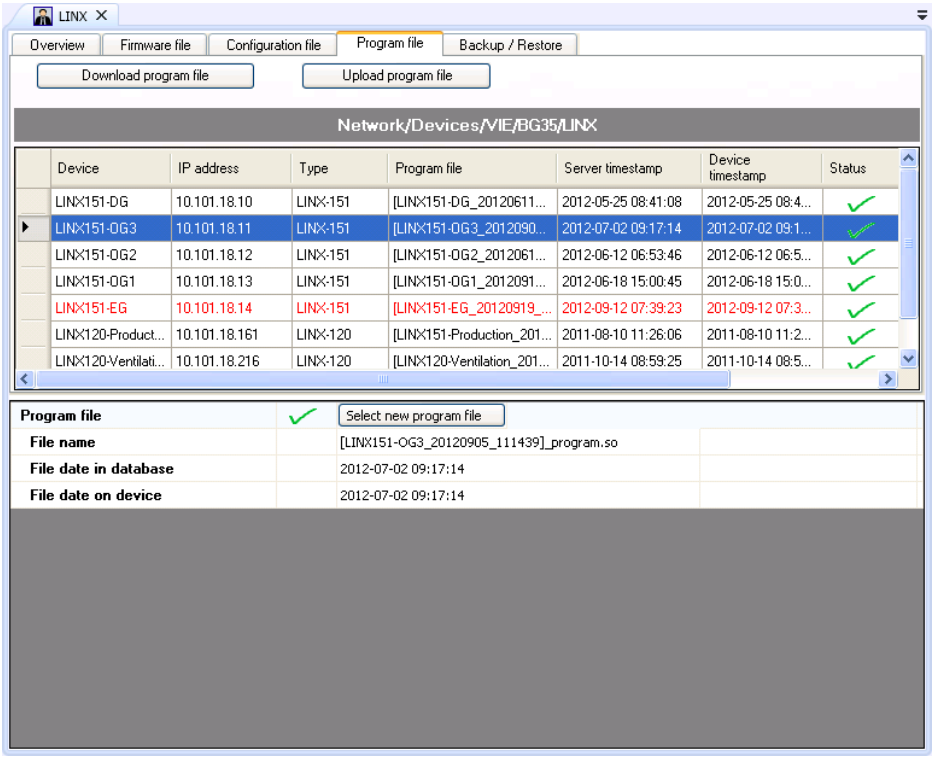


Figure 236: Program File Tab

The columns of the device list are described in Table 46. The status of the program file (up-to-date, download, etc.) is displayed in the column **Status**. The status of the program file is visualized using the symbols described in Table 47.

Column	Description
Device	Name of the device as configured in LWEB-900 navigation view.
IP address	IP address of the device.
Type	Device type (e.g. LINX-120).
Program file	File name of the program file assigned to the device.
Server timestamp	Modification date of the program file assigned to the device.
Device timestamp	Modification date of the program file installed on device.
Status	Status of program file. Refer to Table 47 for a list of possible status symbols.
Location	Location of the device in the tree view using the format Devices/<folder>/…

Table 46: Device List on Program File Tab

Symbol	Name	Description
	Up-to-date	The program file on the device is up-to-date. This is the case if the program file on the device is identical to the file assigned to the device in the database.
	Download	A new program file has been assigned to the device but has not yet been downloaded. The program file needs to be downloaded to the device.
	New on device	The program file has changed on the device since the last download. The "New on device" symbol is displayed if the program is updated with a different tool (e.g. the device configuration software).
	File missing	This is an error state. The device is assigned a program file which no longer exists on the server.
N/A	Not available	This status symbol is displayed if the device does not support a program file.
-	No file	This status symbol is displayed if the device has no program file.

Table 47: Program File Status

The property view contains detailed information about the selected device(s). Table 48 describes the information displayed in the **Program file** sections of the property view. A new program file can be assigned to the selected device(s) by clicking on the button **Select new program file**.

Line	Description
File name	File name of the program file.
File date in database	Timestamp of the program file which is assigned to the device.
File date on device	Modification date of the program file on the device.

Table 48: Program File Properties

6.22.4.1 Upload a program file

To upload the current program file from one or more devices perform the following steps:

1. In the device list, select one or more devices for which you want to upload the program file.

2. Press the button **Upload program file** on the top of the **Program file** tab.

Note: *An alternative method is to choose **Upload program file** from the context menu in the list view.*

3. The **Upload program file dialog** opens as shown in Figure 237. This dialog displays a list of devices and the program files which will be uploaded. To start the upload, press the **Start upload** button.

4. During the upload, the **Status** column is updated with current information. The uploaded program files get default names. Default names for program files have the following format:

   [<device name>_<date>_<time>]_program.so

The program file name can be changed in the **Select Program File** dialog (see Section 6.22.7).

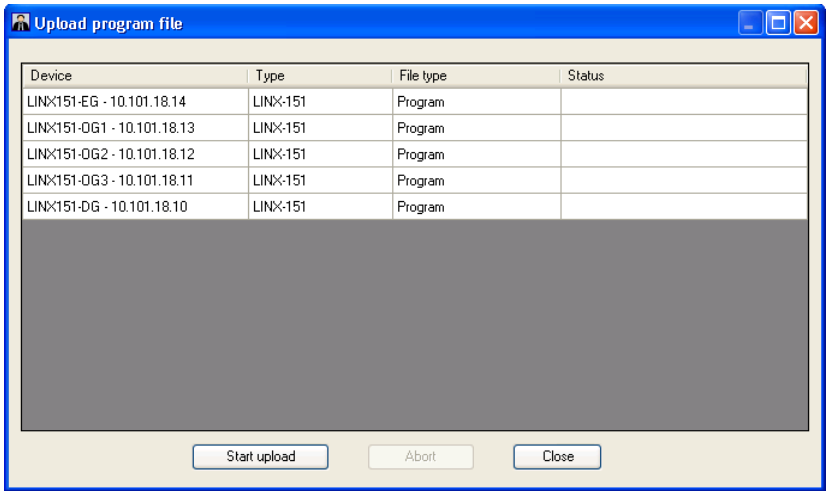


Figure 237: Upload Program File Dialog

6.22.4.2 Assign a program file

To assign a new program file to one or more devices perform the following steps:

1. In the device list, select one or more devices to which you want to assign the same program file. To select all devices which have identical program files assigned, right-click on a device and choose **Select devices with identical program** from the context menu.

2. Click on the **Select new program file** button in the property view.

Note: *An alternative method is to choose **Select program file** from the context menu in the list view.*

3. The **Select program** dialog opens as shown in Figure 238. The dialog displays a list of program files available in the LWEB-900 database. If the desired program file is already available in the list, select it and press **OK**.

   To get a program file into LWEB-900 you have two possibilities:

   - Upload the program from a device as described in Section 6.22.3.1.

Note: *Uploading a program file from one device and then assigning this program to multiple other devices is a quick way to copy the program of a device to other devices.*

   - If you have the program file available on your hard disk, click on the **Import new file…** button, which opens a file selection dialog.

Note: *The program file can be exported from the L-INX Configurator by pressing the **Restore to Disk** button on the **LogiCAD Files** tab.*

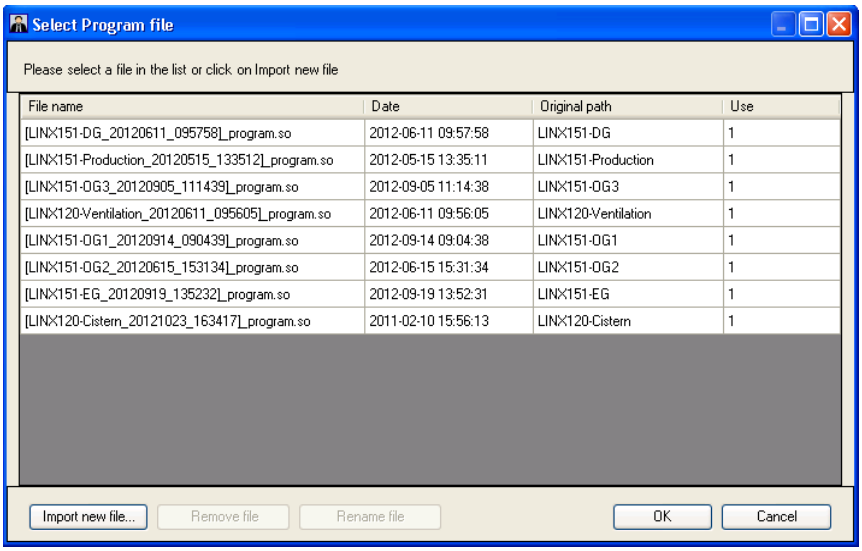


Figure 238: Select Program File Dialog

6.22.4.3 Downloading a program file

To download a program file to one or more devices perform the following steps:

1. In the device list, select the devices to which you want to download the assigned program. Press the button **Download program file** on the top of the **Program file** tab.

Note: *An alternative method is to choose **Download program file** from the context menu in the list view.*

2. The **Download program file** dialog opens. This dialog displays a list of devices and the program files which will be downloaded. To start the download, press the **Start download** button.

6.22.5 LWEB-800/802 files

The device families LINX-10x, LINX-20x, LINX-12x, LINX-15x can contain LWEB-800/802 projects for visualization. They can be managed on the overview tab.

The status of the LWEB-800/802 projects is visualized in the column **L-Web project** using the symbols described in Table 49. Note that multiple projects can be stored on a single device.

Symbol	Name	Description
	Up-to-date	The LWEB-800/802 projects on the device are up-to-date
	Download	The LWEB-800/802 projects assigned to the device do not exist on the device or are newer than the corresponding versions on the device. The LWEB-800/802 projects needs to be downloaded to the device.
	New on device	The LWEB-800/802 projects on the device are newer than the projects in the database. This happens if the LWEB-800/802 projects are updated with a different tool.
	File missing	This is an error state. The device is assigned a LWEB-800/802 project, but the file no longer exists on the server.
?	Undefined	This status symbol is displayed if there are multiple LWEB-800/802 projects on the same device and the status is not the same for all projects.
N/A	Not available	This status symbol is displayed if the device does not support LWEB-800/802 projects.
-	No LWEB-800/802 project devices	This status symbol is displayed if the device supports LWEB-800/802 projects, but no project is stored on the device.

Table 49: LWEB-800/802 Status

The property view contains detailed information about the selected device(s). Table 50 describes the information displayed in the **LWEB-800 projects** section of the property view. New LWEB-800/802 projects can be assigned to the selected device(s) by clicking on the button **Select new LWEB-800 project files**.

Line	Description
File name	File name of LWEB-800/802 project.
File date in database	Timestamp of the LWEB-800/802 file which is assigned to the device.
File date on device	Modification date of the LWEB-800/802 file on the device.

Table 50: LWEB-800/802 Project Properties

6.22.5.1 Upload LWEB-800/802 projects

To upload the LWEB-800/802 projects stored on one or more devices perform the following steps:

1. In the device list, select one or more devices for which you want to upload the LWEB-800/802 project files.

2. Choose **Upload LWEB-800 projects** from the context menu in the list view of the **Overview** tab.

3. The **Upload LWEB-800 projects** dialog opens as shown in Figure 239. This dialog displays a list of devices and the LWEB-800/802 projects which will be uploaded. To start the upload, press the **Start upload** button.

4. During the upload the **Status** column is updated with current information. Uploaded LWEB-800/802 files get a prefix containing the name of the device and the upload timestamp:

[<device name>_<date>_<time>]_<LWEB-800 project file name>.lweb
or
[<device name>_<date>_<time>]_<LWEB-802 project file name>.lweb2

This prefix is internal to LWEB-900. When downloading a LWEB-800/802 project to a device the prefix is removed and the file gets the original name.

The LWEB-800/802 file name can be changed in the **Select L-Web projects** dialog (see Section 6.22.7).

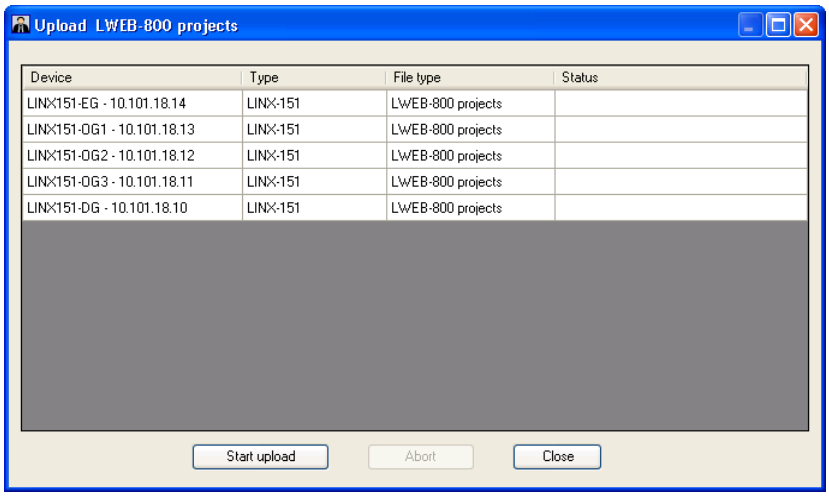


Figure 239: Upload LWEB-800 Projects Dialog

6.22.5.2 Assign LWEB-800/802 projects

To assign LWEB-800/802 projects to one or more devices perform the following steps:

1. In the device list, select one or more devices to which you want to assign the same LWEB-800/802 project files. Usually you will assign a certain LWEB-800/802 project only to a single device.

2. Click on the **Select new LWEB-800 project files** button in the property view.

Note: *An alternative method is to choose **Select LWEB-800 project files** from the context menu in the list view.*

3. The **Select L-Web projects** dialog opens as shown in Figure 240. The dialog displays a list of LWEB-800/802 projects available in LWEB-900. Use the checkboxes to assign LWEB-800/802 projects to the device(s) and press **OK**.

   To get LWEB-800/802 projects into LWEB-900 you have two possibilities:

   - Upload the program from a device as described in Section 6.22.5.1.

   - If you have the LWEB-800/802 project file (extension .lweb or .lweb2) available on your hard disk, click on the **Import new file…** button, which opens a file selection dialog.

Note: *The LWEB-800/802 project file can be exported from the L-INX Configurator by pressing the **Export…** button on the **L-Web Projects** tab.*

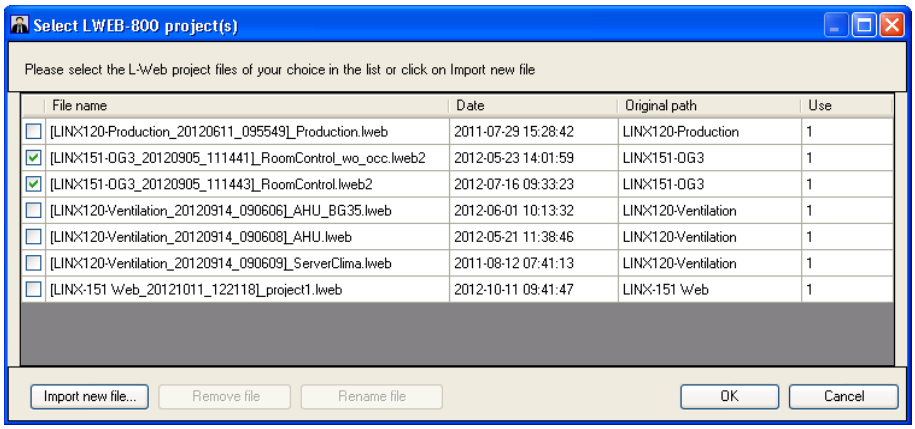


Figure 240: Select LWEB-800 Projects Dialog

6.22.5.3 Downloading LWEB-800/802 projects

To download LWEB-800/802 projects to one or more devices perform the following steps:

1. In the device list, select the devices to which you want to download the assigned LWEB-800/802 projects. Select **Download LWEB-800 projects** from the context menu in the list view of the **Overview** tab.

2. The **Download LWEB-800 projects** dialog opens. This dialog displays a list of devices and the LWEB-800/802 project files which will be downloaded. To start the download press the **Start download** button.

6.22.6 Backup and Restore

Figure 241 shows the **Backup/Restore** tab. Using this tab, you can perform manual backups, define backup schedules, and restore LOYTEC devices.

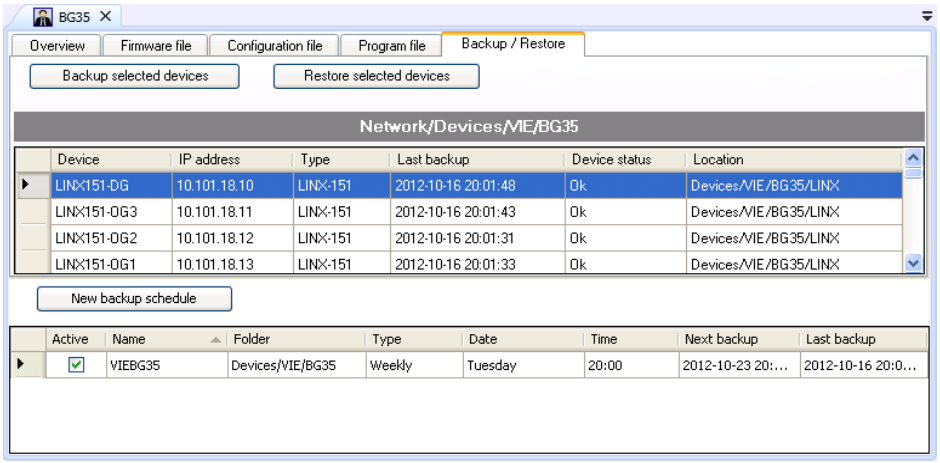


Figure 241: Backup/Restore Tab

6.22.6.1 Manual Backup

To backup one or more devices manually perform the following steps:

1. In the device list select the devices which you want to backup.

2. Press the button **Backup selected devices**.

3. Enter a backup description and press **Continue**. The description helps you later to identify a certain backup.

4. The **Backup devices** dialog opens (see Figure 242). To start the process, press the **Start backup** button. During the backup the **Status** column is updated with current information.

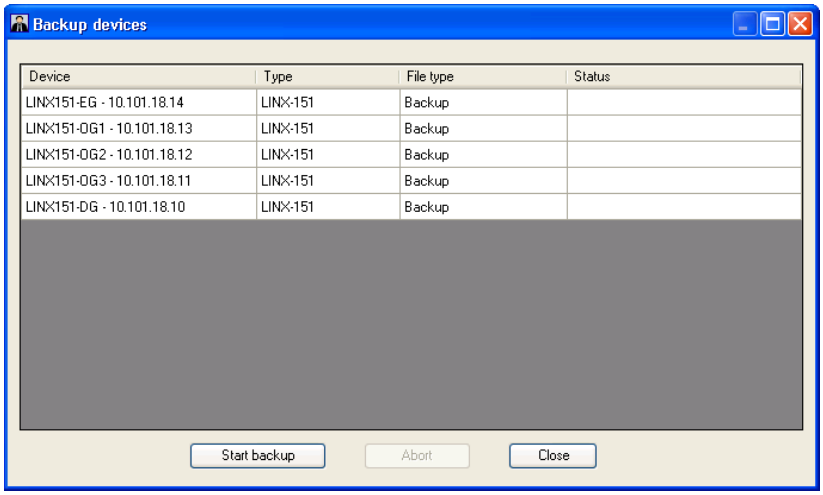


Figure 242: Backup Devices Dialog

6.22.6.2 Backup Schedules

The lower part of the **Backup/Restore** tab (see Figure 243) allows to define backup schedules. Table 51 describes the columns of this table.

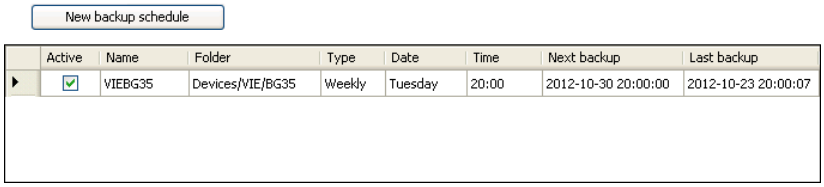


Figure 243: Backup Schedules Table

Column	Description
Active	This checkbox allows to activate/deactivate a backup schedule.
Name	User defined name for backup schedule.
Folder	The backup schedule contains all devices inside this folder.
Type	Type of schedule: Daily, Weekly, Monthly, or Yearly.
Date	Configured backup date. Daily: Empty Weekly: Weekday Monthly: Day in month Yearly: Date
Time	Configured backup time.
Next backup	Date and time when the backup schedule will be executed next.
Last backup	Date and time when the backup schedule was executed last.

Table 51: Backup Schedule Properties

Create a new backup schedule:

1. In the navigation view select a folder. The device list displays all devices below the selected hierarchy level. These devices will be included in the backup schedule. Because the backup schedule references a hierarchy level (folder) and not individual devices, devices which are added later below this level will be included in the backup automatically.

2. Click on the **New backup schedule** button.

3. Configure the name in the **Edit backup schedule** dialog (see Figure 244) and select when the backup will be executed.

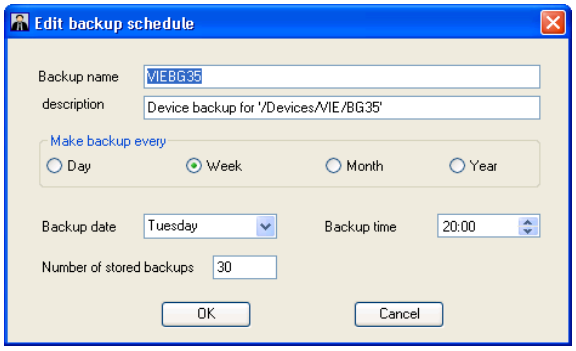


Figure 244: Edit Backup Schedule

Edit Backup Schedule

1. Select a backup schedule.

2. Right click and select **Edit selected backup schedule** from the context menu, or double click on the selected backup schedule.

3. Change the schedule settings in the **Edit backup schedule** dialog (see Figure 244)

Remove Backup schedule

1. Select a backup schedule.

2. Right click and select **Delete selected backup schedule** from the context menu.

6.22.6.3 Restore

Perform the following steps to restore one or more devices from a backup:

1. Select the devices you want to restore in the device list

2. Click on the button **Restore selected devices**.

3. The **Restore devices** dialog (see Figure 245 and Table 52) allows selecting the backups which will be restored. Per default the latest backup is selected for each device. You can select a different backup using one of the following methods:

   - Select specific backup: Select a single device and right-click on the **date** column. A context menu appears which allows you to select one of the available backups for the selected device.

- Select backup before a certain date: Select multiple devices, right-click on the **date** column and select **Backup before date…**. The following dialog allows you to specify a date.

- Select latest backup: Select multiple devices, right-click on the **date** column, and select **Latest backup**.

4. Press the button **Restore devices**.

5. The **Restore backup files** dialog opens (see Figure 246). To start the restore process, press the **Start download** button. During the restore operation, the **Status** column is updated with current information.

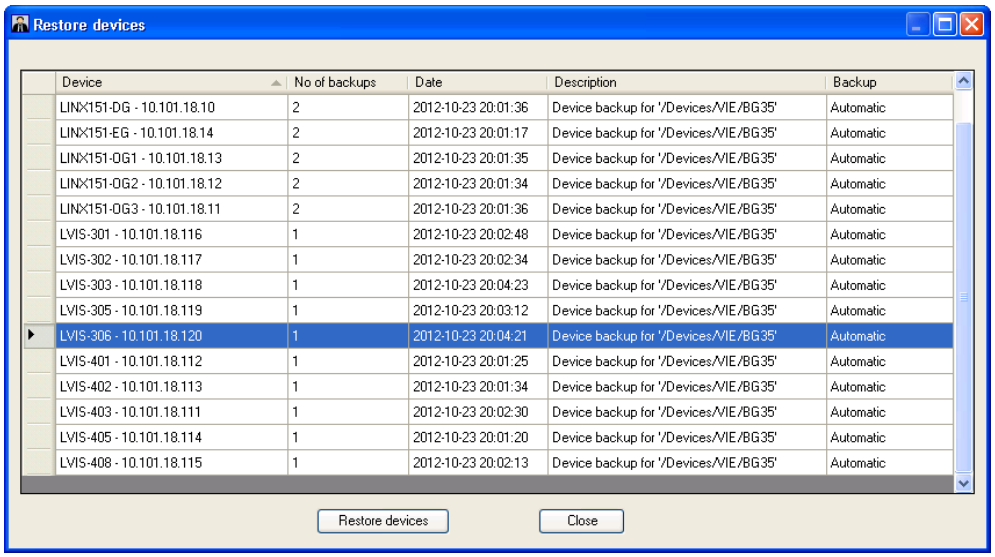


Figure 245: Restore Devices Dialog

Column	Description
Device	Name and IP address of the device.
No of backups	Number of available backups for this device.
Date	Date of the currently selected backup.
Description	Description of the currently selected backup.
Backup	Type of the currently selected backup: • **Manual:** The currently selected backup was created manually. • **Automatic:** The currently selected backup was created by a backup schedule.

Table 52: Columns of Restore Device Dialog

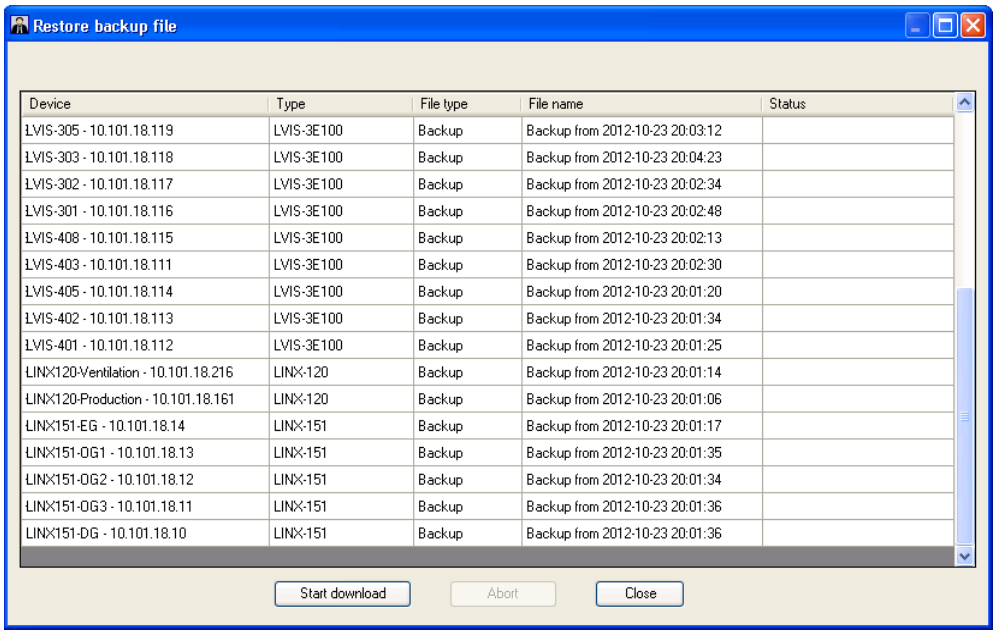


Figure 246: Restore Backup Files Dialog

6.22.7 File Selection Dialog

The dialog to assign a file to a device looks similar for all devices types. Figure 247 shows the **Select Firmware** dialog as an example. All dialogs have the following columns in common:

- **File name**
- **Original path:** Files are uploaded from an LWEB-900 client to the LWEB-900 server. The original path shows where the file was originally stored:

  `[localhost]<path>`
  The file was stored on the same PC where the LWEB-900 server is running in the specified path.

  `[<IP address or host name>]<path>`
  The file was stored on the PC with the specified IP address in the specified path.

  `<device name>`
  File was uploaded from the specified device.

  `www.loytec.com`
  File was downloaded from the LOYTEC homepage (for firmware files only).

- **Use:** This number indicates how many devices the file is assigned to. A file can be deleted only if the use count is 0.

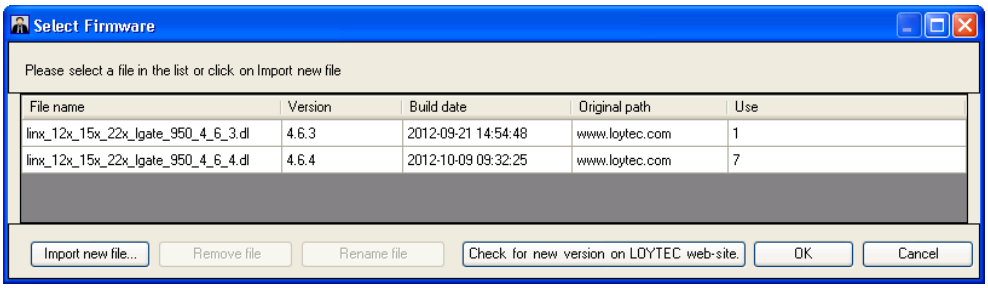


Figure 247: File Selection Dialog

The dialog allows the following actions:

- **Import new file:** Import a new file from the hard disk. If a file with the same name already exists in the database, you have the option to overwrite or to rename the existing file.
- **Remove file:** A file can be removed only if it is not assigned to any device (use count must be zero).
- **Rename file:** Existing files can be renamed. The new name must be unique.
- **Check for new version on LOYTEC web-site:** This action applies only to firmware files. LWEB-900 checks if a new firmware version has been published on the LOYTEC web site. If this is the case, LWEB-900 can download the new firmware and assign it to the selected device.

6.22.8 Manage Files

The manage files dialog displays all files which have been imported into the master device manager or uploaded from LOYTEC devices. The dialog is opened by pressing the **Manage files** button on the **Overview** tab.

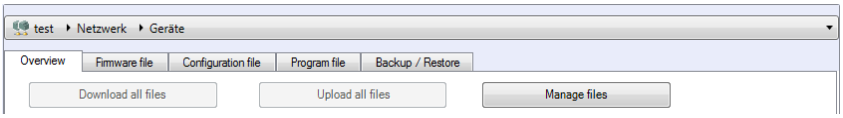


Figure 248: Open Manage Files Dialog

The list of files can be filtered using the checkboxes on the top (see Figure 249).

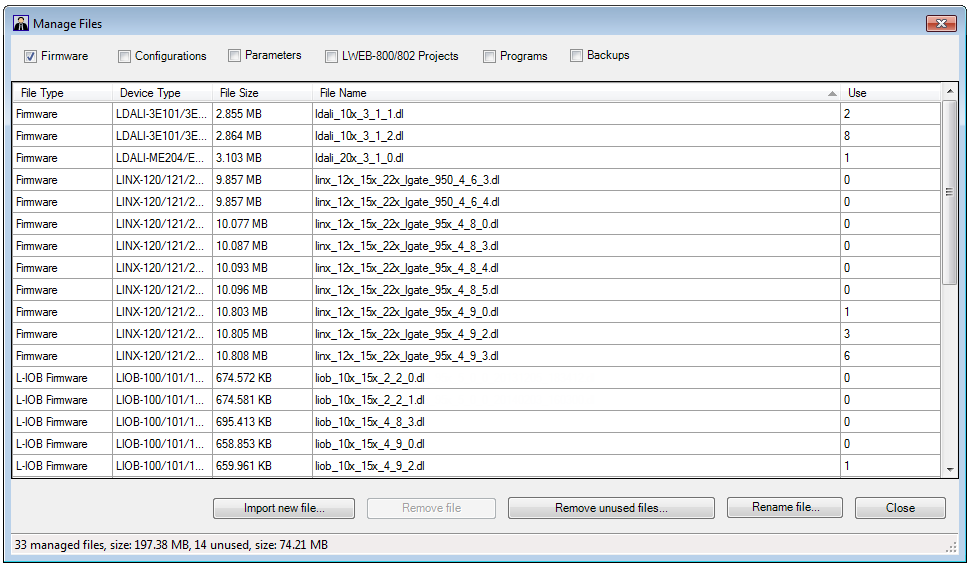


Figure 249: Manage Files Dialog

The dialog allows the following actions:

- **Import new file:** Import a new file from the hard disk. If a file with the same name already exists in the database, you have the option to overwrite or to rename the existing file.
- **Remove file:** A file can be removed only if it is not assigned to any device (use count must be zero).
- **Remove unused file:** Only files which appear in the list above (filter is applied) and which have a use count of 0 are removed.
- **Rename file:** Existing files can be renamed. The new name must be unique.

6.23 Perspectives

Views are organized in the application window in an arrangement called a perspective. You can create and customize your own perspectives by arranging views in the layout that best suits your working style for specific tasks.

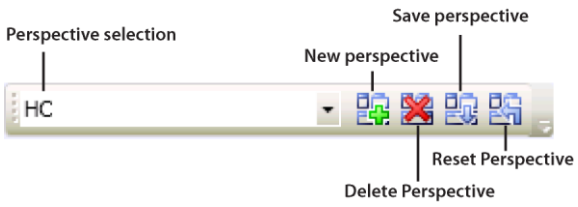


Figure 250: Perspectives Toolbar

Create a new perspective

1. Open the relevant views and arrange them on your screen in the way it suits you best.
2. Press on the **New perspective** toolbar button.
3. Define a name and description for the perspective.

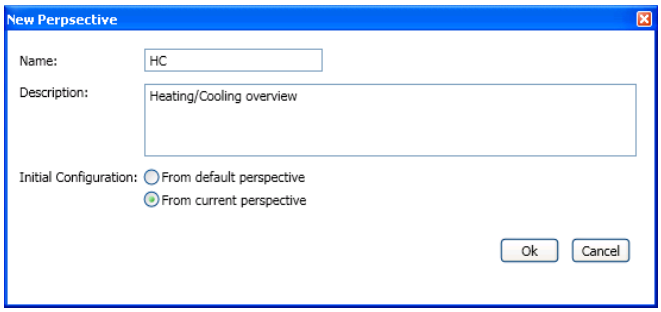


Figure 251: New Perspective

4. Select the initial perspective configuration:

   - **From current perspective**: The new perspective is based on your current view arrangement. This is the default.

   - **From default perspective**: The new perspective is based on your default perspective. The default perspective is defined for each user in the user management dialog (see Section 6.27).

5. Click **OK** to save the perspective. The perspective is created in your home directory. It is now available in the perspective selection drop-down list.

Save and reset perspectives

After you have created a new perspective, you will open new views and change the arrangement of existing views. Your current layout is automatically saved when you log out. Therefore, when you start the LWEB-900 client, you will find it in the same state as when you left it. To return to the initial layout of your perspective, click on the **Reset Perspective** toolbar button. To override the initial layout with your current layout, click on the **Save Perspective** toolbar button.

Make perspective available to other users

When you create a new perspective, it is stored in the Perspectives folder of your home directory. Objects in your home directory cannot be accessed by other users. To make a perspective available to other users, drag it to the **System/Perspectives** folder (see Figure 252). Per default all user have access to this folder and its contents. You can change the access rights as described in Section 6.28. The perspective selection drop-down box shows all perspectives to which you have at least **Read** access. To save a perspective, you need to have **Configure** access.

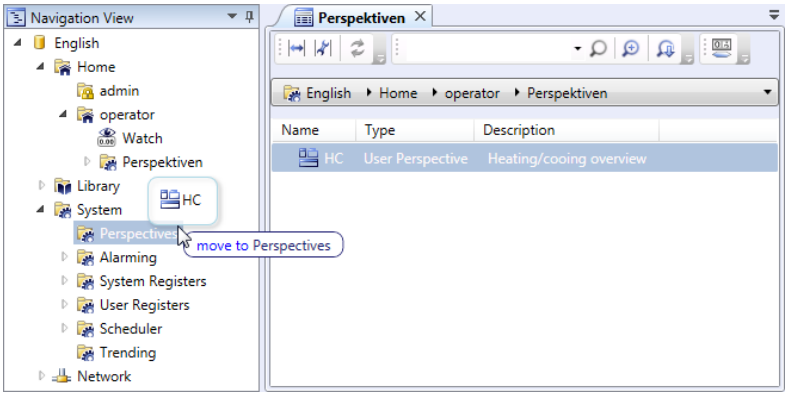


Figure 252: Make Perspective Available to Other Users

6.24 Device Communication Profiles

Communication profiles define how LWEB-900 accesses LOYTEC devices and video cameras. When adding a new device, the communication profile is assigned to the device (see Section 6.5 and Section 6.30.1). In the object list view the communication profiles can be expanded to see all devices which are member of the profile (see Figure 253). You can use drag-and-drop to re-assign a device from one communication profile to another. There are two types of communication profiles:

- **Web-Service communication profile**: This profile is used to define the communication between LWEB-900 Server and LOYTEC device.

- **Video communication profile**: This profile is used to define the communication between LWEB-900 Server and video cameras.

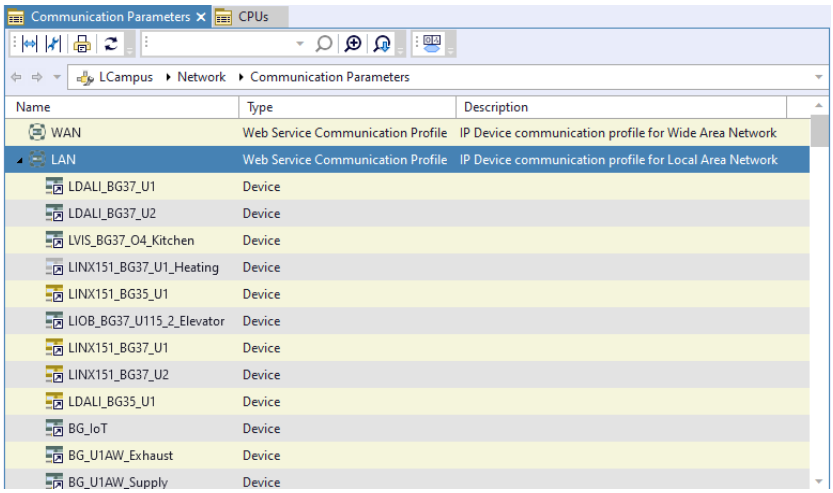


Figure 253: Communication Parameters Folder

Create a new web-service communication profile

1. Right click on the folder **Network/Communication Parameters** and select **New → New Web Service Communication Profile** from the context menu.

2. Define name and description for the communication profile.

3. **Default profile**: If this checkbox is set, this profile is assigned to new LOYTEC devices per default.

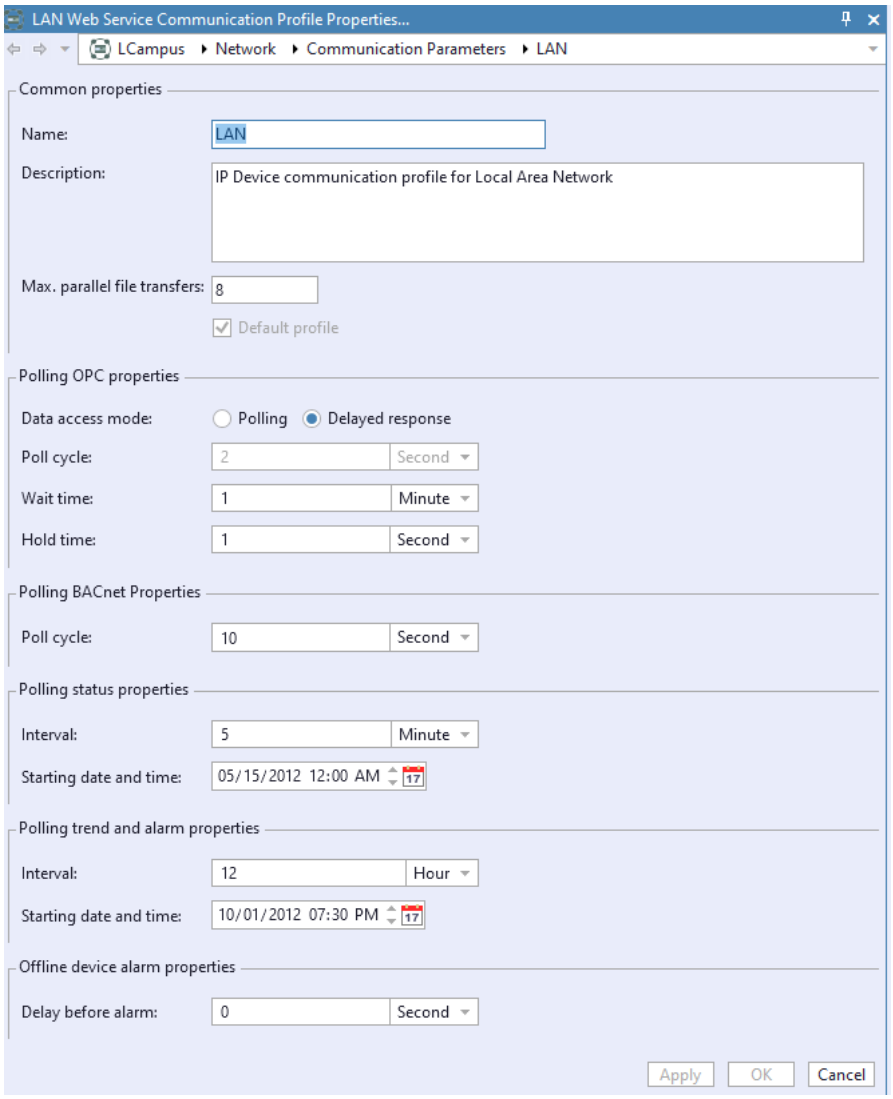


Figure 254: Device Communication Profile

4. Define the maximum number of parallel file transfers: Files need to be transferred to/from a device for firmware upgrades, backup, restore, parameter download/upload, global connections download/upload, etc. To limit the traffic on the network the number of concurrent file transfers can be limited by this setting.

5. Define OPC communication parameters: The LWEB-900 Server uses the OPC XML-DA communication standard to access data points on LOYTEC devices. The standard defines two data access modes:

   - **Polling**: The data points are polled periodically using the interval defined by **Poll cycle**.

   - **Delayed response**: Delayed response is a more efficient alternative to polling. In this mode, a LOYTEC device delays the poll response until one of the requested data points has changed. The parameter **Hold time** specifies the minimum time the LOYTEC holds off until it responds. Set this value based on the maximum update rate needed. The parameter **Wait time** instructs the LOYTEC device to wait the specified duration after the hold time is reached before responding even if no data points have changed.

6. Define BACnet communication parameters: The LWEB-900 Server uses COV subscriptions to access properties of BACnet objects. If a device does not support COV subscriptions, the properties are read periodically using the **poll cycle** parameter.

7. Define status polling properties: The LWEB-900 Server monitors all LOYTEC devices to detect if a device is not responding or if the configuration has changed. A web service is used to check LOYTEC devices and a BACnet service is used for devices of other manufacturers. The **Polling status properties** define how often the device is checked.

8. Define trend and alarm log polling properties: These settings specify how often device trend and alarm logs are read from the device. This poll cycle has to be configured so that LWEB-900 reads out the data before the device runs out of memory and overwrites old data. Usually the devices have enough memory to store log data for several days. Therefore, it is sufficient to read out log data once a day. A web service is used to access LOYTEC devices and a BACnet service is used for devices of other manufacturers.

9. Define Offline device alarm properties: LWEB-900 monitors the status of each device and detects when it is not responding. In such case, it will generate a Fault alarm. The "Delay before alarm" can be increased to wait for some time before generating the alarm, thus giving the possibility to recover the device in the meantime.

Note: *Using the **Starting date and time** parameter, you can define at what times a poll cycle is started.*

Create a new video communication profile

1. Right click on the folder **Network/Communication Parameters** and select **New → New Video Communication Profile** from the context menu.

2. Define name and description for the communication profile.

3. **Default profile**: If this checkbox is st, this profile is assigned to new video devices per default.

4. Define status polling properties: The LWEB-900 Server monitors all video devices to detect if a camera is not responding. The **Polling status properties** define how often the device is checked.

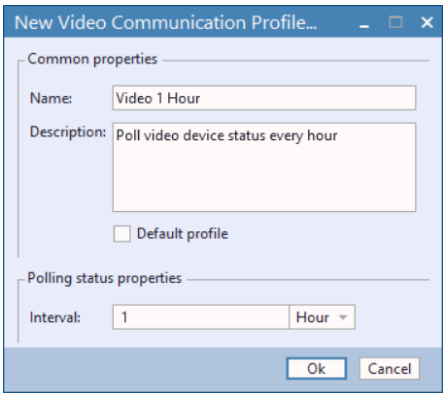


Figure 255: Video Communication Profile

6.25 System Registers

The LWEB-900 server provides internal information as system registers in the folder **System/System Registers**. These registers can be used in a graphical view or added to a watch view.

Folder System/System Registers	
Name	**Description**
Server Version	Version of LWEB-900 Server and build date
Server Time	Server Time (UTC) in seconds since January 1, 1970 00:00:00
Server TZ Offset	Server time zone offset in seconds, positive east of GMT
Server CPU Load	CPU load in % of PC hosting the LWEB-900 Server
Server Free Memory	Free RAM in MBytes of PC hosting the LWEB-900 Server
Project Status	XML description of the contents of the LWEB-900 project
OPC Server Statistics	XML description of the OPX XML-DA server statistics
Unit System	Current unit system
LWEB-900 Server CPU Load	CPU load of LWEB-900 Server process in %
LWEB-900 Server Memory Usage	Memory usage of LWEB-900 Server process in MBytes
Folder System/System Registers/Alarm	
Name	**Description**
Active Unack Alarm Count	Total number of active unacknowledged alarms
Active Ack Alarm Count	Total number of active acknowledged alarms
Inactive Unack Alarm Count	Total number of inactive unacknowledged alarms
Disabled Alarm Count	Total number of disabled alarms

Table 53: LWEB-900 System Registers

6.26 Offline Mode

The LWEB-900 Server can be set into offline mode. In this mode there is no communication with the devices. Therefore, no current data point values can be displayed in graphical view, watch view, and object list view. No alarms are displayed in the alarm view. The trend chart view, trend log view, and alarm log view display only data which has already been stored in the database before switching to offline mode.

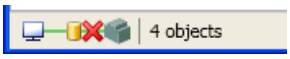
In offline mode all functionalities which require communication with the device are disabled (upload/download device configuration and parameters, refresh data point values, device backup, firmware update, etc.).

Switch to offline mode

1. Press on the **Set Project Offline** toolbar button.



2. The LWEB-900 client status bar indicates the project is now in offline mode.

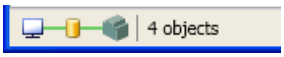


Switch to online mode

1. Press on the **Set Project Online** toolbar button.



2. The LWEB-900 client status bar indicates the project is now in online mode.



6.27 User Management

When the LWEB-900 client is started, a login is required. There is a default admin user (user name: “admin”, password: “loytec4u”) who has full access rights. New users can be created in the user management dialog. Users can be assigned to user groups. User groups are the basis to define detailed access rights on objects.



Figure 256: User Management Toolbar

LWEB-900 supports two types of user authentication:

- LWEB-900 Authentication: The user name and password are stored in the LWEB-900 data base. The LWEB-900 Server performs the authentication.
- Windows Authentication: The LWEB-900 Server is connected to an Active Directory server which performs the authentication.

Create a new LWEB-900 authenticated user

1. Click on the **User Management** toolbar button.
2. To add a new user, click on the **New user** button.
3. Select the radio button **LWEB-900 Authentication.**

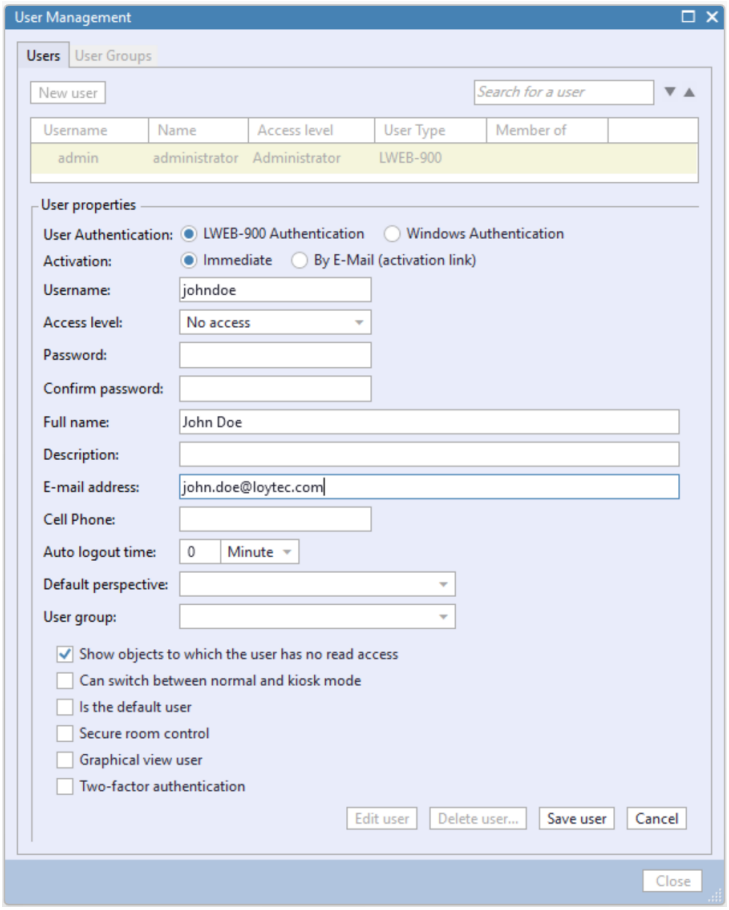


Figure 257: New LWEB-900 Authenticated User

4. Specify the user properties:

   - **User name**: Login name.

   - **Access level**: This drop-down box defines the default access rights of the user. It is used to define a role for a user. The following access levels are defined:

     - **No access:** The user cannot log-in. This setting is used to temporarily disable a user.

     - **Read**: The user can start the LWEB-900 client, but he is not allowed to modify anything. He can monitor data points in watch views, graphical views, etc., but he is not allowed to change the values of the data points. He can see the current parameter values in a parameter view, but he is not allowed to set the parameters. The user is notified about alarms, but he does not have the right to acknowledge them. Master schedules can be viewed but not modified. The user is allowed to open chart and trend log views, but he cannot edit trend log records.

     - **Read/Write**: The user is allowed to change data point values using e.g. watch views and graphical views. He can modify and download parameters using parameter views. The events and calendars of a master schedule can be configured. The user is allowed to acknowledge and disable alarms. He can edit trend log records.

  - **Configure**: In addition to access level **Read/Write**, the user is allowed to create/edit/remove objects in the navigation view. The user is not allowed to open the user management dialog or change access rights.

  - **Full Control**: The user has unrestricted access. He is allowed to create/edit/remove users and groups and can define detailed access rights on objects.

- **Password**: Password for login.

- **Password confirmation**: Enter password a second time for confirmation.

- **Full name**: Optional input field for full user name.

- **Description**: Optional input field for user description.

- **E-Mail address**: Optional input field for user e-mail address. If an e-mail address is specified, an alarm receiver is created automatically for the user (see also Section 6.14.3).

- **Auto logout time**: If the user performs no activity for the specified amount of time, he is automatically logged out. Set this value to zero to disable the auto logout function.

- **Default perspective**: This drop-down box configures the perspective which is loaded when the user logs in for the first time.

- **Show objects on which the user has no read access**: If this checkbox is enabled, the user sees objects (e.g. folders) to which he has no read access. They are displayed with a lock icon. If this option is disabled, those objects are not visible in the navigation and object list view.

- **Can switch between normal and kiosk mode:** If this checkbox is enabled, the user can switch between normal and kiosk mode using the keyboard combination Ctrl+Enter or the **File** menu.

- **Is the default user**: The default user has no password and no auto-logout. If no username and password is specified in the login-in dialog, the LWEB-900 client logs in the default user. If a standard user logs out (auto-logout or manual logout), the default user is automatically logged in. Only the admin user can define/remove the default user.

- **Secure room control**: Enable this checkbox to activate secure room control from a smartphone using the LWEB-APP. This feature requires LOYTEC L-DALI multi-sensors (LDALI-MSx-BT) to be installed in each room. The “secure room control” option requires both user authentication and physical presence. Physical presence is verified through the proximity of the smartphone to a LOYTEC L-DALI multi-sensor. The multi-sensor continuously transmits changing authentication codes. These codes are required to authenticate the user and to refresh the active session with LWEB-900.

- **Graphical view user**: Users for whom this checkbox is enabled have access only to graphical views and to the data points referenced within those views. This simplifies the configuration of access rights, as you only need to define permissions for the graphical views. Access to the underlying data points is automatically restricted to those used in the selected views.

- **Two-factor authentication**: Enable two factor authentication for the user with a third-party authenticator app (e.g. Google Authenticator).

- **Is a multi-site user**: When the project is configured for Multi-Site and this checkbox is enabled, then the user information is replicated in the different other projects configured for Multi-Site and for which project connections exist in the current project (see Section 6.31).

Note: *The admin user is a special user with the following properties:*
- *The user name of the admin user cannot be changed .*
- *The admin user has access level **Full Control** and this cannot be changed.*
- *The admin user cannot be assigned to groups.*
- *Access rights do not apply to the admin user.*
- *The admin user cannot be the default user.*

Create a new Windows authenticated user

1. Click on the **User Management** toolbar button.

2. To add a new user, click on the **New user** button.

3. Select the radio button **Windows Authentication.**

4. Click on the **Browse** icon beside the **Username**. The following dialog allows you to search for users and groups in the Active Directory.

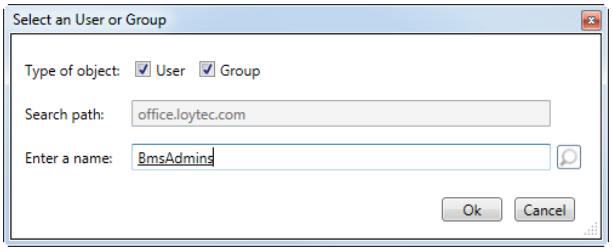


Figure 258: New Windows Authenticated User

Note: *LWEB-900 allows adding a whole Windows group as a Windows authenticated user. This way it is possible to define the access rights for members of the Windows group in LWEB-900 and manage the user in Active Directory.*

Create a new user group

1. Click on the **User Management** toolbar button and switch to the **User Groups** tab.

2. To add a new group, click on the **New group** button.

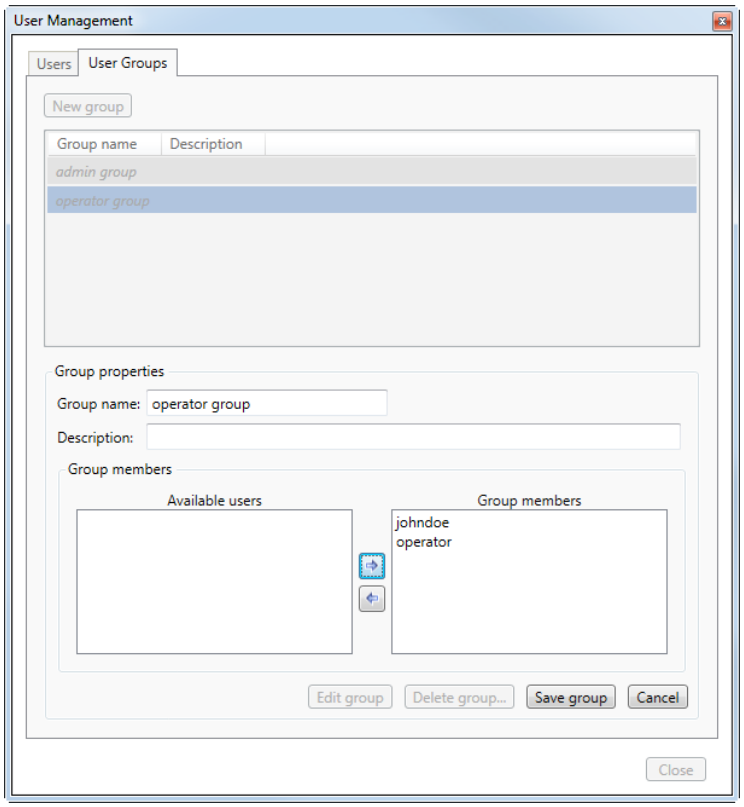


Figure 259: User Groups

3. Specify a group name. The description is optional.

4. Define the group members: The list on the left side of the dialog displays the available users; the list on the right displays the group members. To add a user to the group, select the user in the left list and click on the -> button. To remove a user from the group, select the user on the right side and press the <- button.

Edit personal information

Each user can change his full name, description, e-mail address, and password by clicking on the **Edit personal information** toolbar button.

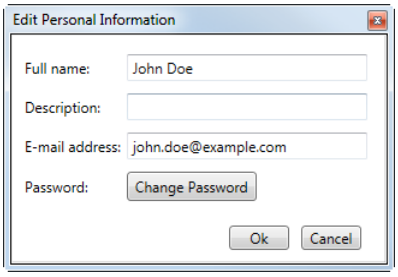


Figure 260: Edit Personal Information

Configure two factor authentication

Two factor authentication adds an extra layer of security to your accounts. You can enable the **Two-factor authentication** option individually for each user in the **User Management** dialog.

After the user's first login with their username and password, LWEB-900 displays a QR code. Scan this QR code with your smartphone using a third-party authenticator app (e.g., Google Authenticator) and enter the verification code provided.

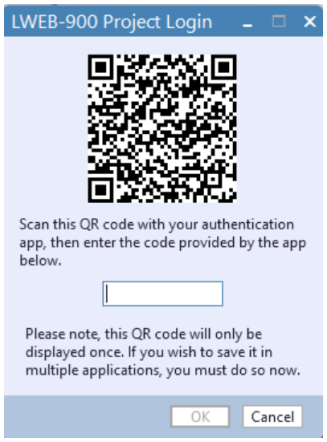


Figure 261: Two Factor Authentication Setup

Make sure to save the backup codes in a secure location. These backup codes can be used if you are unable to access the authenticator app on your smartphone (e.g. if the phone is lost). Each backup code can be used only once.

6.28 Access Rights

The global access level specified for each user defines the default access rights. These default access rights can be further refined by defining access rights to the individual objects in the navigation tree. The effective access rights can never exceed the user access level.

LWEB-900 uses access control lists (ACL) to define which operations a user can perform on a certain object (e.g. folders, data points, visualization view, parameter view, trend charts). Figure 262 shows the default access control list for objects outside the user's home directory.

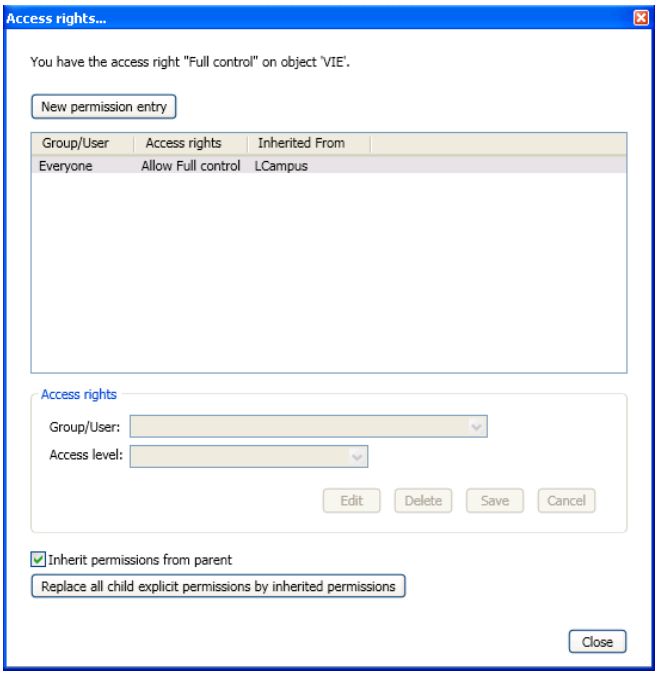


Figure 262: Default Access Control List

The access control contains only a single entry: Allow full control to everyone. This ACL entry is inherited from the parent object. Because full control is the highest access level, the effective access level for a specific user is determined by the access level settings in the user management dialog.

Change access right of an object

1. Right-click on an object (e.g. folder) in the navigation or object list view and select **Access rights** from the context menu.

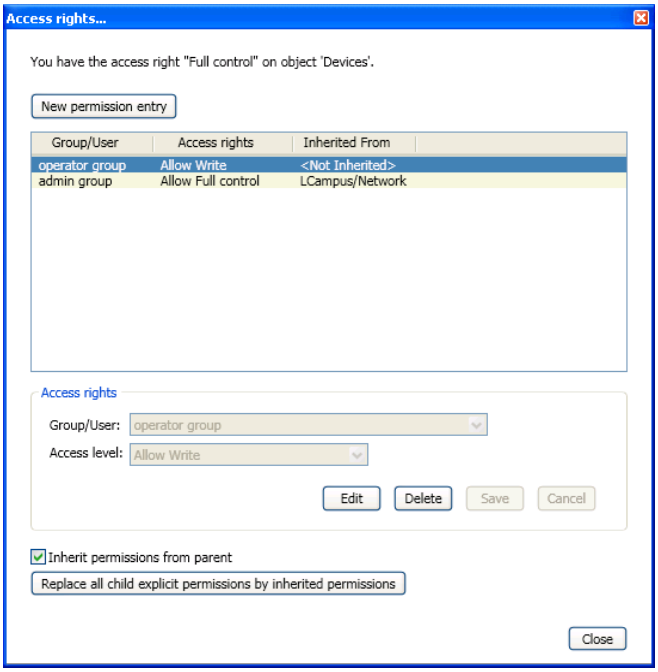


Figure 263: Edit Access Rights

2. Per default an object inherits the access rights from its parent. To remove the inherited permissions, clear the checkbox **Inherit permissions from parent**.

3. To add a new ACL entry, click on the button **New permission entry**. Because the permission entry is created specifically for this object, this type of entry is called an explicit permission entry.

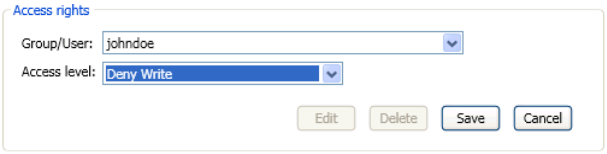


Figure 264: New Permission Entry

4. Select the **Group/User** for which the permission entry applies. **Everyone** is a special group which contains all users.

5. Specify the **Access Level** (see Table 54). Deny permissions take precedence over allow permissions.

6. To remove an ACL entry, select it and click **Delete**. Inherited permission entries cannot be deleted. Disable the **Inherit permissions from parent** checkbox instead.

7. To edit an ACL entry, select it and click **Edit**. Inherited permission entries cannot be edited.

8. If you want to apply the access level settings to all child objects, click on the button **Replace all child explicit permissions by inherited permissions**.

Access Level	Description
Allow Read	The user is allowed to see the value of the object (e.g. data point value, parameter value).
Allow Write	In addition to the permissions granted by **Allow Read**, the user is allowed to change the value of the object (e.g. data point value, parameter value).
Allow Configure	In addition to the permissions granted by **Allow Read**, the user is allowed to change the configuration of the object (e.g. change graphical view, add object in folder).
Allow Full Control	In addition to the permissions granted by **Allow Configure**, the user is allowed to edit the access rights of the object.
Deny Full Control	The user is denied to change the access rights of the object.
Deny Configure	In addition to the permissions denied by **Deny Full Control**, the user is denied to change the configuration of the object (e.g. change graphical view, add object in folder).
Deny Write	In addition to the permissions denied by **Deny Configure**, the user is denied to change the value of the object (e.g. data point value, parameter value).
Deny Read	In addition to the permissions denied by **Deny Write**, the user is denied to see the value of the object (e.g. data point value, parameter value).

Table 54: Access Levels

Algorithm to determine effective access rights

LWEB-900 uses the following algorithm to determine if a user is allowed to perform a certain action on an object:

1. If the action is not allowed due to the access level set in the user management dialog (see Section 6.27), the algorithm stops and the action is denied.

2. If the ACL of the object contains any Deny entry (explicit or inherited) for the requested action, the algorithm stops and the action is denied.

3. If the ACL of the object contains any Allow entry (explicit or inherited) for the requested action, the algorithm stops and the action is allowed.

4. If there is not a single ACL entry (explicit or inherited), the action is denied, else the action is allowed.

Note: *It is possible to deny a user read access to a folder but allow him access to lower-down objects. For example, you can setup the access rights to allow Write access to the folder **Network/Devices**, but deny access to the folder **Network**. In this case, the user cannot use the navigation and object list view to browse the data points on the devices. However, the user can use a graphical view to modify the referenced data points.*

6.29 L-Studio Projects

LWEB-900 can import the following data from L-Studio projects:

- LOYTEC devices and their data point configuration: Because the devices are engineered using L-Studio, LWEB-900 does not allow modifying them with the device configuration software.

- Global connections: Global connections are configured in L-Studio. LWEB-900 displays them but does not allow changing them.

- Graphical views: Graphical views can be imported to a user folder. For graphical views imported from L-Studio, no data point interface is displayed and they cannot be modified in LWEB-900.

Add L-Studio Project

1. Build the project in L-Studio. The compilation generates the configuration files of the devices and the graphical views.

2. In LWEB-900, select the folder **Network/Devices** or a subfolder and choose **New → New L-Studio Project** from the context menu.

3. In the **New L-Studio Project** dialog (see Figure 265) enter the following data:

   - **Name**: User defined name which will be displayed in the navigation view.

   - **Description**: Optional description of the L-Studio project.

   - **L-Studio project file**: Select the solution file (.sln) of the L-Studio project.

   - **Global graphical views**: Select the destination folder for global graphical views. Global graphical views can display information from multiple devices. If this field is left empty, global graphical views are not imported as server graphical views.

   - **Device graphical views**: Select the destination folder for device graphical views. Device graphical views are created in L-Studio for each device instance from the device CAT (Composite Automation Type). If this field is left empty, device graphical views are not imported as server graphical views.

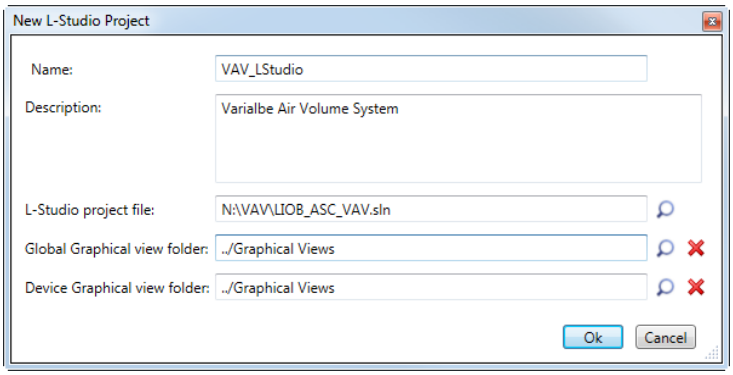


Figure 265: Add L-Studio Project

4. If the L-Studio project was created in secure mode, the credentials stored in the project are encrypted. When LWEB-900 opens such a project, it first checks the Windows Vault for the decryption key that L-Studio previously stored. If LWEB-900 cannot find this key, it will display a dialog prompting the user to enter the project password. This typically occurs when the L-Studio project was created on a different PC.

5. The imported devices are displayed in the navigation view and you have access to all data points.

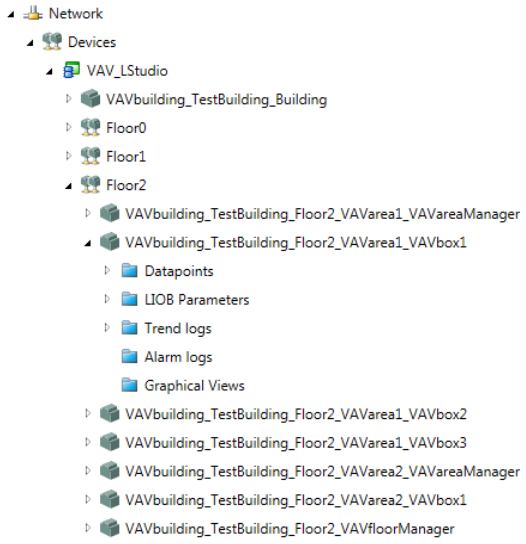


Figure 266: Navigation View after L-Studio Import

Update L-Studio Project

If you have changed your L-Studio project and compiled it, then the project needs to be updated in LWEB-900.

1. In LWEB-900, select the L-Studio project and choose **Update L-Studio Project** from the context menu.

Note — *The **Update L-Studio project** context menu item is displayed only if LWEB-900 finds the L-Studio solution file. If the menu item is missing, select **Properties** from the context menu and check the file path.*

2. The **L-Studio Project Update View** displays the changes in the L-Studio project. Select **Update project** to import the new files.

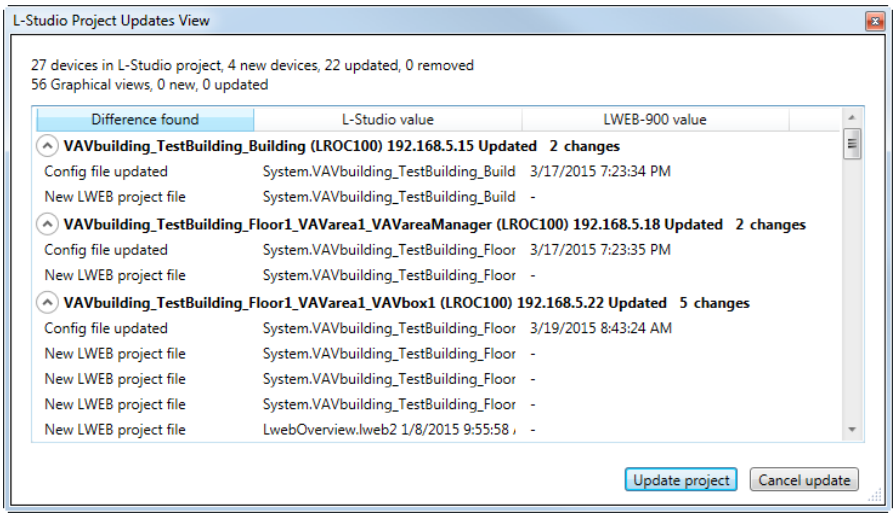


Figure 267: L-Studio Project Update

6.30 Video Integration

LWEB-900 supports the integration of Vivotek and third party cameras supporting the ONVIF protocol.

Note *Make sure that all camera have the latest firmware installed.*

6.30.1 Add Cameras

Camera objects can be added in the folder **Network/Devices**. To manage a large number of devices, they can be grouped in subfolders.

Add camera using network scan

LWEB-900 Server supports an online network scan on the local subnet. During this scan, the LWEB-900 server searches for IP cameras and detects their properties.

1. Select the folder **Network/Devices** or a subfolder and choose **New->Discover Cameras** from the context menu. This opens the camera discovery dialog as shown in Figure 268.

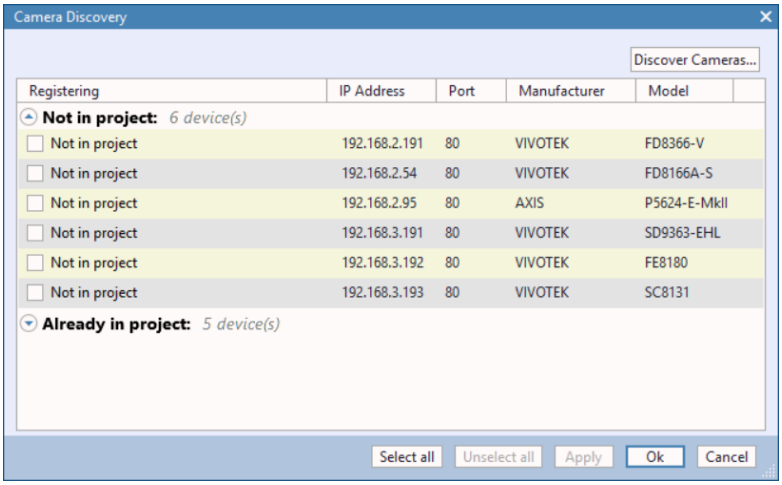


Figure 268: Camera Discovery

2. Activate the checkbox for one or multiple cameras and click the **OK** button.

3. Specify name, administrator user, and password for each camera.

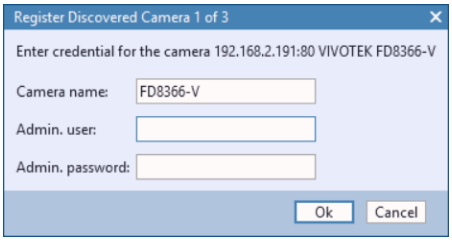


Figure 269: Register Camera

Add camera manually

If the camera is not in the same subnet or if it is not yet online, it is possible to add it as follows:

1. Select the folder **Network/Devices** or a subfolder and choose **New → New camera** from the context menu.

2. In the **New Camera** dialog (see Figure 270) enter the following data:

   - **Name**: User defined name to identify the camera.
   - **Description**: Description of the camera.
   - **State**: If the camera is online, select **Enabled**, else select **Disabled**.
   - **Communication profile**: Select one of the available communication profiles from the drop-down list. Per default, the communication profile **Video** is available. Refer to Section 6.24 for details.
   - **Stream only**: Activate this checkbox, if the camera does not support the ONVIF or VIVOTEK protocol. In this case, you will have to configure the stream URLs manually.
   - **IP address, IP port**: IP address and port of the camera. To use HTTPS communication, activate the **Use secure connection** checkbox.
   - **Admin user, Admin password**: Specify the credentials of an ONVIF user with admin rights.
   - **Web user, Web passwords**: For some cameras the credentials to access the web UI are different from the ONVIF credentials. In this case, you can specify **Web user** and **Web password** separately.
   - **Display Mode**: Use WebRTC or VLC to display the camera. With WebRTC, the LWEB-900 Server connects to the camera and provides a stream for both the LWEB-900 Client and LWEB-80x. With VLC, LWEB-900 Client will connect directly to the camera stream.
   - **Detect Camera Streams**: Most cameras provide multiple streams that can be configured using the web UI of the camera. To read out the available streams, click on the **Detect Camera Streams** button. Selecting a stream profile from the drop-down menu automatically fills out the corresponding URL. You can separately configure the **LWEB-900 stream profile** and the **LWEB-802/803 stream profile**.

- **LWEB-900 stream profile**: This profile will be used in the camera live view (see Section 6.30.2).

- **LWEB-802/803 stream profile**: You can create graphical views containing a web camera control (see Section 6.30.6). Because web browsers can only display MJPG streams and no H.264 streams, a separate stream profile can be specified for graphical views.

- **Record/Snapshot folder**: Provide a folder where the camera records and snapshots will be saved. The default folder is [Project Folder]\ManagedFiles\Files

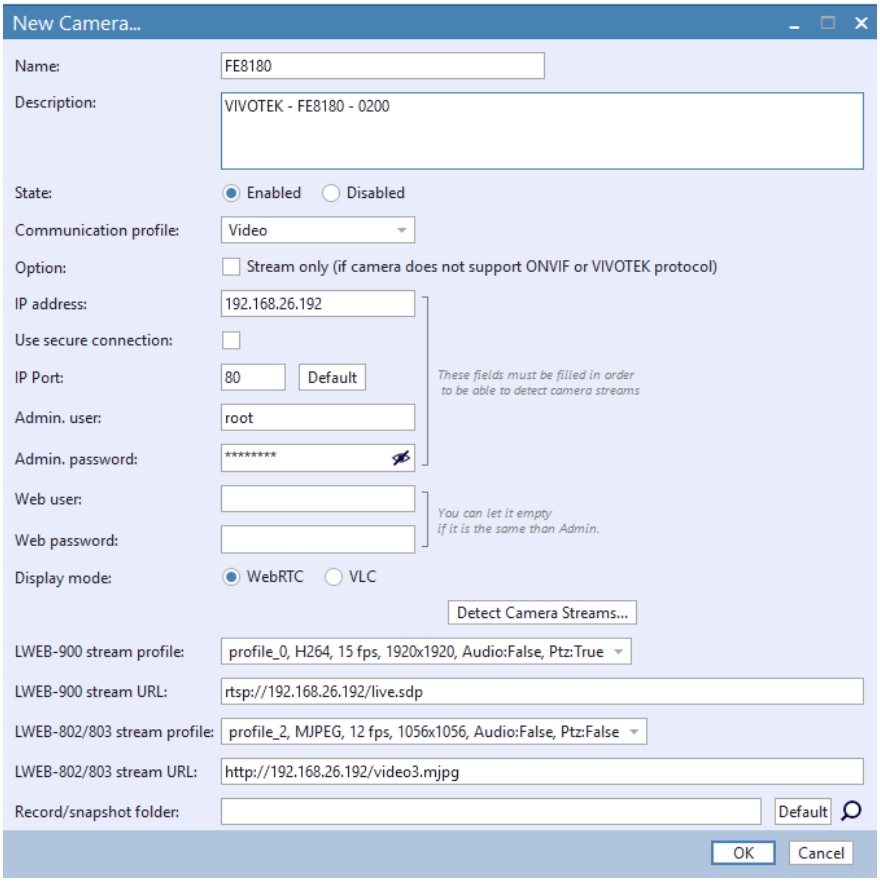


Figure 270: New Camera

3. The new camera is displayed in the navigation view. If you double-click on the camera, the live view is opened.

6.30.2 Camera Live View

When double clicking on the camera object, the camera view is opened in live mode showing real-time video/audio.



Figure 271: Camera Live View

Depending on the features of the camera, you can use the following functions to view and control it:

- If the camera supports PTZ (pan/tilt/zoom) control, you can use the mouse wheel for optical zoom. Use CTRL+click-and-hold to change the camera direction.
- If the camera does not support PTZ control, the mouse wheel performs a digital zoom. You can also zoom in on a specific area by clicking and dragging with the mouse. When you are zoomed it, you can pan the view by using CTRL+click-and-hold or Shift+drag.
- To take a snapshot of the current image, click on the corresponding button it the toolbar. The image is saved in the "Pictures" subdirectory of your home folder. You have the option to save it as a file object on the LWEB-900 Server.
- Volume Control: If the camera provides an audio stream, you can control the volume with the slider or turn it off the sound.
- Recording: If the camera supports video recording, you can trigger the recording from the toolbar. You can adjust the length of the recording. Note, that the recording is stored on the camera.
- Dewarp: For a VIVOTEK fisheye camera, you can select different dewarped views from the drop-down list: 1O (Original), 1P (Panoramic), 2P (2 Panoramic), 1R (Regional), 4R (Quad Regional):

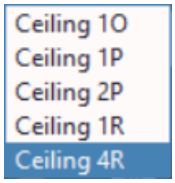


Figure 272: Drop-Down List for Dewarp View

- PTZ Presets: To move a PTZ camera to a predefined position, select the corresponding presets from the drop-down menu. Presets can be configured on the Web UI of the camera or with the **Set or remove preset** button in the LWEB-900 toolbar.

6.30.3 Camera Playback View

The playback view shows the video recordings available on the camera (see Figure 273). Double-click on one of the recordings to start playback.

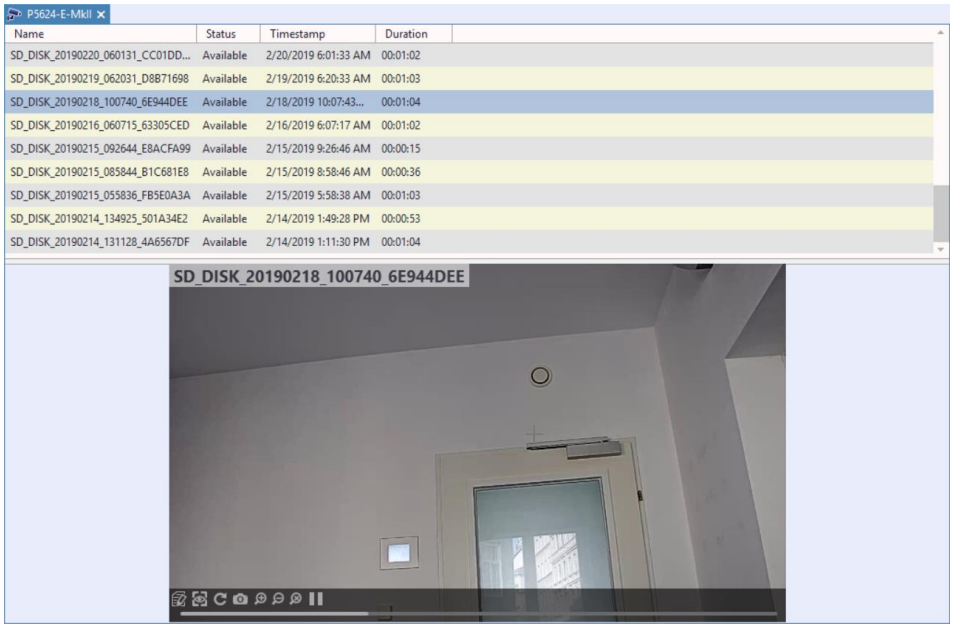


Figure 273: Camera Playback View

6.30.4 Trigger Video Recording by Alarm

LWEB-900 can trigger a video recording when an alarm occurs. Section 6.14.3 describes how to configure an alarm notifier. The video recording is linked as a related item to the alarm that triggered the recording.

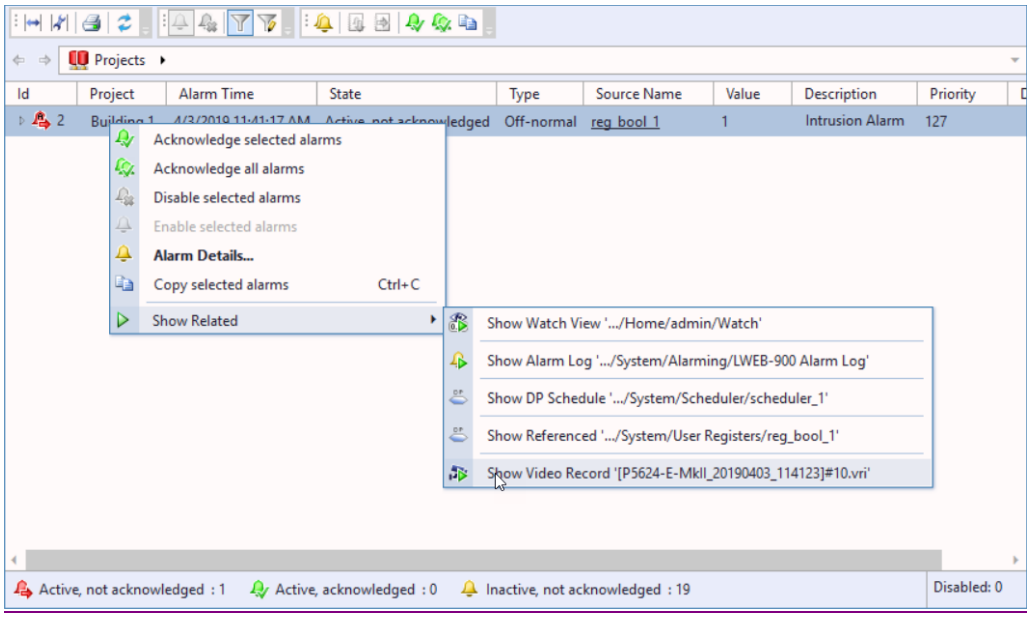


Figure 274: Related Video Recording

6.30.5 Camera Data Points

Events reported by a camera (e.g. motion detection, people counter information) and commands (e.g. PTZ control) can be mapped to data points.

1. Select the camera and choose **Camera Configuration → Manage Camera Events** from the context menu.

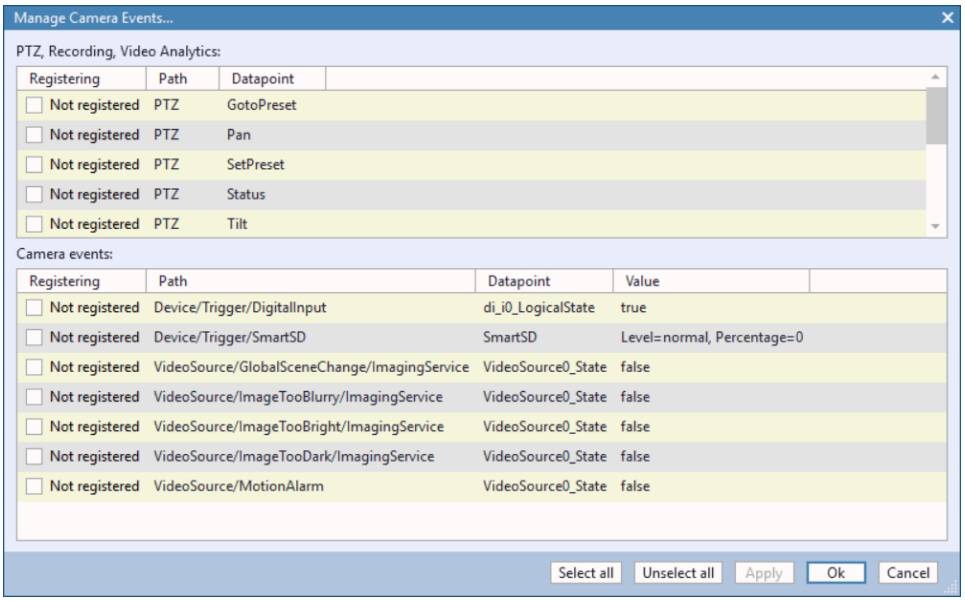


Figure 275: Manage Camera Events

2. Activate the checkboxes for the events and commands, which you want to map to data points. You can use these data points in e.g. graphical views, trend logs and reports, or export them as OPC tags for a device.

6.30.6 Add camera to graphical view

To add a camera to a graphical view, create a Webcam control in the L-VIS Configurator and then drag-and-drop the camera from the navigation view to the new control. LWEB-900 configures the stream URL defined in the camera properties for the **LWEB-802/803 stream profile**.

6.30.7 WebRTC

Starting with LWEB-900 version 4.4.0, camera streams can be accessed using the WebRTC protocol. With WebRTC enabled, the LWEB-900 Server acts as a gateway, allowing multiple clients to access the same camera stream simultaneously.

Unlike the VLC display mode, WebRTC does not require a direct connection to the camera. This enables access through the following clients:

- LWEB-900 Client
- LWEB-80x / LWEB-APP
- L-VIS / L-PAD
- Standard web browsers

6.30.7.1 WebRTC properties in LWEB-900 Client

Both existing and new cameras can be configured in LWEB-900 Client to use WebRTC. To enable WebRTC:

1. Open the camera properties dialog
2. Select WebRTC as the display mode

This option is available for cameras using the VIVOTEK or ONVIF Profile, as well as Stream only cameras.

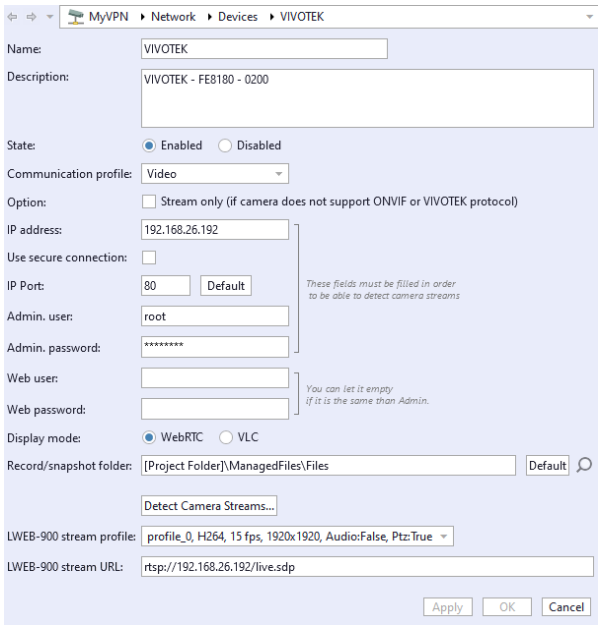


Figure 276: WebRTC camera properties

Once a camera is configured with WebRTC, recordings and snapshots can be saved directly to the LWEB-900 Server computer. Configure the Record/Snapshot folder location as needed.

The following storage limits apply:

- Recordings: 32 recordings per camera (first-in-first-out)
- Snapshots: No limit (storage limit on disk apply)

6.30.7.2 WebRTC configuration in LWEB-900 Server

LWEB-900 Server supports WebRTC configuration to ensure that all clients—whether accessing locally or remotely—can connect to camera streams reliably.

WebRTC uses the UDP protocol for media transport. By default, client connections use the UDP port range 49152 to 65535. This port range can be customized to suit your network requirements.

When clients and the LWEB-900 Server are separated by a firewall, a STUN (Session Traversal Utilities for NAT) server must be enabled to facilitate connections. The default STUN ports are: 3478 and 3479. Those ports can be used by TCP or UDP.

To enable WebRTC communication, be sure to configure your firewall and router to allow traffic to LWEB-900 Server PC on these ports.

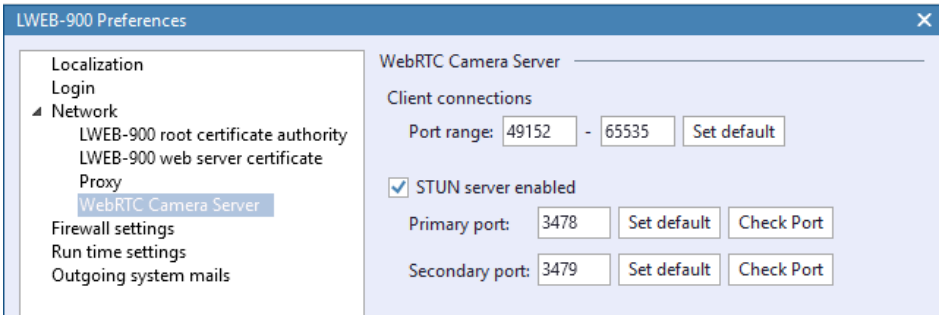


Figure 277: WebRTC Camera Server properties

Note: *WebRTC will add load on the LWEB-900 Server CPU, as the Server must decode and encode the camera stream to provide it in WebRTC format.*

6.31 Multi-Site

This feature allows accessing multiple LWEB-900 Servers located at different sites with a single LWEB-900 Client. To enable this function, the LWEB-900-MS license needs to be installed on each LWEB-900 Server (refer to Section 3.2).

Note: *Make sure, that the LWEB-900 Client can access all LWEB-900 Servers and that the LWEB-900 Servers can communicate with each other.*

Enable multi-site mode

1. Select **Properties** from the context menu of the project node in the navigation view and switch to the **Multi-site** tab.

2. Active the **Enable multi-site mode** checkbox.

3. Select the **Adaptor** and **IP Address** via which the LWEB-900 Server is available for other LWEB-900 Servers and LWEB-900 Clients.

4. Select the **Account for replication**: This account is required to synchronize data between the different projects that are part of the multi-site.

Note: *The **Account used for replication** has to exist with the identical password and access level "Full Control" in all projects.*

5. If the LWEB-900 Server is not accessible by all other servers and clients via the local IP address (e.g. LWEB-900 Server is located behind a NAT router), configure **Public hostname or IP address** and **Public port number**. Activate the **Use secure communication** checkbox to use the SSL (Secure Socket Layer) protocol.

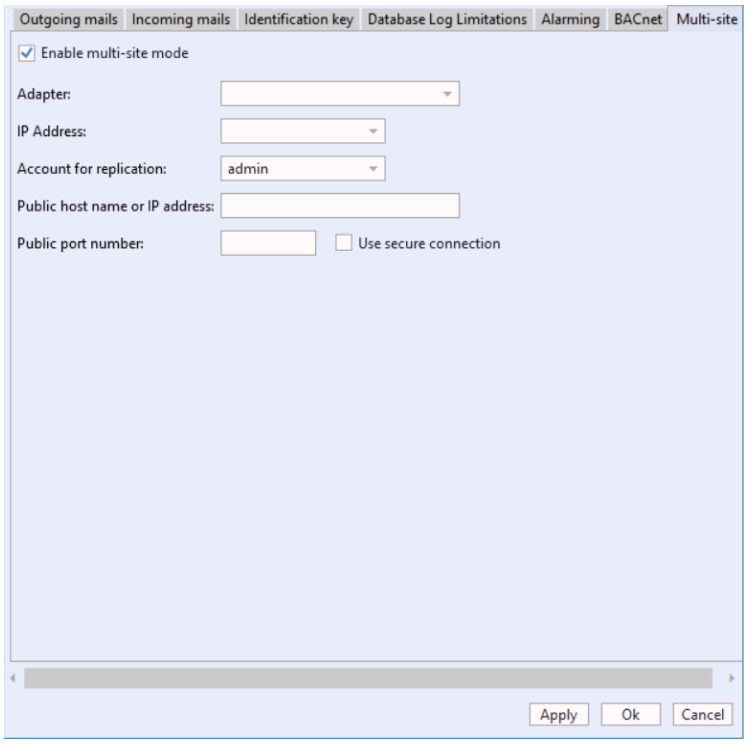


Figure 278: Enable Multi-Site Mode

6. The new top-level hierarchy **Projects** is created in the navigation view, below which connections to additional projects can be added.

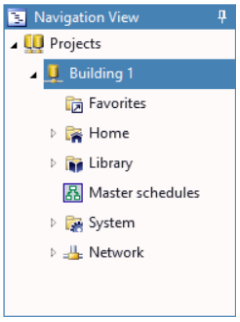


Figure 279: Projects Node

Add project connections

1. Right-click on the **Projects** node in the tree view and select **New → New project connection** from the context menu.

2. Enter a name and description for the new project connection.

3. **Host name or IP address**: Host name or IP address of the LWEB 900 Server.

4. **Use secure connection**: Activate this checkbox to connect to the LWEB-900 Server using SSL (Secure Socket Layer).

5. **Port**: Port of the LWEB 900 Server (see Section 5.3).

6. **Project name**: Name of the project. To obtain a list of projects, press on the search button. If the server is protected by a password (see Section 5.2), the server user name and password are requested.

7. The new project connections is displayed in the tree view and you can expand it to access it.

8. Right click on the new project connection in the navigation view and select **Properties** from the context menu. Change to the **Multi-site** tab and activate the **Enable multi-site mode** checkbox.

Note *The last step is optional. If you enable the multi-site mode for all projects, LWEB-900 can synchronize project connections, multi-site users, and graphical views between all projects.*

Create multi-site user

When you create or edit a user, you have the possibility to activate the **Is a multi-site user** checkbox. In this case, the user will be replicated to all other project connections that have the multi-site mode enabled.

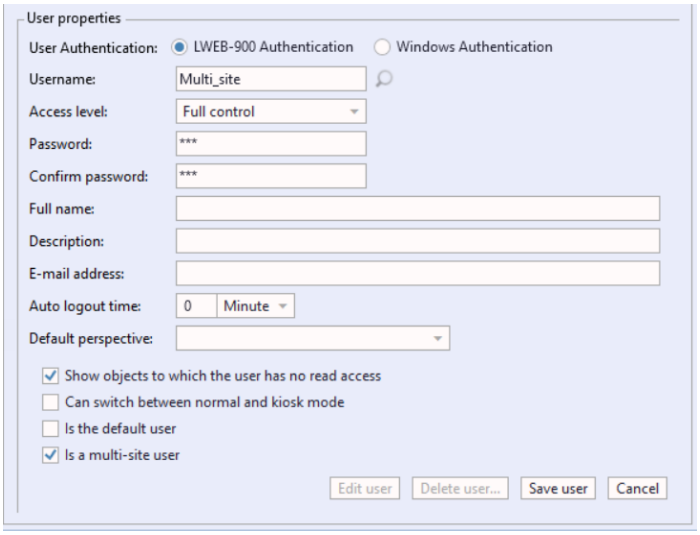


Figure 280: Multi-Site User

Create multi-site graphical view

If you create a graphical view below the **Projects** node, it can visualize data from all connected projects. You can create the data point interface in the same way as for a normal graphical view (see Section 6.11.2) but you have access to the devices of all connected projects. The graphical view is replicated to all other projects that have the multi-site mode enabled.

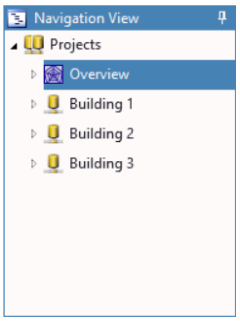


Figure 281: Multi-site graphical view

Multi-site alarm view

The multi-site alarm view shows alarms from all connected projects. You can either group the alarms by project as shown in Figure 282 or show them in a flat list (ALT+G or toolbar button).

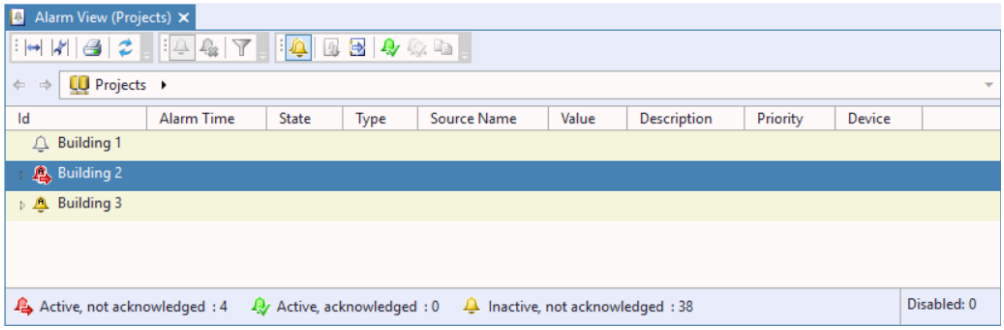


Figure 282: Multi-Site Alarm View

Multi-site master device manager

The multi-site master device manager allows managing all devices across the sites. You can either group the devices by project as shown in Figure 283 or show them in a flat list (ALT+G or toolbar button).

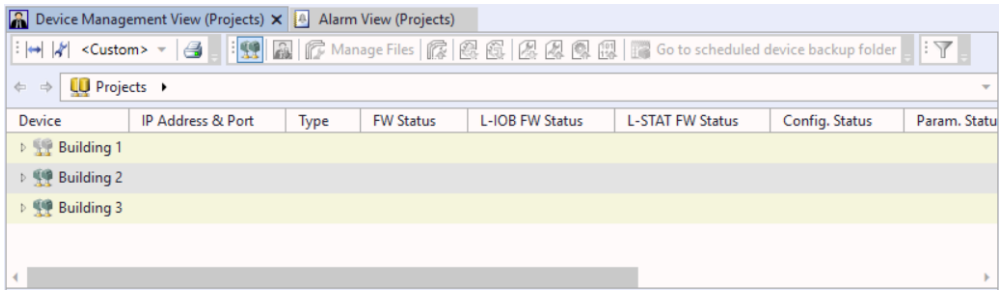


Figure 283: Multi-Site Master Device Manager

6.32 VPN

LWEB-900 can configure a virtual private network (VPN) consisting of LOYTEC devices, LWEB-900 clients and any other devices supporting the OpenVPN protocol (see Figure 284). Each LOYTEC device establishes a VPN tunnel to the VPN server configured by LWEB-900. PCs running the LWEB-900 client or mobile devices can join to the VPN to have direct access to LOYTEC devices.

When activating the VPN web-service, the LWEB-900 server registers all necessary information for LOYTEC devices to join the VPN with the LOYTEC web server. The devices can then automatically fetch this information from the LOYTEC web server. This way, it is very quick and easy to add devices to the VPN.

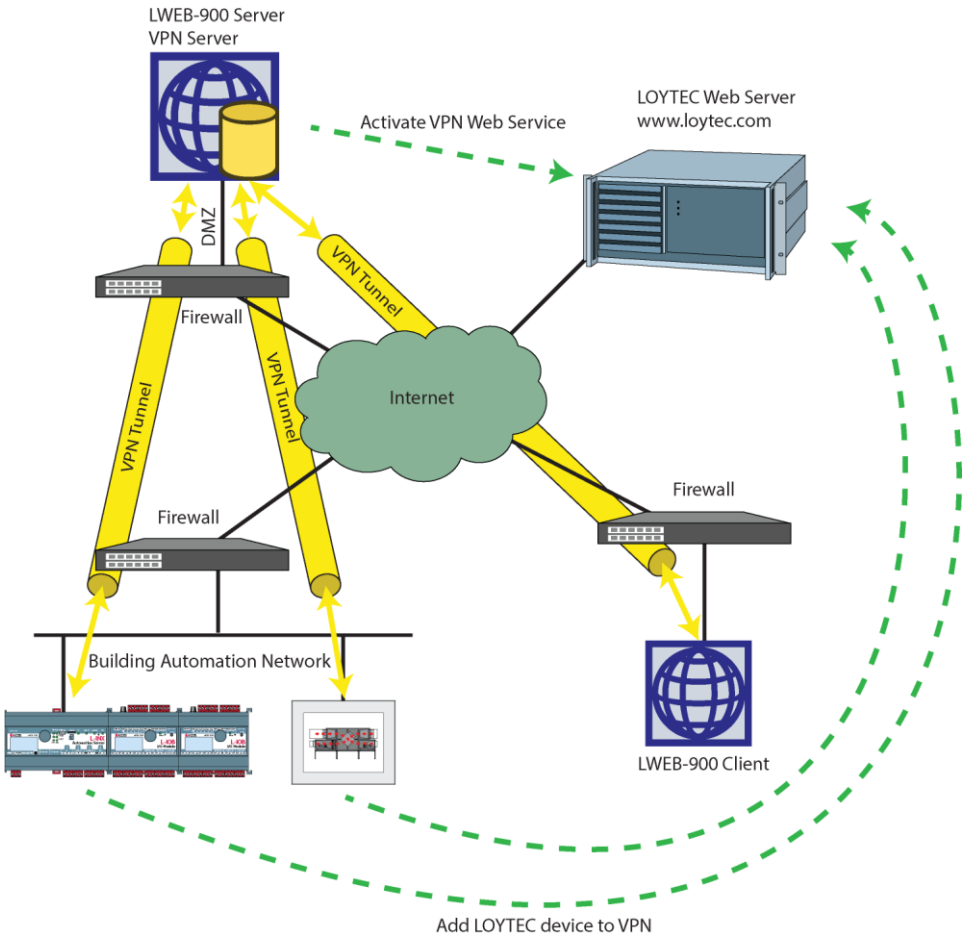


Figure 284: LWEB-900 VPN

It is possible to create multiple projects in one LWEB-900 Server. For each project, the VPN function can be enabled separately creating distinct VPN instances.

The VPN implementation has the following restrictions:

- The DNS name of the LWEB-900 Server needs to resolve to an IP v4 address.
- The recommended maximum number of LOYTEC devices in a VPN is 100 (UDP).
- The VPN implementation does not support multi-site.

License

The VPN feature requires two licenses:

- VPN base license: To enable the VPN function, the LWEB-900-VPN-BASE license needs to be installed. Each active LWEB-900 project for which VPN is enabled requires a separate LWEB-900-VPN-BASE license.

- VPN maintenance license: LOYTEC devices are added to the VPN using the VPN web services, which require the LWEB-900-VPN-MNT license. The VPN maintenance license is valid for all projects on the server but is limited to the duration of one year. The VPN will continue to operate after the LWEB-900-VPN-MNT license has expired but it will not be possible to add devices to the VPN using the VPN web service.

Refer to Section 3.2 on how to request and install the required licenses.

Enable VPN

1. Select **Properties** from the context menu of the project node in the navigation view and switch to the **VPN** settings.

2. Active the **Enable VPN** checkbox.

3. Configure the **VPN Subnet** and **VPN Subnet Mask**. The default VPN subnet is 10.1.0.0 with mask 255.255.0.0. This virtual IP address range should be a private range, which is currently unused on your network.

4. The **Protocol** can be UDP or TCP. UDP is recommended for performance reasons. When using TCP the maximum number of VPN clients is 60.

5. Data channel packets are encrypted with the selected **Cipher** algorithm. The default is AES-128-GCM, which offers a good balance between security and performance for LOYTEC devices.

6. The default **Log Verbosity** is “Normal”. For trouble shooting the verbosity can be increased. Each verbosity level shows all info from the previous levels.

7. The LWEB-900 Server needs to be accessible by all LOYTEC devices and clients via the configured **Public Hostname** and **Public Port**. The default port is 1194 for UDP. If multiple projects on the same server are configured with VPN, each VPN instance needs a different port number.

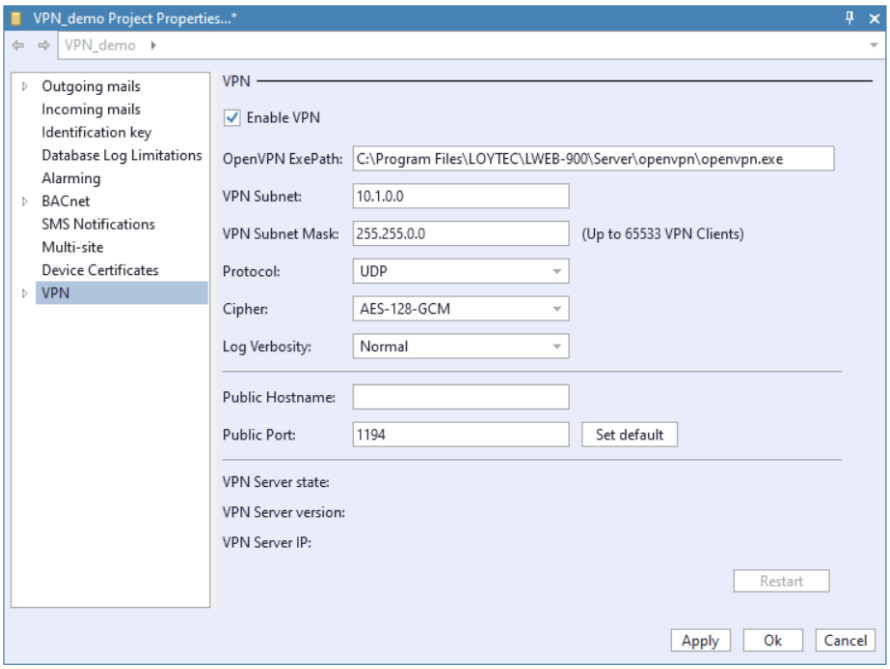


Figure 285: Enable VPN

Activate VPN Web Services

1. Select **Properties** from the context menu of the project node in the navigation view and switch to the **VPN -> VPN Web Services** settings.

2. Click on the button **Activate VPN Web Services**.

3. Fill out **Full Name**, **E-Mail Address**, **Company Name** and the **Public Host Name** of the LWEB-900 Server. All LOYTEC device, which you want to add to the VPN, need to be able to connect to the LWEB-900 Server using the specified public host name and the LWEB-900 Server HTTPS port.

4. Activate the checkbox to accept the Terms and Conditions for using LOYTEC VPN Web Service.

5. An e-mail is sent to the specified e-mail address. Press on the **Activation** button in e-mail to finish the activation.

6. After the VPN web services have been activated, the dialog in LWEB-900 displays the settings as shown in Figure 286. The **Project PIN Code** is used to identify the LWEB-900 project when adding devices to the VPN as described in the next section. Different devices of the project are identified by their individual device PIN code. A device PIN code expires after the **Device PIN Code Validity Period**.

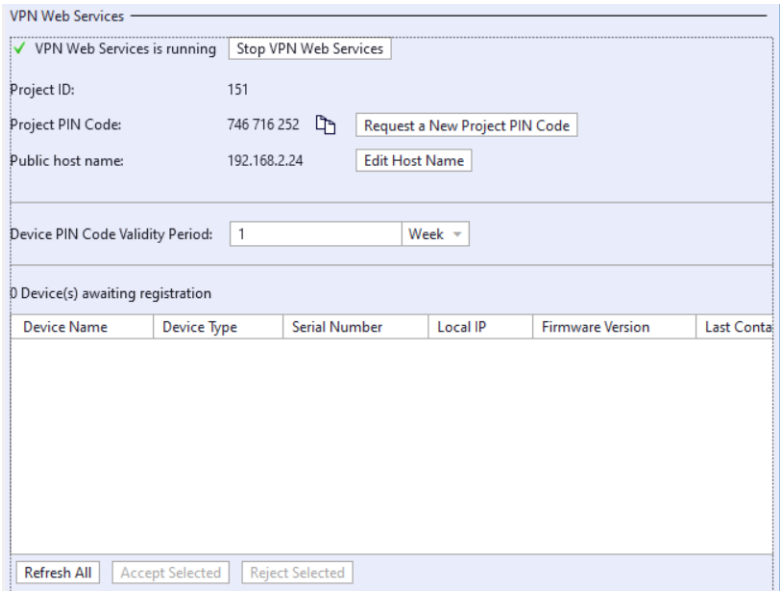


Figure 286: VPN Web Service

Add LOYTEC device to VPN

1. Select the folder **Network/Devices** or a subfolder and choose **New → New device** from the context menu. Adding a new device is described in detail in Section 6.6. Add the device manually with communication mode "Web Service".

   The **Public IP address** will be used by LWEB-900 to communicate with the device if VPN is not active. You can leave it empty if the device has no public IP address.

   The **Local IP address** is optional because it can be read from the device when it is connected. However, when using VPN it is recommended to configure the local IP address manually for documentation purpose. If configured, the VPN IP address can be derived automatically from the local IP address.

2. Enable the **VPN** checkbox and configure the **VPN IP address**. Press on the button next to the input field to let LWEB-900 derive a VPN IP address from the local or public IP address. If no local or public IP address is configured, the next free IP address will be assigned.

3. Press on the **Apply** button.

4. In the following "Device Action" dialog press **Cancel** to postpone the assignment of a data point configuration.

5. **Project PIN Code** and **Device PIN Code** are now displayed in the VPN tab of the device properties (see Figure 291). By default, the device PIN code is valid for 1 week. This can be changed in the settings of the VPN web services.

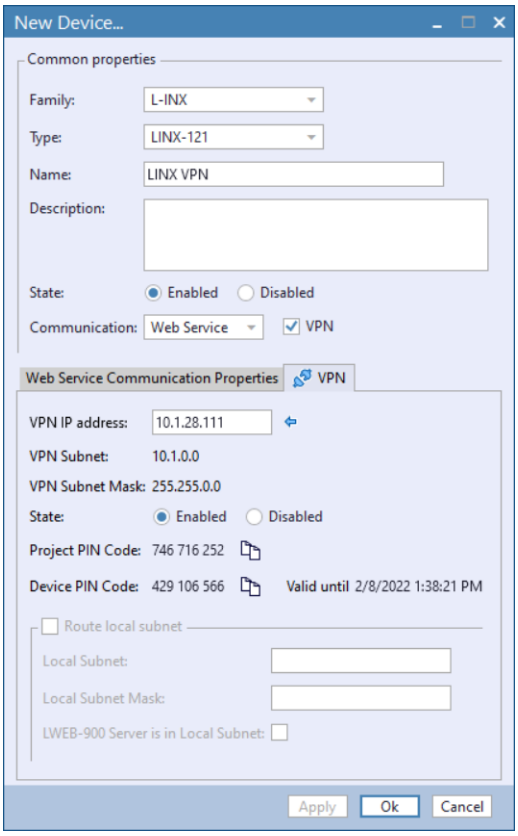


Figure 287: Device Properties, VPN Tab

6. Open the Web UI of the device and select **Config → Port Config** from the menu. Open the **VPN** tab, set the **Port Mode** to „Separate Network“ and then go to the OpenVPN Menu. Select „LWEB-900 VPN“ as **OpenVPN Mode** and click on **Save Settings**. Enter **Project PIN Code** and **Device PIN Code** and then press the **Start** button. Alternatively, you can use the LCD UI of the device to enter the PIN codes (menu entry **Device Management → TCP/IP Setup → VPN Config**).

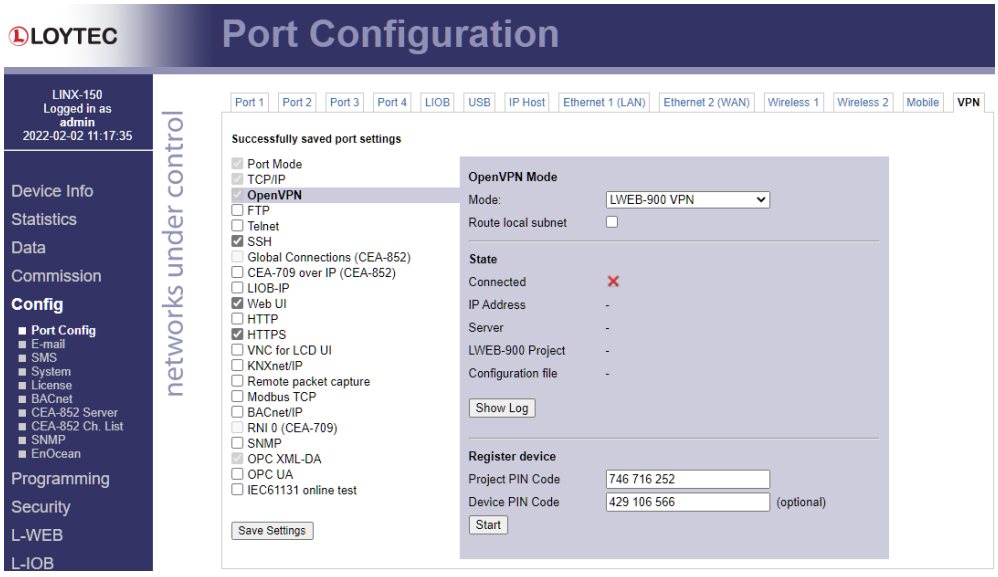


Figure 288: Device Web UI, VPN Configuration

7. If the LWEB-900 Server can communicate with the device via VPN, the icon in the navigation view changes to include a small green “VPN” text box.



Figure 289: Device with green “VPN” text box

It is also possible to add multiple devices in LWEB-900 and then export the project PIN code and all device PIN codes as a CSV file. The menu entry is available in the **VPN** context menu of the **Devices** folder in the navigation view.

If you enter only the **Project PIN Code** on the web UI of the LOYTEC device, the LWEB-900 Server cannot uniquely identify the device. The device then appears in the list on the **VPN Web Services** properties (see Figure 290). To open this dialog, select **Properties** from the context menu of the project node in the navigation view and switch to the **VPN** -> **VPN Web Services**. To add the device to the project, select it and click on the button **Accept Selected**. You can now associate the selected device with an existing device or create a new one.

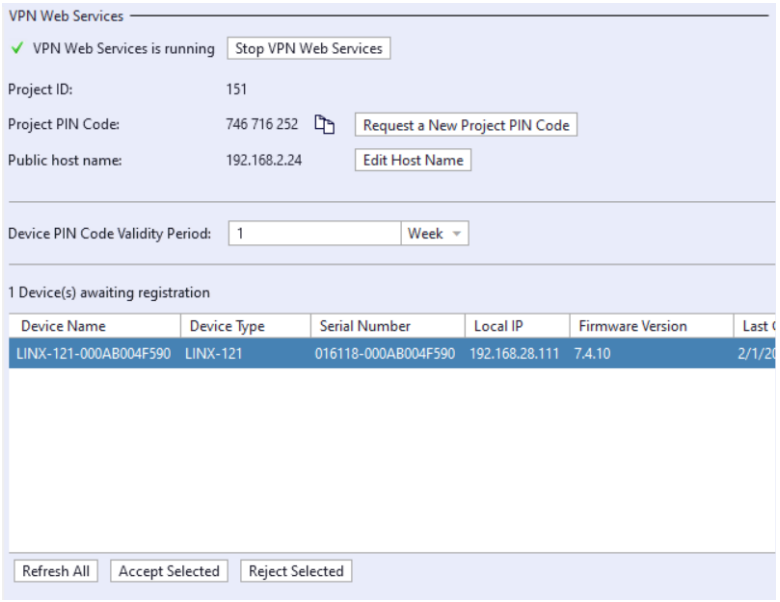


Figure 290: VPN Web Service, Accept Selected Devices

Subnet routing

A LOYTEC device can route VPN traffic to and from the local IP subnet. This effectively makes all devices on the local IP network available over the VPN with their local IP address. In this way, it is possible to communicate with devices on the local subnet, which are not VPN clients. This function requires that the IP subnet is unique on the entire VPN.

The L-INX device in Figure 291 is configured as a router to the local subnet. The web cam is not a VPN client and has no VPN IP address. Therefore, the web cam can only be accessed with the local IP address via the VPN tunnel to the L-INX device. The L-VIS device can be accessed via the VPN IP address or the local IP address. Using the VPN IP address has the advantage that it does not create unnecessary load on the L-INX device.

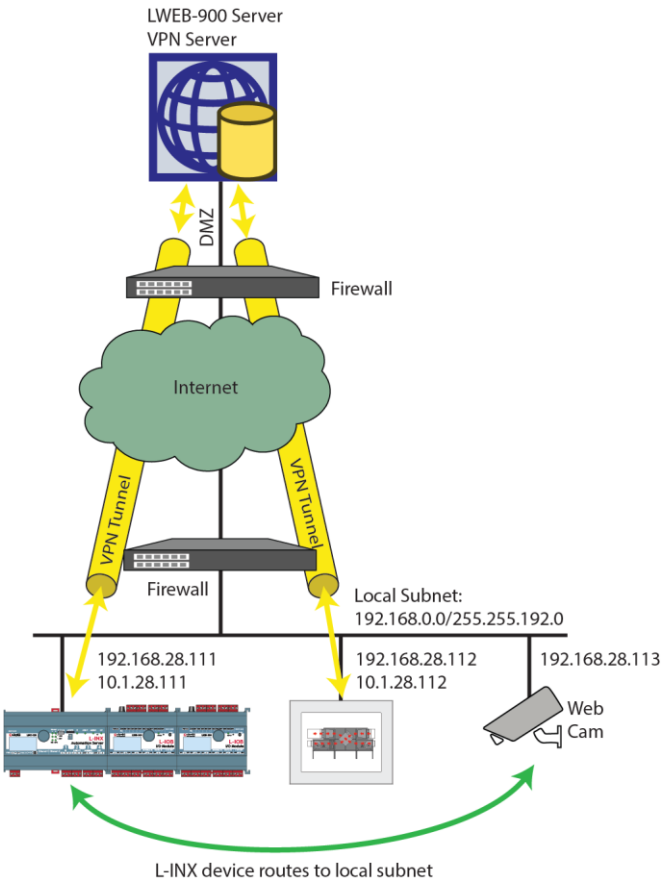


Figure 291: Subnet Routing

1. Select the device in the navigation view and choose **VPN → Create VPN Client LAN Subnet Route** from the context menu.

2. Configure the **LAN Subnet** and **LAN Subnet mask** and select if the **LWEB-900 Server is in the local subnet** or not (When not checked, this will add a route to the device local subnet on the computer running LWEB-900 Server).

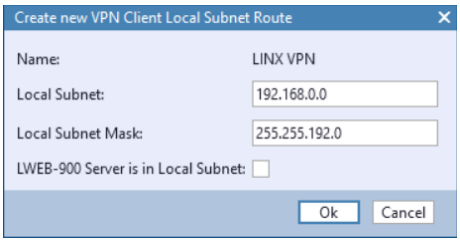


Figure 292: Configure Local Subnet Router

Add PC or mobile device as VPN client

PCs and mobile devices need to be added to the VPN only if direct access to the devices is required.

1. Select the folder **VPN Clients** or a subfolder and choose **New → New VPN Client** from the context menu.

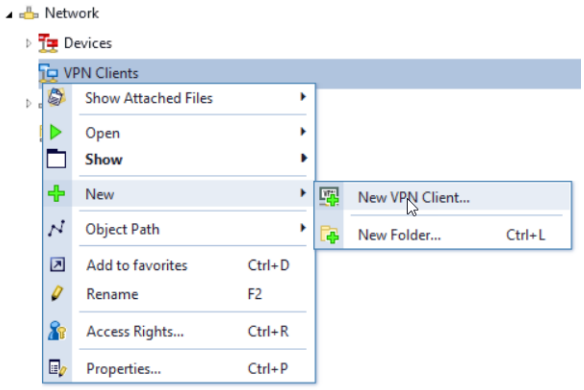


Figure 293: Navigation View, New VPN Client

2. Enter a **Name** and **Description** for the client. The LWEB-900 Server will automatically select the next free **VPN IP** address per default. The setting **VPN Certificate Lifetime** determines for how long the client will be able to connect to the server without renewing the certificate.

3. From the context menu of the new client you have different options to transfer the connection information to the client (see Figure 294):

   - Export OVPN: The OVPN file contains all necessary information for the client to connect to the VPN.
   - Generate QR Code and Download link: LWEB-900 provides a download link that is valid for one day. To download the OVPN file, you have to authenticate with an LWEB-900 user name and password. The LWEB-900 user needs „Read“ access rights on the associated VPN Client.
   - E-Mail OVPN file to: This option is only available if an outgoing E-Mail server is configured.

4. Every transfer of the OVPN file require to set a unique password that will be used for this file. If you lost the password, you should transfer the file again and set a new password.

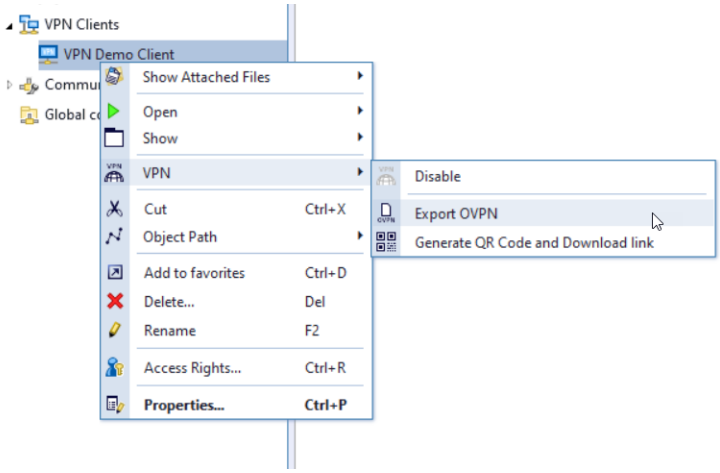


Figure 294: VPN Client Context Menu

Connect with LWEB-900 Client to VPN

Create a VPN client in LWEB-900 and export the OVPN file. You can add the OVPN file to your project connection:

1. Start the LWEB-900 Client and click on the **Edit** button next to the connection name.
2. Create a new connection and fill out the **Connection name**.
3. Activate the checkbox **Use VPN** and select the OVPN file.
4. Click **Save**

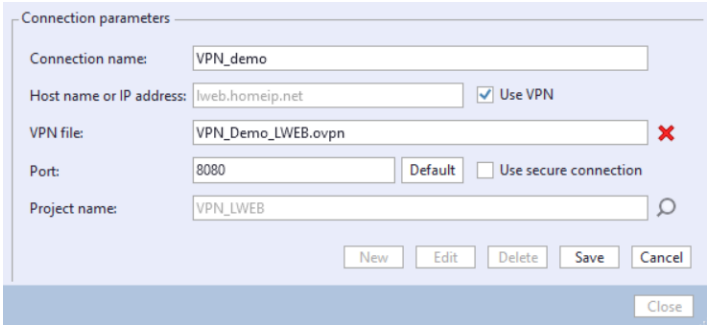


Figure 295: Connection Parameters, Use VPN

Connect with Android or iPhone mobile device to VPN

In order to connect to the VPN created by LWEB-900 with your smart phone, you need to install the “OpenVPN Connect” app from iOS App or Google Play Store. You can then create a VPN client in LWEB-900 and e-mail the OVPN file to your mobile device. Alternatively, you can generate a QR and scan it with your camera:

1. Open the camera app to scan the QR Code.
2. You will see a pop-up notification to open the link in the default browser.
3. To download the OVPN file you have to specify your LWEB-900 user name and password.
4. On Android, the “OpenVPN Connect” application will open automatically to import the VPN profile. On iPhone, open your downloads and click on the file to preview it. You can now click on the iOS action (share) button and select OpenVPN.
5. When asked, enter the Private Key Password you choose in the LWEB-900 Client when creating the QR Code.

Troubleshooting

Check that the port and protocol used by the VPN server (default UDP, 1194) is open in the firewall.

Chek that the port used by the VPN Web Services and LWEB-900 HTTPS Server (default TCP, 8443) is open in the firewall.

Verify that the **Public Hostname** configured for the VPN Server and WebServices can be resolved by the DNS used by your LOYTEC devices.

Enabling the debug information in LWEB-900 Server System Log might help you. The modules „VPNConsole“ and „VPNManager“ show detailed information about the VPN server, „VPNWebServiceClient“ and „VPNWebServiceServer“ for the VPN Web Services.

6.33 Scripting

The LWEB-900 Server can launch and monitor the execution of Nodejs scripts. It can also launch and monitor the execution of a Node-RED server running functional flows.

A Nodejs script can read/write/subscribe data point values, read records stored in project data logs.

A Node-RED flow can read/write/subscribe data point values.

Those features are extending the possible applications: obtain weather data from the Internet and inject them into data points, interoperate with third-party devices by using specific communication protocols, cyclically export data log records, etc.

6.33.1 Nodejs scripts

Add new script object

To create a new Nodejs Script Object:

1. Select the folder **System/Scripting** and choose **New->New Script Object** from the context menu. This opens the script object properties dialog.

2. Specify the script object properties:

- **name**: name of the script.
- **Description**: optional description of the behavior of the script (if left empty, it will be automatically fulfilled with the one of the selected Script resource, see below).
- **Startup mode**: Automatic or Manual; in Automatic mode, the script will be automatically started with the LWEB-900 project and will be monitored to restart after 5 minutes in case an error stops its execution.
- **Script resource**: select from the library the script resource that will be implemented by this script; for example, the built-in “dpConnector” can be used to automatically subscribe and copy the value of a source data point to a target data point.
- **Variables**: in case the script resource specifies that some data points should be provided as variables for its execution, then those variables are listed and must be bind to some data points of your choice. For a specific variable (for example the “source dp” or “target dp” of a “dpConnector” script object), click the “Datapoint” cell: this will open a selection dialog for searching and selecting the proper data point to bind to the variable; only data point of the expected type (for example, “analog”) can be selected. You can alternatively use the “Automatic creation of user registers from variable”, this will create user registers for this script object.

Change script object properties

Use the « Properties » context menu option to change some of the following properties of the script object: its name, description, startup mode, eventual data points bound to its variables.

Execution

A script object is either currently running or stopped. The color of its icon indicates its current status:

- Green: the script is running. For example, with the “dpConnector” script: it will remain green until manually stopped, because its task consists in copying source data point value to target data point indefinitely.
- Red: the script stopped its execution because of an error; the detailed cause of the error can be seen in its “Last error” property.
- Grey: the script is stopped; this can be normal case when a script has successfully completed its tasks and had nothing more to execute.

To stop the execution of a script object currently running, select the “Stop Script” option from the context menu.

To start its execution, select the “Start Script” context menu option.

In case the script has stopped its execution because of an error, you can use the “Start Script in Debug Mode” option. This will start nodejs in a special state where it is waiting for Google Chrome web-browser to establish a debugging session. Inside this web-browser, enter the following URL: “chrome://inspect”; this will display a page with an “inspect” link to start the debugging session.

User Script Resources

To implement the behavior of a new Nodejs script:

1. Write the javascript source forming the script. It must have a .js file where LWEB-900 will look for eventual metadata describing the variables supported by the script for binding with data points of the LWEB-900 project. An example of implementation can be obtained by exporting the “dpConnector” built-in resource: it will produce a dpConnector.lwscpt file, which is a ZIP archive containing the dpConnector.js file.

2. Select the folder **Library/Script Resources** and choose **New->New Script Resource** from the context menu. This opens the script resource properties dialog.

3. Specify the script resource properties:

   - **name**: name of the script resource.
   - **Description**: optional description of the behavior of the script.
   - **Type**: type of file(s) forming the script sources
     - File: the script resource is implemented as a single Javascript file.
     - Folder: the script resource is implemented in multiple files located in a specific folder (for example including node modules); it must contain a top-level index.js file (or a file referenced as “main” file from a top-level

Nodejs package.json file) where LWEB-900 will look for eventual metadata.

- ZIP archive: the script resource is implemented in multiple files stored in a specific ZIP archive; it must contain a top-level main.js file where LWEB-900 will look for eventual metadata.

Depending on this type of files forming the script sources, you will have to select the corresponding file, folder or ZIP archive. Once this new resource will be created, LWEB-900 will cyclically verify if this source has changed and mark the script resource with an asterisk if it has changed on disk or if it has been deleted.

6.33.2 Node-RED Server

Add new Node-RED Server

To create a new Node-RED Server Object:

1. Select the folder **System/Scripting** and choose **New->New Node-RED Server** from the context menu. This opens the Node-RED Server object properties dialog.

2. Specify the Node-RED server object properties:

- **name**: name of the server.

- **Description**: optional description of the server

- **Port number:** the TCP/IP port on which the Node-RED Server will provide its web interface for configuring execution flows. The port selected will be automatically verified to detect if it is not yet used by another application or LWEB-900 Node-RED server object.

- **LWEB-**900 user: the user account in the LWEB-900 project that will be used by this Node-RED server when reading/writing/subscribing data point values.

- **Startup mode**: Automatic or Manual; in Automatic mode, the server will be automatically started with the LWEB-900 project and will be monitored to restart after 5 minutes in case an error stopped its execution.

Execution

A Node-RED Server is either currently running or stopped. The color of its icon indicates its current status:

- Green: the server is running.

- Red: the server stopped its execution because of an error; the detailed cause of the error can be seen in its “Last error” property.

- Grey: the server is stopped; this can be normal case after having been manually stopped, or not configured to start manually and not yet started.

To stop the execution of a Node-RED server currently running, select the “Stop Node-RED Server” context menu option.

To start its execution, select the “Start Node-RED Server” context menu option.

In case the server stopped its execution because of an error, you can use the “Start Node-RED Server in Safe Mode” option. This will start the server in a special state where it will not execute its configured flows.

Configuring the execution flows

Use the “Configure Node-RED flows” context menu of a Node-RED server to open its web interface. Once this web interface is loaded, you will find in the “function” blocks the Loytec readDP and writeDP items. For example, to subscribe to the “LWEB-900 Server CPU Load” system register:

- Drag/drop a new “readDP” node to a flow.
- Double-click this node to edit its properties.
- Select in the LWEB-900 Navigation View the “LWEB-900 Server CPU Load” system register and drag/drop it to the “Data Point Path” of the readDP node. This will automatically fulfill the Server, Topic, Data Point Path of this readDP node.

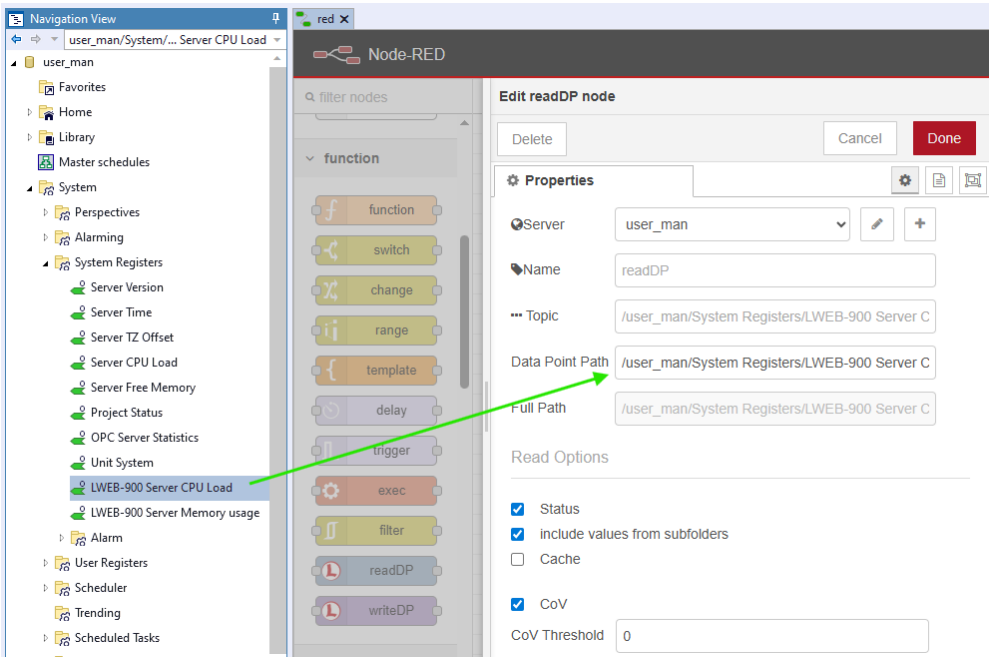


Figure 296: drag/drop to readDP node

Click the “Done” button then “Deploy”: the current value of the Cpu Load will be displayed in the flow.



Figure 297: readDP node live value

To test the update of a data point value by using a “writeDP” node: create a new LWEB-900 user register “CPU Load feedback” of type analog, drop it to the Data point path of a new writeDp node in the flow, connect the output of the readDP to the input of the writeDP, and finally click the “Deploy” button. The value of the “CPU Load feedback” register will be automatically updated with the current value of the “LWEB-900 Server CPU Load” register.

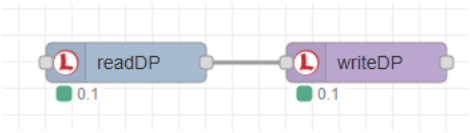


Figure 298: readDp/writeDP nodes connection

7 WEB Access

The graphical views defined in an LWEB-900 project can be accessed with a standard web browser. In this way it is possible to quickly check the status of the building automation system while travelling. It makes no difference, whether a smart phone, tablet, or PC is used.

Open graphical view in web browser

1. Open the web browser an enter the following URL:

   `http://<IP address of server>:<port>/lweb900/`

Note:	*The port is configured in the network settings of the LWEB-900 server (see Section 5.3). The default port is 8080.*

2. Specify the name of the LWEB-900 project. If the LWEB-900 Server is password protected, you have to enter the name in a text field, else you are presented with a drop-down list of the available projects.

3. Enter your user name and password and press **OK** to login.

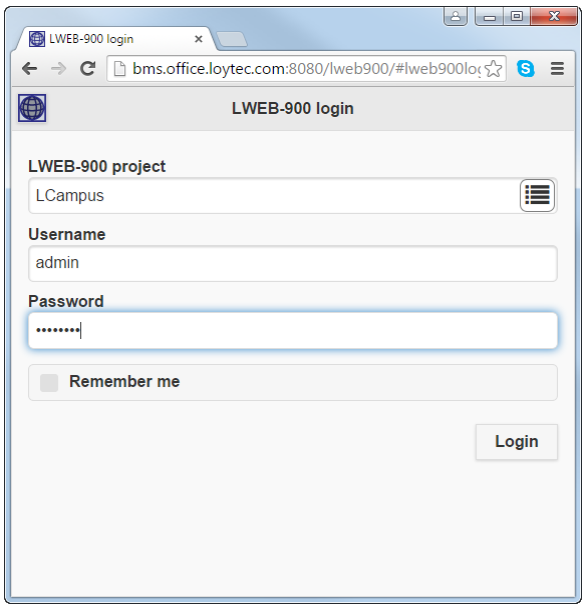


Figure 299: LWEB-900 Web Login

4. The web browser displays a list of all graphical views and chart views of the LWEB-900 project to which you have at least **Read** access.

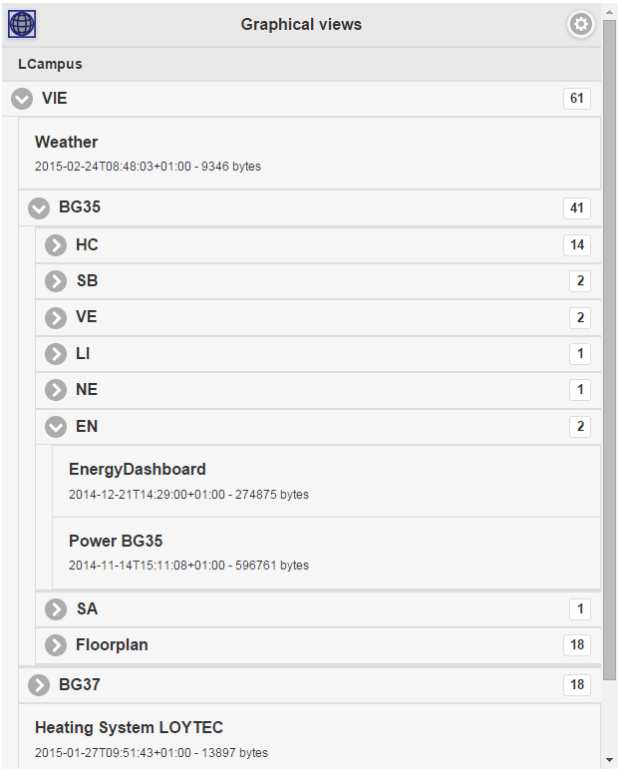


Figure 300: Graphical View List

5. Click on the name of a graphical view to open it.

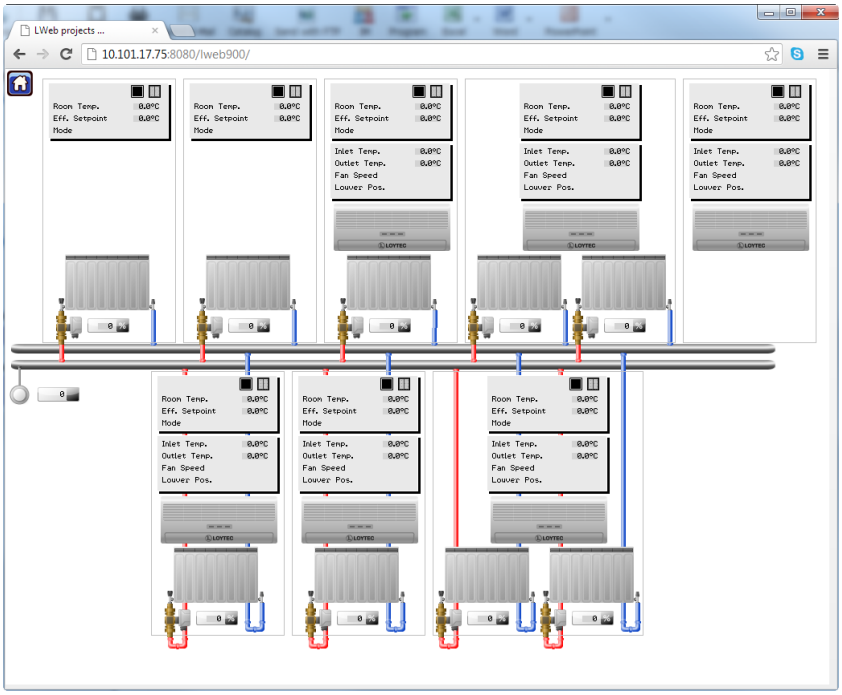


Figure 301: Graphical View in Web Browser

Create home screen icon on Android devices

1. Bookmark the graphical view in your browser.

2. Android 4.x: Tap on the app panel (six squares) in the upper right of the home screen. Switch to **Widgets** and long press on **Bookmark.**

   Older Android versions: Long press on the home screen. From **Add to Home Screen**, select **Shortcuts** and then select **Bookmark**.

3. Select the bookmark of your graphical view.

Create home screen icon on iOS devices

When the graphical view is displayed, just hit + and select **Add to Home Screen**.

7.1 Navigation Menu and System Menu

The navigation menu is opened by one of the following actions in the main window:

- Left click and hold: The left click and hold operation opens the navigation menu after the time configured in the L-VIS/L-WEB Configurator. Please note that for correct operation, the left click and hold action should be executed on a free spot on the display. If the area of an input control is clicked, the control enters input mode and all further input is processed by the control.

- Right click: A right click has the same effect than a left click and hold operation. It is not available on touch displays.

Figure 302 shows an example of the navigation menu.

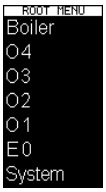


Figure 302: Navigation Menu

The navigation menu displays the menu items which were defined in the L-VIS/L-WEB Configurator and the “System” entry to open the menu shown in Figure 303.

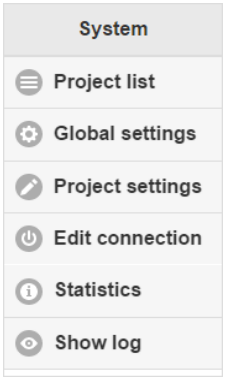


Figure 303: System Menu

The system menu give access to the following functionality:

- Project list: Display a list of graphical views in the LWEB-900 project.
- Global settings: Refer to section 7.2.
- Project settings: Refer to section 7.3.
- Edit connection: Edit the connection parameters.
- Statistics: Refer to section 7.4.
- Show log: Refer to section 7.6.
- Refresh values: This icon is displayed only if **manual only** is selected as update method in the global settings. Clicking on this icon performs a manual update of the data point values.

7.2 Global Settings

Global settings apply to all graphical views.

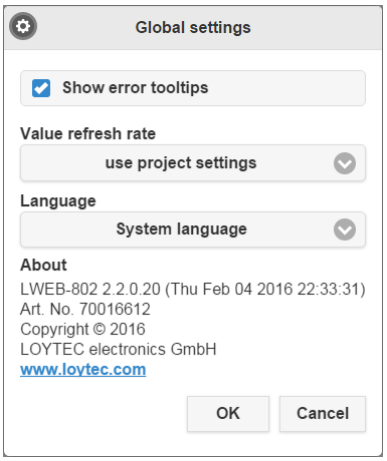


Figure 304: Global Settings

The **Global settings** dialog as shown in Figure 304 contains the following settings:

- **Show error tooltips**: If this checkbox is set, a tooltip is displayed showing the OPC error when hovering over a grayed-out control.
- **Update control**: This setting defines how often data point values are updated. The default setting is **use project settings**.
- **Language**: This drop down box allows changing the display language. The new setting takes effect after reloading the application (CTRL+r).

7.3 Project Settings

This dialog contains settings which are specific to a graphical view.

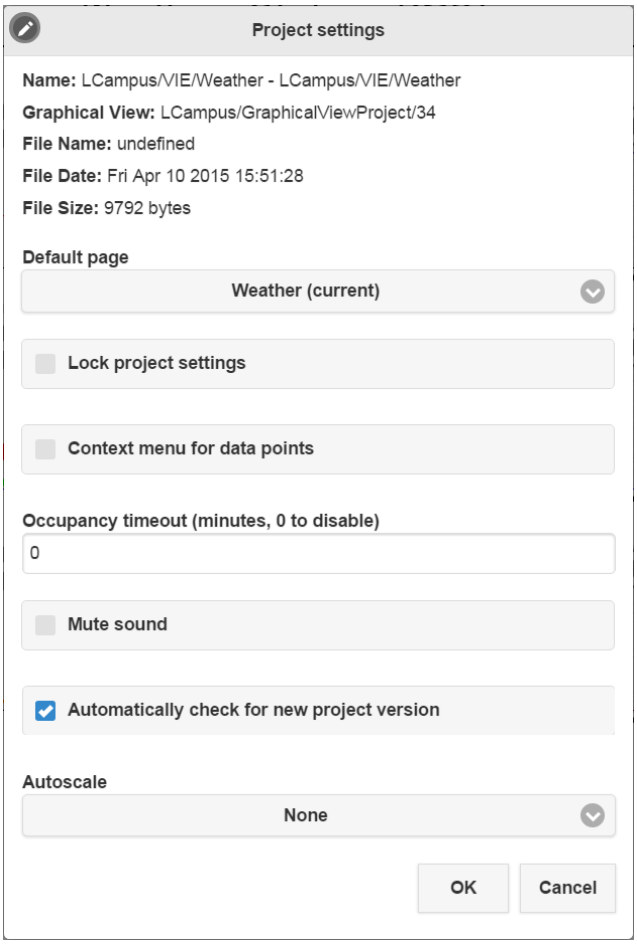


Figure 305: Project Settings

- **Default page**: If the graphical view contains multiple pages, the default page which is displayed when opening the view can be selected from this drop-down list.

- **Lock project settings**: If this checkbox is enabled, a PIN code will be required before opening the project settings dialog. In addition, no menu entries will be displayed in the navigation menu. This feature can be used for example to setup a project with multiple pages where each page controls an office room. The default page for each user is set to the room in which he is located and then the menu is disabled. This way each user can control only the own room.

  The PIN codes can be configured in the L-VIS/L-WEB Configurator using the menu **File → Project Settings**. Press the Button **Setup Pin Codes…** to open the **Access Codes** Dialog and set the PIN code for Level 15.

- **Context menu for data points:** If this checkbox is enabled, you can click with your right mouse button on a control to view data point details. A context menu is displayed listing the attached data points (see Figure 306). Select the name of the data point for which you want to inspect the properties as shown in Figure 307.

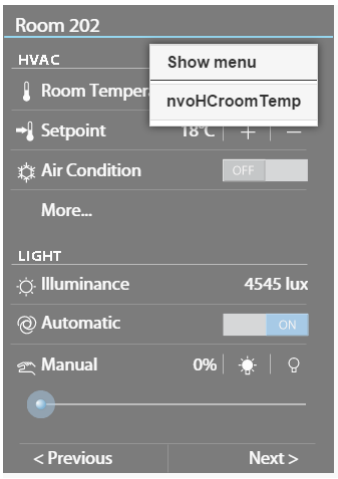


Figure 306: Data Point Context Menu

nvoHCroomTemp

DataType	double
Value	24.13
Timestamp	2015-03-24T09:52:27.372
Quality	good
EU Type	analog
EU Units	°C
Description	
High EU	327
Low EU	-273
Identification Key	VIEBG35O202HCRCT00GEN00SET00VAL00
Full Path	LINX151-OG2.CEA709 Port.Datapoints.RI2.HC.nvoHCroomTemp
Datapoint Trend charts	
Source	LWEB-900 Server http://bms.office.loytec.com:8080

Figure 307: Data Point Details

- **Occupancy timeout:** LWEB-802 has an internal system data point called **PC Active**. If enabled, this data point is 1 as long as there is activity inside the browser window. LWEB-802 cannot detect activity outside the browser window.

- **Mute sound:** This option allows disabling sound output for the project.

- **Automatically check for new project version:** If this option is enabled, LWEB-802/803 automatically checks in the background if a new version of the project is available. This check is done once every hour. If a new version is detected, it is reloaded automatically

- **Autoscale:** This option is only available in LWEB-802. The user can always change the zoom level manually using pinch-zoom or CTRL + mouse wheel. The autoscale operation is performed for each project load, orientation change, or resize event. The drop down box contains the following settings:

    - **None:** No autoscale is performed and the zoom level is persistent.

    - **Fit in Window:** The graphical view is scaled to completely fit into the browser window.

- **Cover Window:** The graphical view is scaled to fit either the width or the height of the browser window so that the whole browser window is covered.
- **Fit Width:** The graphical view is scaled to fit the width of the browser window.
- **Fit Height:** The graphical view is scaled to fit the height of the browser window.

7.4 Error Handling

If a control does not receive data from the LOYTEC device or the LWEB-900 server, the control will be grayed out. If tooltips for error messages are enabled the OPC error message will be displayed when hovering over the control as shown in Figure 308.

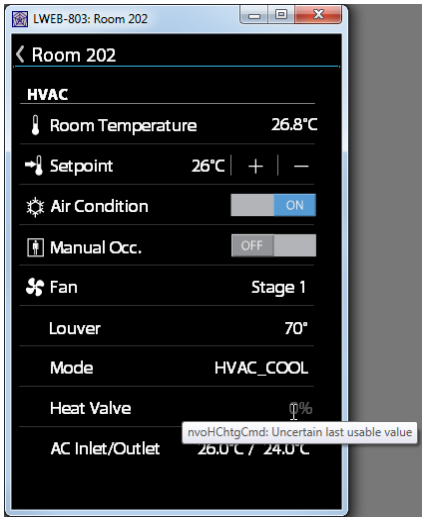


Figure 308: Tooltip to report error

7.5 Statistics

The **Statistics** dialog displays the connection status with the LWEB-900 Server (see Figure 309).

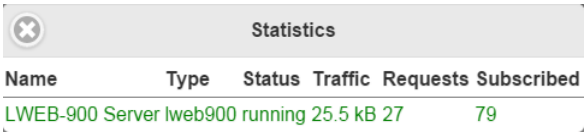


Figure 309: Connections Dialog

7.6 System Log

The system log records all activities. When reporting a problem with the LWEB-900 web access, it is recommended to include a screenshot of the system log. This will speed-up problem analysis.

8 Interfaces

8.1 Trend Log CSV File

The CSV file format for a trend log is defined in this section. The CSV file starts with a header, containing at least the first line, which specifies the CSV format (log_csv_ver). The current version is 2. The next line contains the field log_device. It has trailing fields that specify the vendor, product code, firmware version and device ID string. The Device ID String contains the host name of the LWEB-900 Server.

The log_info line specifies the ID and name of the trend log object. The line log_create has two fields specifying the date and time when this CSV log was generated. The line log_capacity has two fields: the current number of log entries in the file and the log capacity.

Following are one or more lines of log_item. Each line specifies a trended data point. The first field is the index, the second the ID of the logged data point, the third the data point name. The data point name can be augmented by engineering units in square brackets. Log entries in the CSV refer to the item index to identify the data point, for which the entry was logged.

```
#log_csv_ver,2
#log_device;LOYTEC;Product Code;Firmware Version;Device ID String
#log_info;Log-ID;Log Name
#log_create;YYY-MM-DD;HH:MM:SS
#log_capacity;filled;capacity
#log_item;index;UID;data point name [units]
```

After those lines any number of comment lines starting with a hash character '#' are allowed. One line contains the column headings. Lines that are not comments specify one log record per line, using the column information as described below. The columns are separated by commas ',' or semi-colons ';'. If commas are used as a separator, the decimal point must be a point '.'. If semi-colons are used, the decimal point must be a comma ','.

Column	Field	Example	Description
A	Sequence Number	50	The log record sequence number. This is the monotonously increasing sequence number, which is unique for each log record.
B	Source	0	Data point source identifier. Indexes into logger_entry header. For value lines in a multi-column CSV, this field indexes the first column, which has a value. For the ERROR record type, the field indexes the data source that caused the error. For LOGSTATE, TIMECHANGE records this field is not applicable and set to 255.
C	Record Type	2	The record type: LOGSTATE (0), BOOL (1), REAL (2), ENUM (3), UNSIGNED (4), SIGNED (5), NULL (7), ERROR (8), TIMECHANGE (9)
D	Error/Time Change/Log Status	1	This field is valid for records of type ERROR, TIMECHANGE, and LOGSTATUS.
E	Date/Time	2007-11-02 15:34:22	The date/time of the log record. This is in the format YYYY-MM-DD HH:MM:SS.
F	Value 0	24,5	Logged value from source 0 or empty
G	Value 1	200	Logged value from source 1 or empty
…	…		
…	Value *n* – 1	5000	Logged value from source *n* – 1 or empty

Table 55: Columns of the Trend Log CSV File.

There are as many value columns as value sources specified in the header. If at a given date/time more values are logged, all of them appear in the same line. If at that given time some sources did not log values, those columns are left empty. The “Source” column in a multi-value CSV refers to the first data source that supplied a value in a given line.

8.2 Alarm Log CSV File

The historical alarm logs can also be exported as CSV-formatted files. The CSV format of the alarm log CSV file is identical to the trend log CSV format as described in Section 8.1.

8.3 Identification Key CSV File

Identification keys can be exported and imported via CSV files. Figure 310 shows and example.

```
Path,Name,IK,Type,Description
./LI/I1/,nvoLIvalue,VIEBG35O401LIRCT00ZON01LIF00CMD00,DP User  Output,
./LI/I1/,nviLIvalueFb,VIEBG35O401LIRCT00ZON01LIF00CMF00,DP User  Input,
./LI/I1/,nviLIOvrValue,VIEBG35O401LIRCT00ZON01LIF00OVR00,DP User  Input,
./LI/I1/,nvoLIovrValue,VIEBG35O401LIRCT00ZON01LIF00OVR00,DP User  Output,
./LI/I1/,nvoLIvalFb,VIEBG35O401LIRCT00ZON01LIF00CMF00,DP User  Output,
./LI/I1/,nviLIlux,VIEBG35O401LIRCT00ZON01SEL00VAL00,DP Analog Input,
./LI/I1/,nviLIoccup,VIEBG35O401LIRCT00ZON01SEO00VAL00,DP Multistate  Input,
```

Figure 310: Example of Identification Key CSV File

Column	Field	Description
A	Path	Path of the object relative to the folder from which the file was exported
B	Name	Name of object
C	IK	Identification key assigned to the object
D	Type	Object type
E	Description	Object description

Table 56: Columns of the Identification Key CSV File.

8.4 Database Interface

To allow 3rd party applications access to historical data, trend and alarm logs are stored in a dedicated database. When creating a new LWEB-900 project, you can decide which database engine to use (see Section 5.7). The following sections describe the tables used to store trend and alarm log information.

8.4.1 Datalog Configuration Table (DatalogConfig)

This table contains global data log parameters stored as (key, value) pairs. The "key" is the unique identifier of the parameter, its "value" is a string.

Name	Type	Description
Id	int64	Id of the parameter: DATABASE_VERSION (0)
Value	text	Value of the parameter.

Table 57: DatalogConfig Table

8.4.2 Log Information Table (LogInfo)

This table contains global information on log objects.

Name	Type	Description
Id	int64	Unique identifier of the log
Type	int16	Type of the log: • Device trend log (0) • Device alarm log (1) • Server trend log (2) • Server alarm log (3)
SourceName	nvarchar(64)	Name of the source for this log: • Name of a device in case of a device log • Name of an LWEB-900 project in case of a server log
AbsolutePath	nvarchar(2048)	Path of the log in the form /<log source name>/…/<log name>
SourceTotalCnt	int64	Total count of records ever logged on the log source (e.g., device). Some of these records might no longer be on the log source due to log size limitation or user deletion.
ServerTotalCnt	int64	Total count of records ever logged on the LWEB-900 Server. Some of these records might no longer be in the database due to log size limitation or user deletion.
ServerRecCnt	int64	Actual count of uncompressed records stored in this log on the LWEB-900 Server
FirstTimestamp	int64	Date/time in seconds since 1.1.1970 of the oldest record in this log
LastTimestamp	int64	Date/time in seconds since 1.1.1970 of the newest record in this log
TableName	nvarchar(20)	Name of the table for the associated log. For each device there is a separate trend log and alarm log table the Datalog database. Each trend/alarm table has a different name suffixed with a counter Id for alarm and another for trend and padded with a padding scheme of 8 digits. The first AlarmLog get the TableName "AlarmLog_00000001", the first Trend: "TrendLog_00000001" and so on.

Table 58: LogInfo Table

8.4.3 Log Item Information Table (LogItemInfo)

This table contains a description of the items for which trend log records are stored into the database.

Name	Type	Description
LogId	int64	Identifier of the log this log item is attached to
ItemId	int64	Internal identifier of the log item in the LWEB-900 project database
ItemIndex	int16	Index of this item within the set of log items attached to the same log
AbsolutePath	nvarchar(2048)	Absolute path to the log item, in the form /<root object name>/…/<log name>
Unit	nvarchar(20)	Unit to interpret the values logged for this log item
AggregationMode	int16	Aggregation mode used when logging values for this item: • val (0) : no aggregation • min (1) • max (2) • average (3)
Compression	nvarchar(256)	This column contains information in JSON format, which is internally used by LWEB-900 for trend log compression. When a trend log has reached its maximum size or duration, the old data is not completely deleted. Instead, for each day a first, last, minimum, and maximum value is kept in the database.

Table 59: LogItemInfo Table

8.4.4 Trend Log Table (TrendLog)

This table contains the records forming the trend logs.

Name	Type	Description
RecordType	int16	The record type: LOGSTATE (0), BOOL (1), REAL (2), ENUM (3), UNSIGNED (4), SIGNED (5), NULL (7), ERROR (8), TIMECHANGE (9)
LogId	int64	Identifier of the log this data log record belongs to
ItemIndex	int16	Index of the item of the log
SeqNum	int64	Sequence number assigned to this record when logged on the server
Value	nvarchar(2048)	Logged value, depending on the record type: • Data record (BOOL, REAL, ENUM, UNSIGNED, SIGNED): value of the item • Log state record (LOGSTATE): 1 (log enabled) or 0 (log disabled) • Error record (ERROR): error code • Time change record (TIME CHANGE): Number of seconds to clock was put forward or backward • Other: 0
Timestamp	int64	Date and time when the record was logged in seconds since 1.1.1970

Table 60: TrendLog Table

8.4.5 Alarm Log Table (AlarmLog)

This table contains the records forming the alarm logs.

Name	Type	Description
LogId	int64	Identifier of the log this alarm log record is attached to
ItemIndex	int16	0
RecordType	int16	The record type: LOGSTATE (0), BOOL (1), REAL (2), ENUM (3), UNSIGNED (4), SIGNED (5), NULL (7), ERROR (8), TIMECHANGE (9)
Timestamp	int64	Date and time the record was logged in seconds since 1.1.1970
SeqNum	int64	Sequence number assigned to this record when logged on the server
XAID	varchar(64)	Extended alarm identifier; this identifier is used to acknowledge the alarm on its source
State	int16	State of the alarm in case the event is an alarm event. An enabled alarm can have the following states: • 1: active, not acknowledged • 2: acknowledged, but still active • 3: inactive, but not acknowledged • 4: acknowledged and inactive • 5: inactive, no acknowledgement required Other states describe disabled alarms and can be ignored.
AlarmType	int16	Type of the alarm: • 0: normal • 1: off-normal • 2: low-limit • 3: high-limit • 4: fault • 5: buffer
Priority	int16	Priority of the alarm
AlarmTime	int64	Date and time in seconds since 1.1.1970 when the alarm occurred
ClearTime	int64	Date and time in seconds since 1.1.1970 when the alarm condition was cleared
AckTime	int64	Date and time in seconds since 1.1.1970 when the alarm was acknowledged
AckSource	nvarchar(64)	Name of the user who acknowledged the alarm
DisableSource	nvarchar(64)	Name of the user who disabled the alarm
AckRequired	boolean	**True** when acknowledgement is required for the alarm, else **False**
Description	text	Textual description associated to the alarm
ValueType	int16	Type of the value column: • double (0) • integer (1) • boolean(2)
Value	nvarchar(2048)	Value of the data point when the alarm condition was triggered
PointName	nvarchar(64)	Name of the data point which triggered the alarm condition
UserId	int64	Internal ID of the user who acknowledged or disabled

		the alarm.
Comment	Text	Comment entered by the user when he disables an alarm
ObjId	int64	Internal identifier of object, which has triggered the alarm. This ID references an object in the internal project data base

Table 61: AlarmLog Table

8.5 Report Template

LWEB-900 can create reports based on trend logs. Reports can be used, for example, to document the energy consumption in a building. The LWEB-900 Server is delivered with a set of built-in report templates which cover most use cases for building automation. This section describes how to create your own custom user report templates.

A user report template is a Zip archive with the (*.rep) file extension. The archive contains the following files:

- An XML file which describes the template to the LWEB-900 Server
- A Microsoft Report File Definition file (*.rdl or *.rdlc for older file)
- An optional (*.png) file

To create or modify the RDL file you need the software Microsoft Report Builder.

You could find it here: https://go.microsoft.com/fwlink/?LinkID=734968

Create a user defined Report Template

1. Select the build-in report template which is most similar to the report template which you want to create. Right click on the build-in report template and select **Export report template** from the context menu.
2. Change the extension of the exported file from .rep to .zip and unzip it.
3. Modify the files as described in the following sections.
4. Create a .zip archive and rename the file extension to .rep.
5. Click with the right mouse button on the folder **Library/Report Templates/User Report Templates** and select **Import report template** from the context menu.

8.5.1 Report Template XML file

This xml file contains all information required by the LWEB-900 Server to create data for the report.

```
<?xml version="1.0" encoding="utf-8"?>
<ParamDefinition xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns="http://www.loytec.com/xsd/lweb900/ParamDef/1.0/">
  <TemplateDesc>Compare two sets of trend logs during different time periods</TemplateDesc>
  <CommonParams>
    <ReportParam paramName="ReportDescription" paramType="ReportDesc"/>
    <ReportParam paramName="ExecutionTime" paramType="ExecutionTime"/>
    <ReportParam paramName="AxisTitleY" paramLabel="Y-Axis label" paramValue="Energy [kWh]"/>
    <ReportParam paramName="Group1Name" paramLabel="Group 1 name" paramValue="Current"/>
    <ReportParam paramName="Group2Name" paramLabel="Group 2 name" paramValue="Baseline"/>
    <ReportParam paramName="EngineeringUnit" paramLabel="Unit" paramValue="kWh"/>
    <ReportParam paramName="Group1Precision" paramLabel="Decimal digits" paramValue="2"/>
    <ReportParam paramName="EnableCompareGauge" paramLabel="Show compare gauge" paramValue="true" paramDataType="Boolean" />
    <ReportParam paramName="EnableCompareChart" paramLabel="Show compare chart" paramValue='true' paramDataType="Boolean" />
    <ReportParam paramName="EnableCompareTable" paramLabel="Show compare table" paramValue="true" paramDataType="Boolean" />
    <ReportParam paramName="EnableTable" paramLabel="Show value table" paramValue="true" paramDataType="Boolean" />
    <ReportParam paramName="EnableItemsTables" paramLabel="Show items tables" paramValue='true' paramDataType="Boolean" />
    <ReportParam paramName="EnableItemsCharts" paramLabel="Show items charts" paramValue='true' paramDataType="Boolean" />
    <ReportParam paramName="YourCompanyLogo" paramLabel="Image file (*.jpg/*.png)" paramValue="" paramType="Image" />
    <ReportParam paramName="LogoPosition" paramLabel="Select logo position" paramValue="0" paramDataType="Integer" paramStateMap="Bottom-Right,Bottom-Left,Top-Right,Top-Left"/>
  </CommonParams>

  <DataSet dataSetName="DataSet1" dataSetType="TrendlogSingleValueColumn">
    <DataSetParam groupName="Group 1">
      <DatalogSourceParam maxItems="0" userInstruction="Please add trend log items">
        <ValueMethod periodValueMethod="Average"/>
        <ReportParam paramName="Group1PeriodFrom" paramType="PeriodFrom"/>
        <ReportParam paramName="Group1PeriodTo" paramType="PeriodTo"/>
        <ReportParam paramName="StepInterval" paramType="StepInterval"/>
        <ReportParam paramName="Group1Color" paramType="Color" paramValue="#418CF0,#FCB441,#DF3A02,#056492,#BFBFBF,#1A3B69,#FFE382,#129CDD,#CA6B4B,#005CDB,#F3D288,#506381,#F1B9A8,#E0830A,#7893BE"/>
      </DatalogSourceParam>
    </DataSetParam>

    <DataSetParam groupName="Group 2">
      <DatalogSourceParam maxItems="0" userInstruction="Please add trend log items">
        <ValueMethod periodValueMethod="Average"/>
        <ReportParam paramName="Group2PeriodFrom" paramType="PeriodFrom"/>
        <ReportParam paramName="Group2PeriodTo" paramType="PeriodTo"/>
        <ReportParam paramName="Group2Color" paramType="Color" paramValue="#7893BE,#E0830A,#F1B9A8,#506381,#F3D288,#005CDB,#CA6B4B,#129CDD,#FFE382,#1A3B69,#BFBFBF,#056492,#DF3A02,#FCB441,#418CF0"/>
      </DatalogSourceParam>
    </DataSetParam>
  </DataSet>

</ParamDefinition>
```

Figure 311: Example of report template XML file with two data groups

The XML file consists of the following main sections:

- TemplateDesc: This xml tag contains the description of the report template
- CommonParams: Each report template can be customized using parameters. This xml tag contains common parameters which apply to the whole report.
- DataSet: Each report template operates on a data set. A data set can contain one or two groups. This section defines also the parameters which apply to a specific group.

Common Params

Common parameters are displayed in the report properties on the **Parameters** tab as shown in the following screenshot.

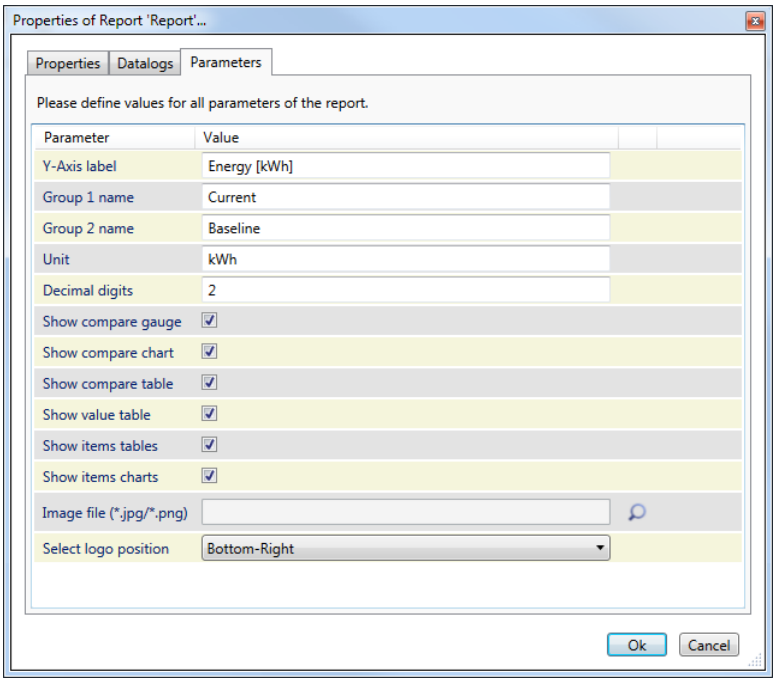


Figure 312: Common report parameters as seen in LWEB-900 Client

Each common parameter can have the following attributes:

- paramName: Name of the parameter. This name has to match the name of the parameter in the .rdl file.
- paramLabel: Label displayed in the **Parameters** tab of the report properties. If this attribute is not specified, the parameter is not displayed.
- paramValue: Default value of the parameter.
- paramType: Parameters can have the special types shown in Table 62. If this attribute is not specified, the parameter is a generic parameter.
- paramDataType: Data type of the parameters as described in Table 63. If this attribute is not specified, the type is Text.
- paramStateMap: If paramDataType is Integer, a state map can be provided. The state map is a comma separated list of values.

paramType	Description
ReportDesc	Parameter contains the description of the report as defined in the report properties
ExecutionTime	Parameter contains the date and time when the report was created
Image	Parameter to select an image which should be displayed in the report
Generic	Any other parameters

Table 62: Attribute paramType for common report template parameters

paramDataType	Type	Description
Text	*VarChar*	Text input field
Integer	*Int32*	If the attribute *paramStateMap* is provided, a combo box with the available states is displayed.
Boolean	*Boolean*	Checkbox

Table 63: Attribute paramDataType for common report template parameters

Data Set

The *DataSet* element contains one or two *DataSetParam* elements. The *DataSetParam* elements correspond to the groups on the **Datalogs** tab as shown in Figure 313. The *groupName* attribute define the display name for a group.

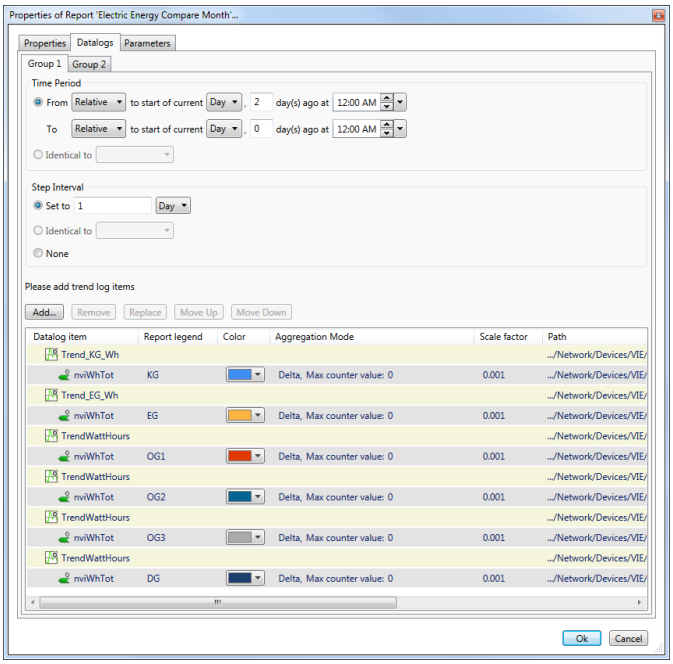


Figure 313: DataSet element as seen in LWEB-900 Client

The *DatalogSourceParam* element has the following attributes:

- maxItems: Maximum number of trend log items in this group. If the value is set to 0, an unlimited number of trend log items can be attached.
- userInstructions: Text displayed in user dialog.

The *ValueMethod* element allows defining the default aggregation mode. The following values are allowed:

periodValueMethod	**Description**
Average	Average value during the step interval
FirstValue	First value in the step interval
LastValue	Last value in the step interval
Min	Minimum value in the step interval
Max	Maximum value in the step interval
Sum	Sum of all values in the step interval
Delta	Calculate the difference between the last value of the current step interval and the last value of the previous step interval. This aggregation mode is used for energy counters.
OnCounter	Counts how often the value changed from zero to non-zero during the step interval.
OffCounter	Counts how often the value changed from non-zero to zero during the step interval.
PulseCounter	Count how many occurrences of the following sequence is detected during the step interval: change from zero, to non-zero and then change back to zero.
RunningTime	Time during which the value is non-zero
DownTime	Time during which the value is zero
Availability	RunningTime/(RunningTime+DownTime) in percent

Table 64: Attribute periodValueMethod for data group

The *ReportParam* elements define parameters which apply to a specific data group. They can have the following type:

paramType	Description
PeriodFrom	Parameter contains the start of the time period for which the report was created.
PeriodTo	Parameter contains the end of the time period for which the report was created.
StepInterval	Parameter contains the step interval of the report.
Color	This parameter contains the colors configured for each trend log item in the data group. A default color palette can be provided in the paramValue attribute. The colors are encoded in hexadecimal in a RGB color space (value between: #000000 - black and #FFFFFF - white) and separated by commas. There should be no space between any characters and the latest color shall not be followed by a comma.

Table 65: Attribute paramType for data group parameters

8.5.2 Microsoft Report File Definition

A **R**eport **D**efinition **L**anguage is a type of file used to create reports with Microsoft Reporting technology. To create, preview or modify a RDL file you will need the Report Builder from Microsoft

Note *RDL files are encoded using XML. However, we do not recommend modifying the file using a text editor as you could easily break the report file.*

You can create an RDL file from scratch or export a build-in report template as starting point.

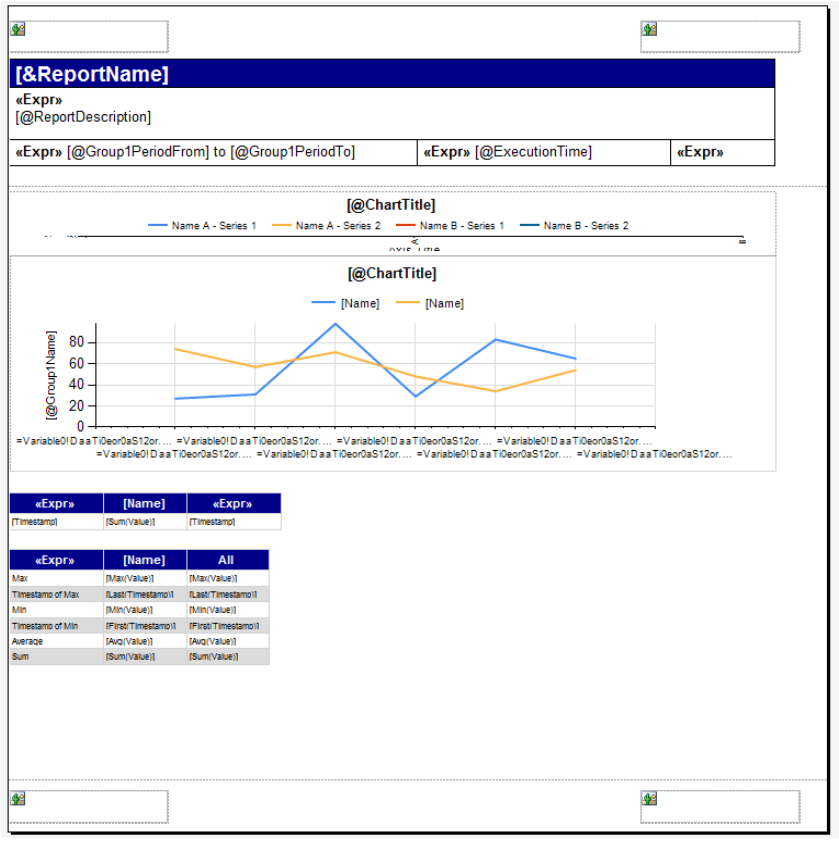


Figure 314: RDL file as viewed with Microsoft Report Builder

RDL parameters

Each of the parameters defined in the Report Template XML file has to correspond to a parameter in the RDL file.

You can add new parameters in Microsoft Report Builder using the Report Data view (CTRL + ALT +D when you have a RDL file open). **Name** and **Data type** of RDL parameters have to match with the attributes *paramName* and *paramDataType* in your Report Template XML file.

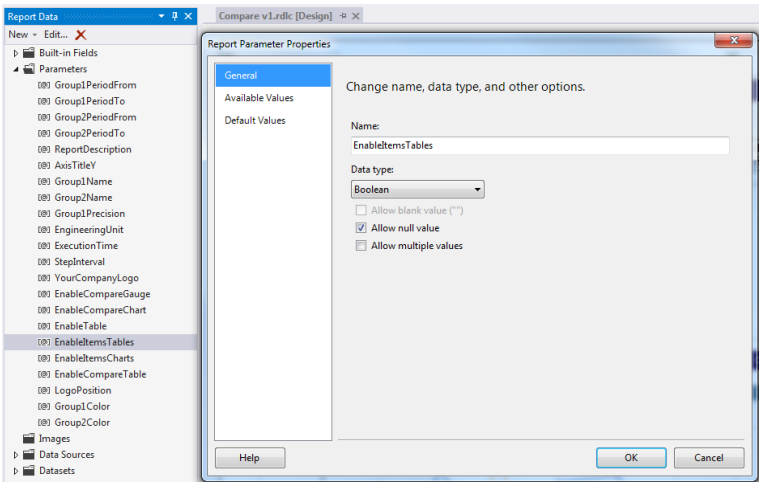


Figure 315: RDL Parameters as seen with Microsoft Report Builder

8.5.3 Image File

The image file for a user-defined report template is optional but strongly recommended. It provides a preview when selecting a report template. If no image file is provided, a default image will be displayed. Size minimal recommended: 150*250 pixels

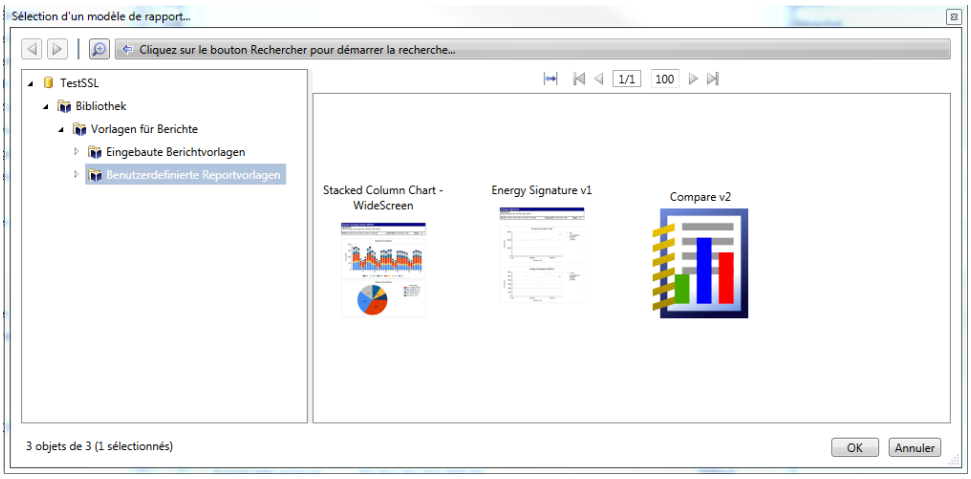


Figure 316: Example of report template with and without (Compare v2) image file

9 Troubleshooting

9.1 Technical Support

LOYTEC offers free telephone and e-mail support for the L-WEB product series. If none of the above descriptions solves your specific problem please contact us at the following address:

Delta Intelligent Building Technologies (Europe) GmbH
Blumengasse 35
A-1170 Vienna
Austria / Europe

e-mail : ***support@loytec.com***
web : ***https://www.loytec.com***
tel : ***+43/1/4020805-100***

or

Delta Intelligent Building Technologies (Canada) Inc.
17850 56 Ave
Surrey, BC V3S 1C7
CANADA

email : ***support@loytec-americas.com***
web : ***https://www.loytec.com***
tel : ***+1 800.335.8221***

9.2 Bug Reports

When you report a bug, you can speed-up the problem analysis a great deal if you include the right information. These guidelines explain how to write such reports.

Before you report a bug, make sure your software is up to date. A good bug report includes the following items:

- Description how to reproduce the problem. This is the most important part of the bug report. The developer has to be able to reproduce the bug on his or her own computer. Include screenshots to document the steps to reproduce the problem.

- System Log: The system log can give useful information about what was happening at the time when the problem occurred.

- Project backup: Sometimes the problem cannot be reproduced without a backup of your setup. There might be something unusual about your configuration which is necessary to reproduce the bug.

Save system log to CSV file

1. Start LWEB-900 Server UI

2. Select **File → Display System Log** from the menu bar.

3. Press on the button **Save to CSV file**.

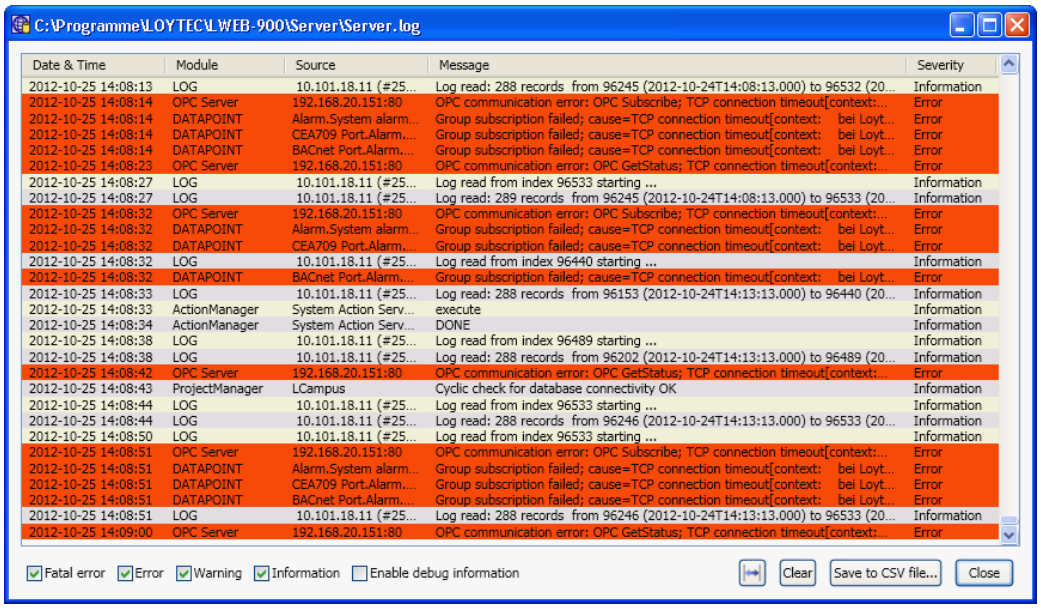


Figure 317: LWEB-900 Server System Log

Create a project backup

1. Start LWEB-900 Server UI

2. Right click on the project and select **Backup project** from the context menu.

3. To minimize the size of the project, select the option **Configuration project backup**.

4. Click on the button **Make backup**.

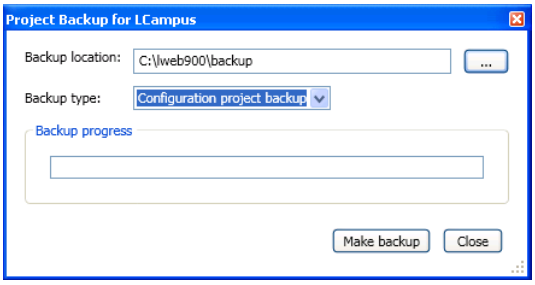


Figure 318: Project Backup

10 Specifications

10.1 System requirements

The LWEB-900 Server requires a Windows PC with the following minimum requirements:

- 2 GHz 64-bit processor
- 4 GB main memory
- 50 GB free hard disk space (for program installation and database)
- Ethernet access
- Operating System:
  - Windows: 11
  - Windows Server: 2016, 2019, 2022, 2025

The LWEB-900 Client requires a Windows PC with the following minimum requirements:

- 2 GHz 64-bit processor
- 4 GB main memory
- 2 GB free hard disk space
- Ethernet access
- Operating System:
  - Windows: 11
  - Windows Server: 2016, 2019, 2022, 2025
- Minimum display resolution: 1280x720

For the LWEB-900 web access one of the following browsers is required:

- Google Chrome (recommended)
- Mozilla Firefox
- Microsoft Edge
- Android Web Browser 6 and later
- iOS Web Browser 15 and later

11 References

[1] L-VIS User Manual, Delta IBT (Europe) GmbH, Document № 88068530, September 2026.

[2] L-INX/L-GATE User Manual, Delta IBT (Europe) GmbH, Document № 88073033, September 2026.

[3] LIOB-10X/X5X User Manual, Delta IBT (Europe) GmbH, Document № 88078519 September 2026.

[4] LIOB-X8X User Manual, Delta IBT (Europe) GmbH, Document № 88080317, September 2026.

[5] L-DALI User Manual, Delta IBT (Europe) GmbH, Document № 88077122, September 2026.

[6] L-IP User Manual, Delta IBT (Europe) GmbH, Document № 88065919, June 2025.

[7] LWEB-800/802 User Manual, Delta IBT (Europe) GmbH, Document № 88074227, September 2026.

12 Revision History

Date	Version	Author	Description
2012-12-14	1.0	AD	Initial revision for LWEB-900 1.0.0
2012-05-24	1.1	AD	Update for LWEB-900 Version 1.1.0: • License model based on number of devices • Support secure communication (SSL) between server and client • Use web services for all communication between server and LOYTEC devices • Support graphical view templates • Support graphical views in devices • Support upload global connections • Group multiple occurrences of the same alarm • Search in object path • Search in fields of structured data points • Navigation view: additional hierarchy level added to context menu options • Import of LWEB-900 project: renaming of the imported project is now possible
2014-03-02	1.3	AD	Update for LWEB-900 Version 1.3.0: • Reporting • LWEB-900 Server schedules • Alarming improvements • Create L-VIS project from LWEB-900 Server graphical view • Allow wildcards in search expressions • Hide folders to which user has no access • Import and export Identification key schema • Datapoint details • Chart view improvements • Manage files in master device manager
2015-03-30	2.0	AD	Update for LWEB-900 Version 2.0.0
2015-04-11	2.1	AD	Update for LWEB-900 Version 2.1.0
2017-06-03	2.2	AD	Update for LWEB-900 Version 2.2.0
2019-04-04	3.0	AD	Update for LWEB-900 Version 3.0.0
2022-02-04	4.0	AD	Update for LWEB-900 Version 4.0.0
2022-09-07	4.0.1	AD	Updated Section “Database Interface”

Date	Version	Author	Description
2025-11-11	4.4.0	AD	Update for LWEB-900 Version 4.4.0
2026-03-26	4.6.0	AD	Update for LWEB-900 Version 4.6.0
2026-09-30	4.6.4	AD	Update for LWEB-900 Version 4.6.4