System description

Powering Business Worldwide

Company information

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Service

For service and support, please contact your local sales team.

Contact info.	Eaton.com/contact
Service page:	Eaton.com/aftersales

Original Operating Instructions

is the German-language edition of this document

Publication date

10/24 rd/th edition 1.0

Table of Contents

0.1 About this manual

The devices to which this system description applies consist of touch panels with Linux as an embedded operating system. XV-303 devices have a capacitive touch display, while XV-102 panels feature resistive touch controls, so that input can be entered directly on the display.

In order to be able to use this system, you must first be familiar with how to design and configure projects using software.

Please send any comments, recommendations, and suggestions concerning this document to: AfterSalesEGBonn@eaton.com

List of revisions

New topics, deleted topics, and changes in comparison to earlier versions.

Make sure to always use the latest documentation for your device.

The latest version of this documentation, as well as additional references, is available for download on the Internet.


Eaton.com/documentation

Please send any comments, recommendations, or suggestions regarding this document to: DocumentationEGBonn@eaton.com

0.1.1 List of revisions

The following significant amendments have been introduced since previous issues:

Publication date	Keyword
10/2024	New edition

0.1.2 Target group

This manual is intended for people who are familiar with the Linux operating system and who will be using the touch panels as operating and monitoring devices or as integrated operating and control devices in their own applications.

Legal disclaimer

0.1 About this manual

0.1.3 Legal disclaimer

All the information in this manual has been prepared to the best of our knowledge and in accordance with the state of the art. However, this does not exclude the possibility of there being errors or inaccuracies. We assume no liability for the correctness and completeness of this information. In particular, this information does not guarantee any particular properties.

It is assumed that the user of this document is thoroughly familiar with the information found in the manuals for the touch panels and the corresponding usage information for incorporation into automation processes.

Hazards posed by the automation software cannot be eliminated if the safety instructions are not observed – especially if the Touch Panel is installed and commissioned by unqualified personnel and/or the Touch Panel is used improperly. Eaton assumes no liability for any damages resulting from cases such as these.

0.1.4 Writing conventions

Tab. 1: Format conventions used throughout this manual

Award	Meaning
`Monospaced` Font	Used for displays, elements at the file level, source code command lines
Button	Used to indicate GUI button text
Option	Option, designation, or menu in the software
Menu path\submenu\...\item	Used for paths to views and dialog boxes in the software
Menu/command	Used for commands found in the menu
<name>	Angle brackets are used to indicate variable values that you must replace with your own values

Property damage warning

ATTENTION
Warns about the possibility of material damage.

Notes

Indicates useful tips

Indicates instructions to be followed

Additional information, background information, information worth knowing, useful additional information

0.1.4.1 Additional information for use

Documents (such as manuals) are listed together with the corresponding name and Eaton number.

Links to external Internet addresses; specified as target addresses without http (s)://www.

Links in the text will be shown in blue.

→ Reference: See section or other additional usage information

0.1 About this manual

1. Introduction

Starting in 2024, Eaton will offer touch panels that can be run with Linux as an operating system.

Linux makes it possible for users to configure their system according to their own specific needs.

Eaton offers a Configuration Tool for its touch panels.
This Configuration Tool features two user-friendly configuration interfaces for touch panels – a "local configuration" and a "web configuration."

When using a local configuration, all settings can be configured directly on the corresponding touch panel. In contrast, using a web configuration makes it possible to configure the same settings from a PC so that you can set up your system quickly and efficiently.

To use the interface on the touch panel, you simply need to tap directly where you want.

The corresponding page contents will either be subdivided into multiple tabs or scrollable.

Settings can be selected with slider controls (disabled) (enabled) or drop-down menus as appropriate.

Input can be entered with the usual elements that appear when tapping the corresponding area.

Abb. 1: for example keyboards

Disabled functions will be grayed out.

1. Introduction

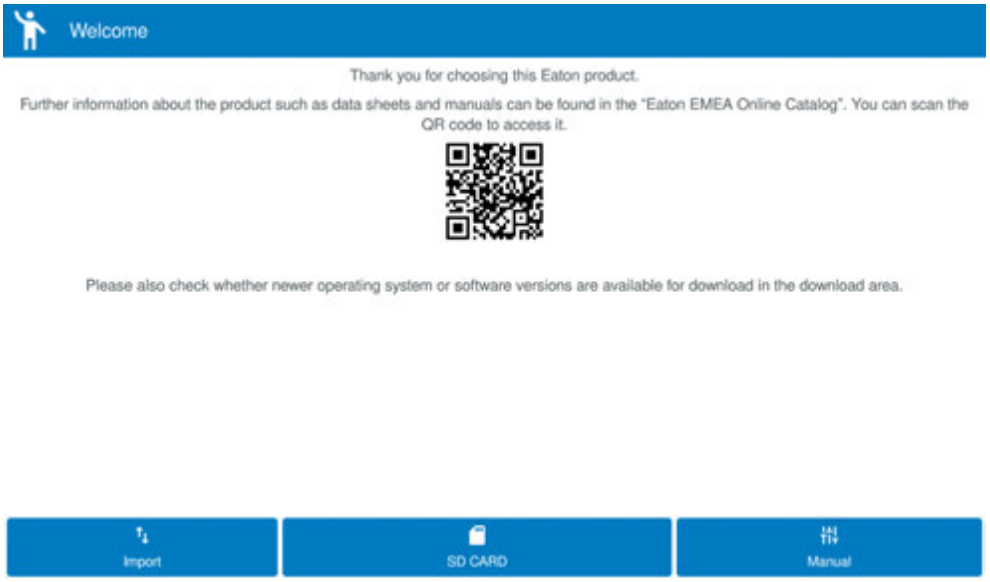
2. First Start Wizard

The first time you start the device, as well as after a factory reset, the First Start Wizard will appear.

Please note that the First Start Wizard is only available in English.

▶ Accept the end-user license agreement (EULA).

The screen will show a message indicating where additional information can be found.
You will then be able to use the wizard.



The QR code will link to additional information at eaton.com (including manuals, for example).

▶ Select the setup method you want.

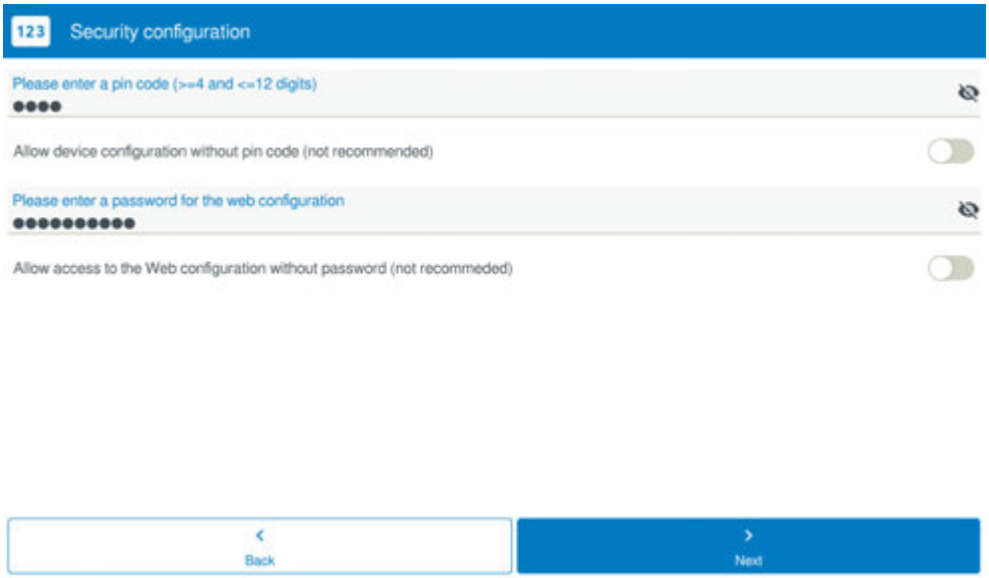
Import	Used to import an existing configuration
SD CARD	Setup: Used to run the system from the SD card
Manual	Used to configure settings individually

2.1 Manual

This page can be used to configure basic settings manually.

As soon as you define a pin code, users without the PIN will only be able to see device information and legal information. These users will not be able to configure any settings.

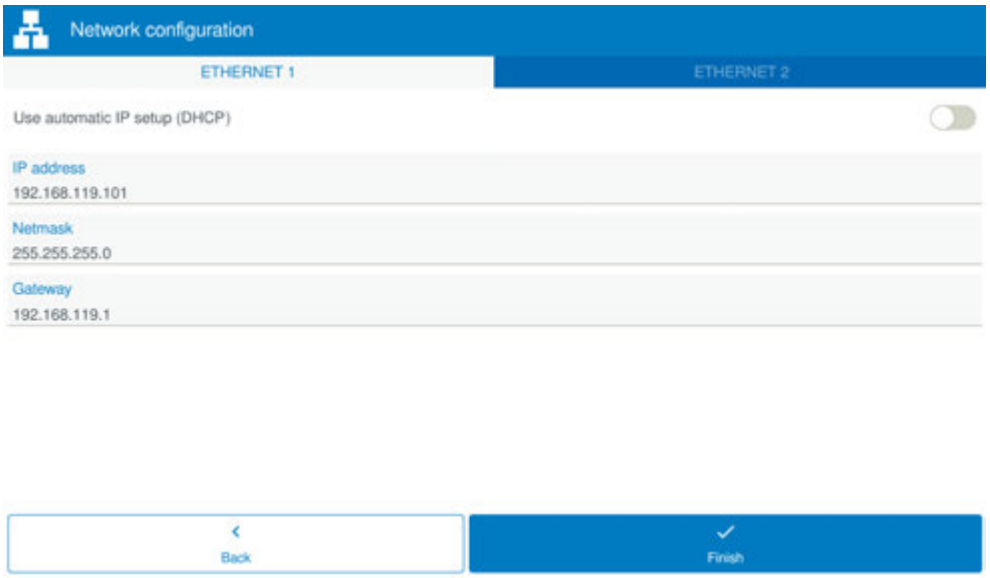
- Enter a pin code for the device so that the PIN will be required in order to unlock configuration settings
  (the code must be between four and 12 numbers long).
- Enter a password for the web configuration
  (at least eight characters, which must include at least one uppercase letter, one lowercase letter, one number, and one special character)



You can choose to allow access without a password,
but this is strongly advised against due to cybersecurity concerns.

- Tapping Next will take you to the network configuration settings.

By default, DHCP will be enabled for all available Ethernet interfaces.

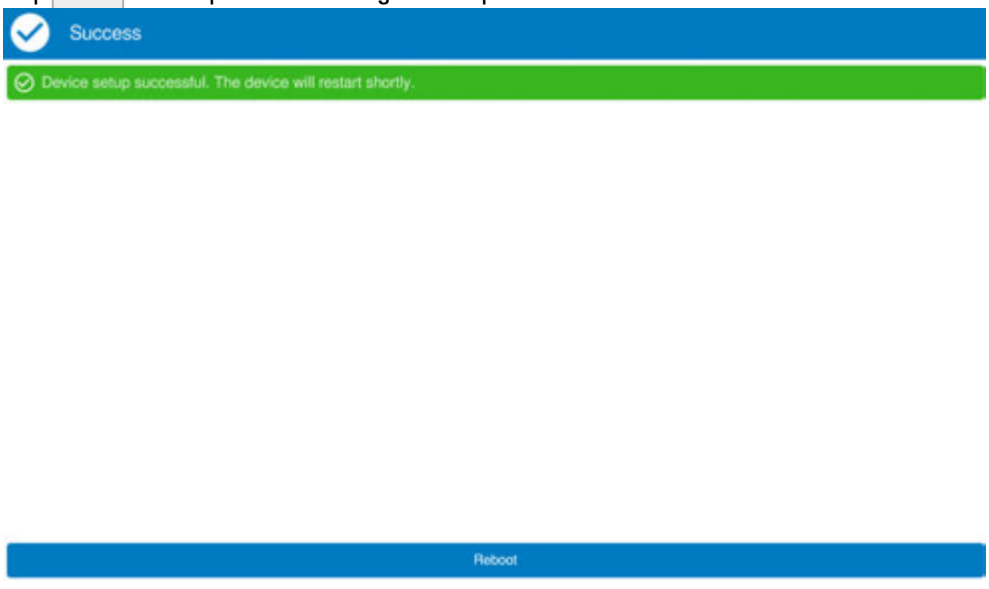


Tapping the input field will open an on-screen keyboard.

▶ Enter the correct IP address, netmask, and gateway.

If the device features more than one Ethernet interface, each one will have its own tab.

▶ Tap Finish to complete the configuration process. The device will restart.



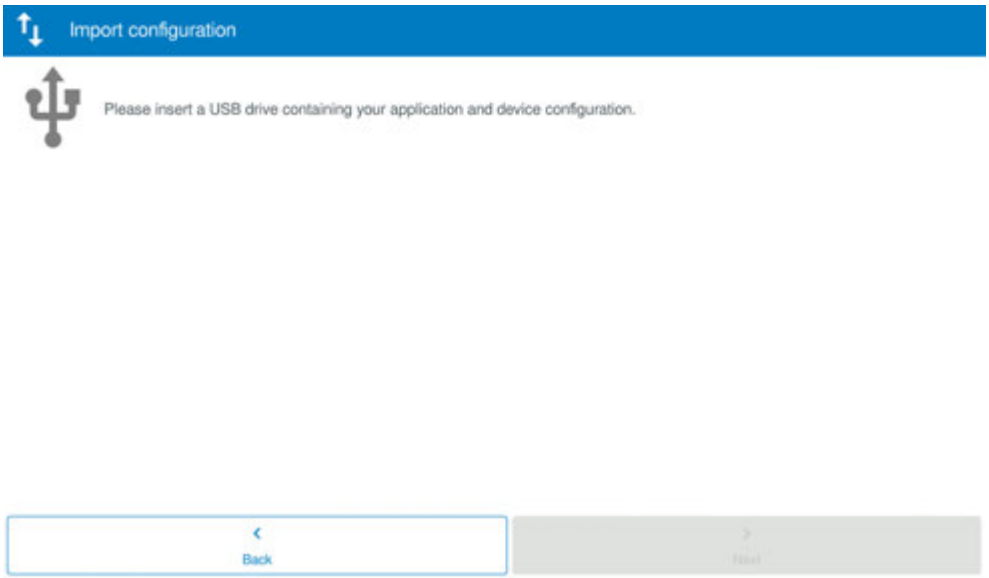
The device will start up with the configuration you just set up.

The device will restart automatically and the device configuration (Configuration Tool) will then be opened directly.
You can also restart the device manually by tapping the Reboot button.

2.2 Import

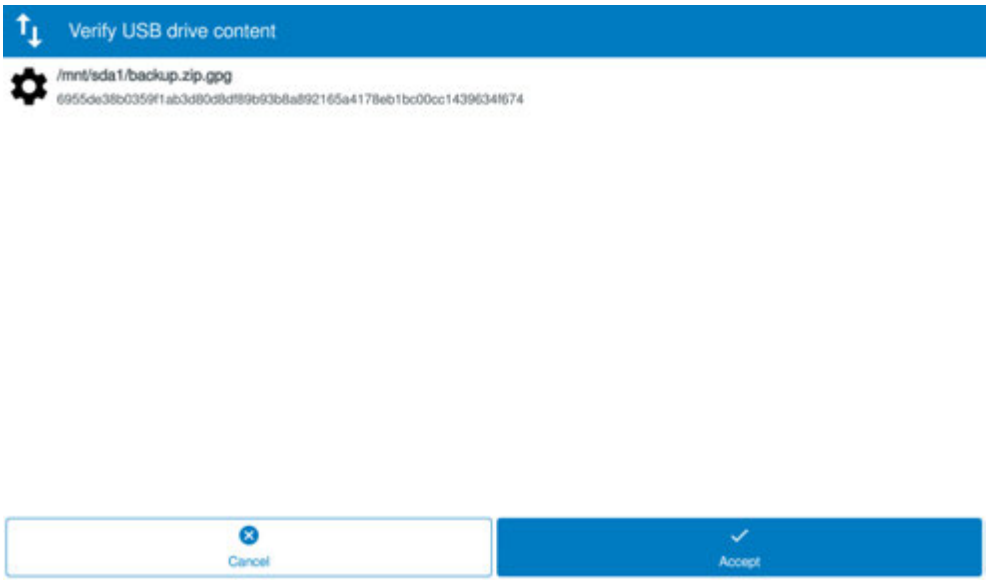
Use this option if you want to set up the configuration using a backup.
The backup must be available on a USB storage device.

Create Backup:Back up & restore



▶ Insert the USB storage device with the backup into the touch panel.

As soon as the device detects the USB storage device, a screen with Accept and Cancel buttons will appear.



▶ To start setting up the device with the backup, tap Accept.

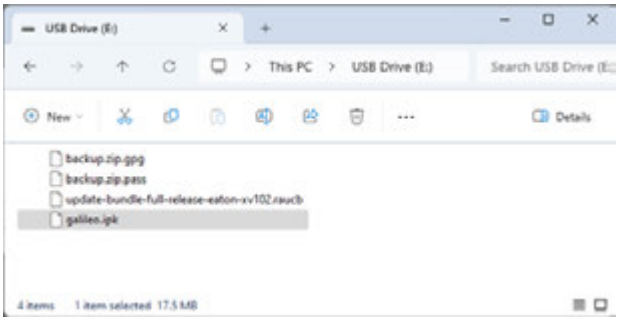
If the device detects that the backup file is corrupted or otherwise faulty, it will provide you with the option of tapping
Reboot to restart the device or Factory reset to restore the device to its default settings.

→ An error can occur if the required matching **Backup.zip.pass** password file is not found on the USB storage device.

The device will restart automatically and apply the configuration from the USB storage device.

→ The device will restart automatically and the device configuration (Configuration Tool) will then be opened directly.
You can also restart the device manually by tapping the Reboot button.

The USB storage device can also contain operating system updates (*.RAUCB) and/or one or more installation packages (*.IPK), such as for Galileo and XSOFT CODESYS.



If this is the case, the installation order will be as follows: first the operating system update, then the installation packages, and finally the backup file.

If there are multiple files or installation packages of the same type, you can adjust the installation order by numbering them at the beginning of the corresponding file-names (e.g., "01-i am the first one.ipk" and "02-i am next.ipk").
The order will be the same one shown in the list displayed after the data verification process.

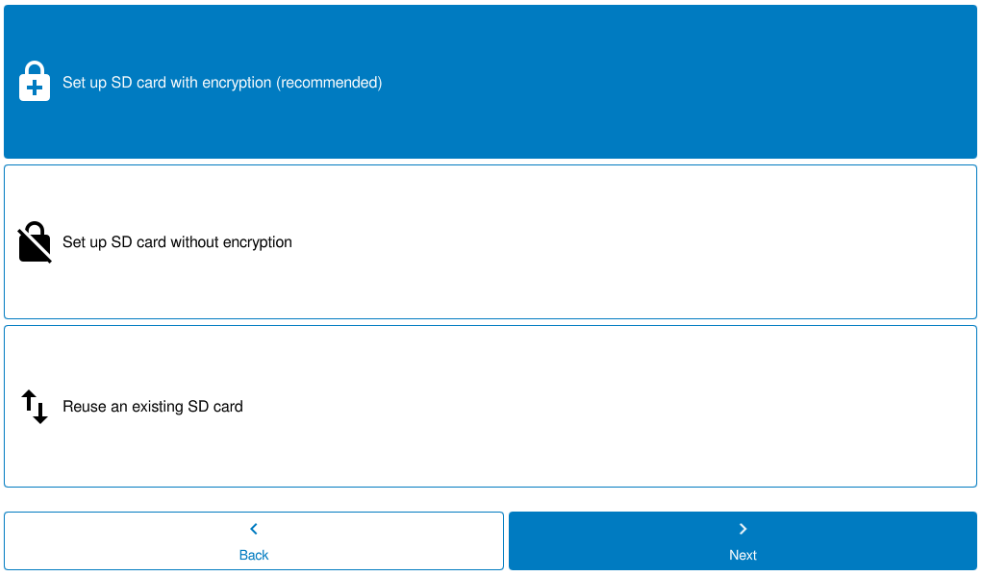
→ This method is recommended for mass production.

2.3 SD CARD

This option can be used to set up the operating system with an SD card instead of internal memory.

There will be three available options, which are described below:

Set up SD card with encryption (recommended)	Used to set up an SD card with encryption (recommended) — encrypted
Set up SD card without encryption	Used to use an existing SD card — unencrypted
Reuse an existing SD card	Used to use an existing SD card — reuse



2.3.1 Set up SD card with encryption (recommended)

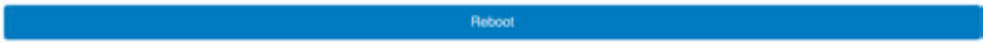
— encrypted

You must have inserted an SD card and a USB storage device into the device (the operating system is stored on the SD card, while the key is stored on the USB storage device).

If there is no key file on the USB storage device, one will be created.

If there is a key file on the USB storage device already, it will be used for the encryption operation. This also means that you can set up multiple SD cards using the same key.

▶ Tap Start to start the SD card setup process.



The device will restart automatically and the First Start Wizard will resume.
The SD CARD option will be grayed out (disabled).
Starting at this point, the device will run from the SD card (in addition, the user data will be found on the SD card).

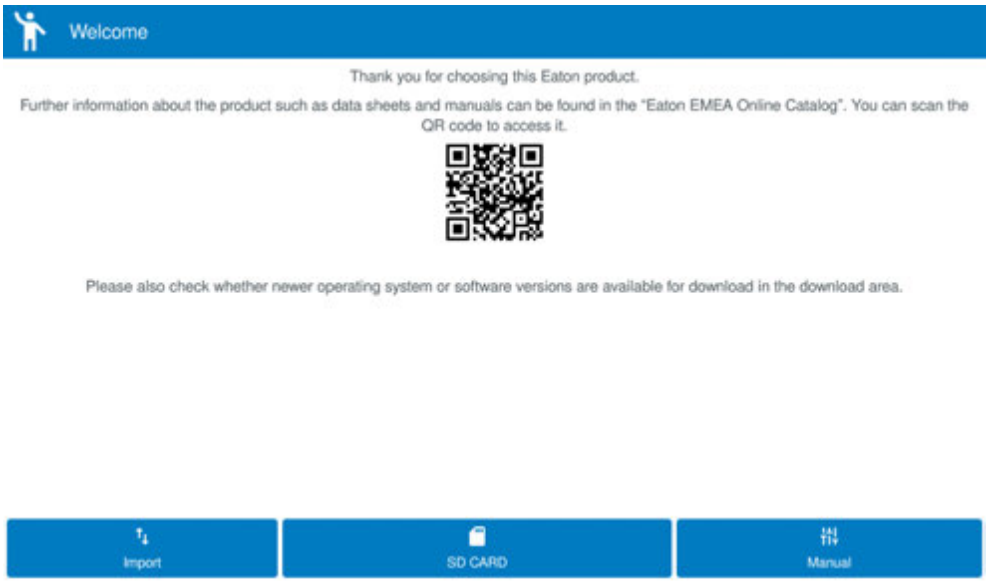
→ The device will restart automatically and the device configuration (Configuration Tool) will then be opened directly.
You can also restart the device manually by tapping the Reboot button.

You can now remove the USB storage device.

→ The USB storage device used to set up the SD card is **only** required for the "Reuse an existing SD card" option and will only work together with the SD card you just set up.

ATTENTION
If you format or overwrite the USB storage device, you will no longer be able to reuse the SD card.

→ Recommendation:
Save the "sd_card_key.key" file found on the USB storage device in a safe place in case you need to use it in the future. This file will make it possible to set up a USB storage device in such a way that you will be able to reuse the encrypted SD card(s) at any time.



Now use the → "Import", Seite 12 and → "Manual", Seite 10 functions as described.

If there is no SD card, the following screen will appear:

If this happens, either insert the correct SD card and restart the device by tapping Reboot or restore the device to its default settings by tapping Factory reset.

Once the system has been set up, the key from the USB storage device will not be needed anymore, since the key will have been stored on the device.
You will not need the USB storage device with the key after this point unless you want to reuse the encrypted SD card on a different device.

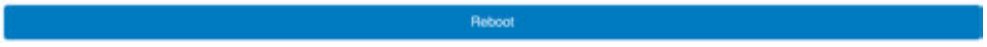
2.3.2 Set up SD card without encryption

Using an existing SD card — unencrypted

There must be an SD card in the device.

Aside from encryption, the general procedure and behavior are identical to the ones for the encrypted version.

▶ Tap Start to start the SD card setup process.



The device will restart automatically and the First Start Wizard will resume.
The SD CARD option will be grayed out (disabled).

The device will restart automatically and the device configuration (Configuration Tool) will then be opened directly. You can also restart the device manually by tapping the Reboot button.

Now use the → "Import", Seite 12 and → "Manual", Seite 10 functions as described.

If there is no SD card, the following screen will appear:

If this happens, either insert the correct SD card and restart the device by tapping Reboot or restore the device to its default settings by tapping Factory reset.

2.3.3 Reuse an existing SD card

— Using an existing SD

If you set up an SD card so that the device can run from it, you will also be able to use the card on any device from the same device family.
On the same device:

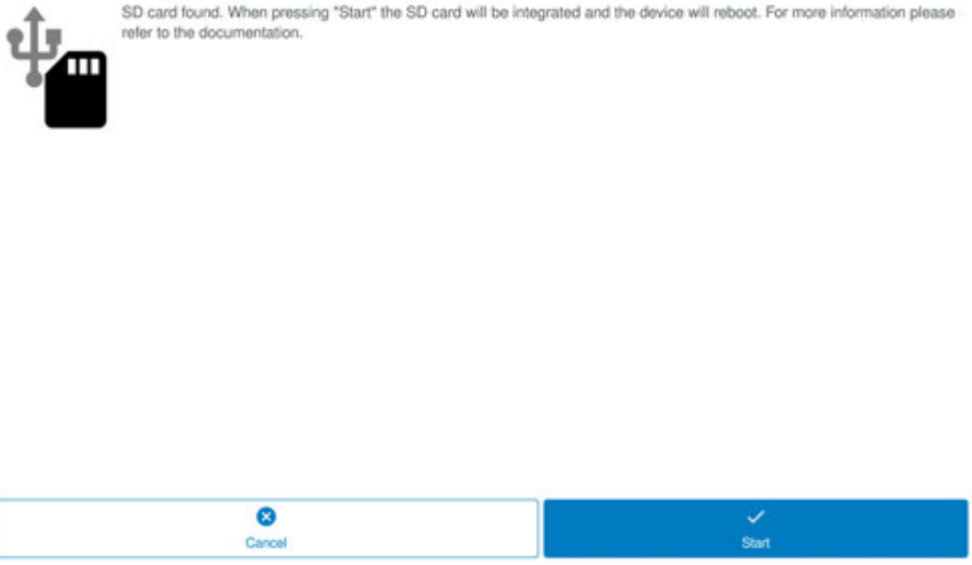
- If the device has been restored to its default settings with Factory reset
  or
- On a different device from the same device family

Use case 1:Replacing a faulty or defective device with a new one.

Use case 2: For mass production.
You can clone the SD card with a 1:1 duplicator and transfer the same configuration to a large number of devices.
Please note that this use case requires for the customer to have appropriate hardware.

The behavior of the unencrypted SD card will be different from that of the encrypted SD card only in terms of how a corresponding USB storage device needs to be inserted for the latter.

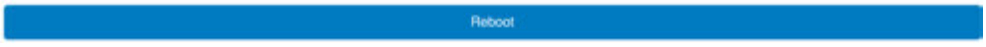
If the SD card is unencrypted, it will be enough for it to be inserted if the "Reuse an existing SD card" option is selected.



If the SD card is encrypted, the USB storage device matching the SD card must be inserted when the "Reuse an existing SD card" option is selected.
If the USB storage device does not match the SD card, you will not be able to use the First Start Wizard.

If the inserted USB storage device is the wrong one, or if there is no USB storage device inserted, a "Could not open key file" error message will appear.

▶ Tap Start to integrate the SD card into the system.



The device will restart automatically. At this point, the First Start Wizard is done.

After this restart, you will be able to use the device right away with the settings stored on the SD card.

The Configuration Tool will start.

2.4 Background information

The bootloader, the operating system, and the default configuration parameters are always stored in internal memory.
If you use an SD CARD installation, only the "userdata" will be stored on the SD card. Please note that this is an important difference with regard to earlier devices with Windows CE, where the operating system was also stored on the SD card and saved from there.

The aforementioned "userdata" includes the device settings (/etc Linux directory), the user home directories (/home) that contain the Galileo runtime and application and XSOFT-CODESYS runtime and application, and the /usr and /var Linux directories.

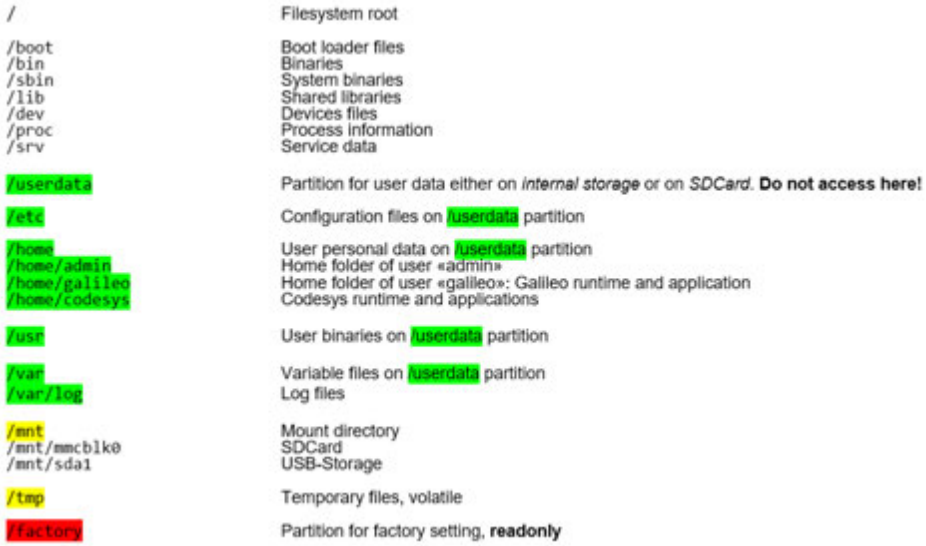
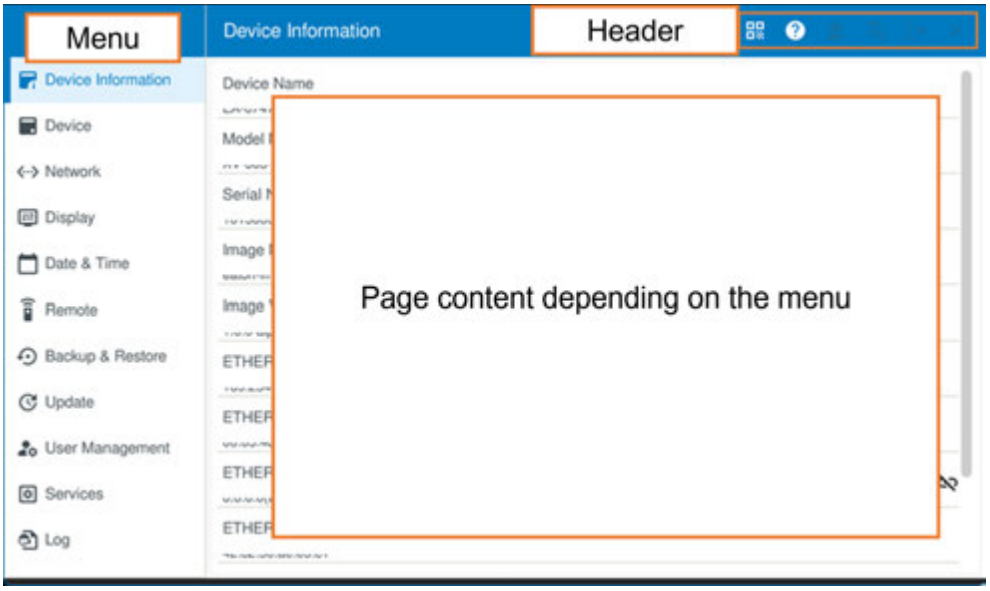


Abb. 2: Overview of Linux filesystem

3. Local configuration

The local configuration will have the same basic setup for all touch panels. Differences with regard to the pages available and their content will arise based on the optional features of the individual devices in question.



Header

The title bar will show the name of the page that is currently active. Moreover, additional information at eaton.com regarding the product can be accessed by scanning a QR code on the right.

End User License Agreement (EULA)

Product documents

EPAS code (not available yet)

In addition:

Change language
English and German are available.

Pin code
Device access based on entering a PIN, → Abschnitt " — User Managment", Seite 51
grayed out – a PIN has not been set

Additional icons may appear depending on the specific Configuration Tool page.
These icons are described in the respective sections.

3.1 — Device information

Overview of configured data

Device: Device name, model number, serial number, boot device, device time

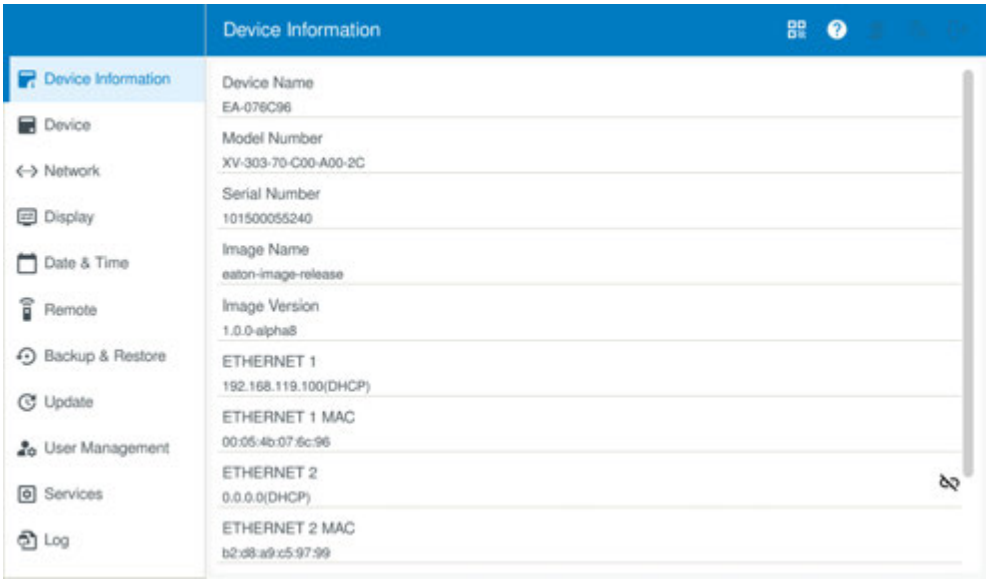
Versions: Imagename, Image Version

Interface: Optional based on device model (check type plate)
E.g., Ethernet1, Ethernet1 MAC, Ethernet 2 Ethernet2 MAC.

→ If one of the available connectors (Ethernet 2, for example) is not connected, this will be shown here .

→ The boot device setting will be shown:
internal memory or SD card

Boot device (internal memory or SD card) shown



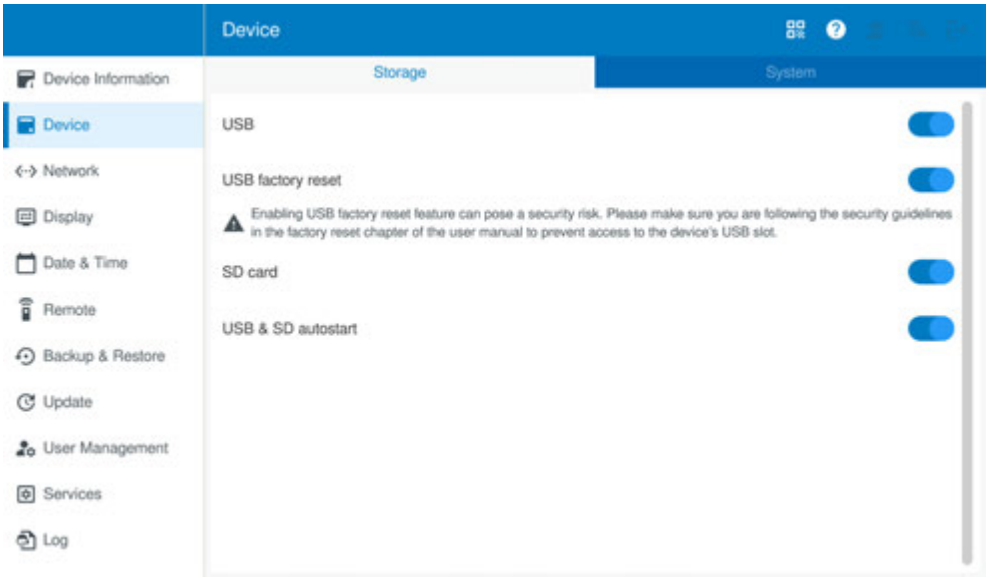
3.2 — Device

The "Device" page has two tabs. One is for the settings for the storage devices and the other one is for the system. Among other things, the file browser can be found here.

3.2.1 Storage

The USB port and SD card interfaces will be locked by default.
You can enable them on this page.

→ The storage device must be formatted to FAT32, NTFS, or exFAT in order for the device to recognize it.



SD card
If the SD card is configured as a boot device, it will be enabled at all times.
Please note that the lock on these interfaces will not affect the First Start Wizard.

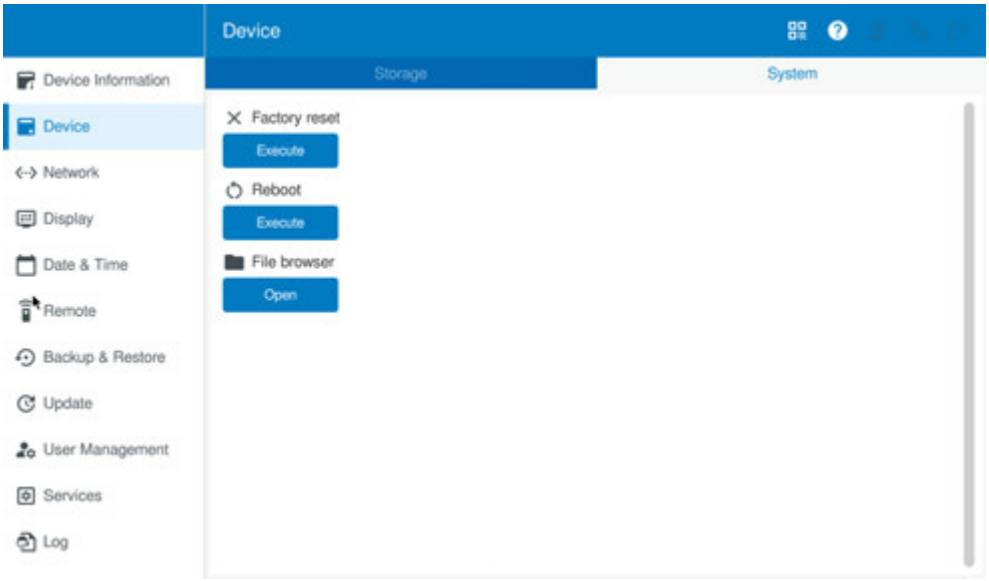
USB & SD autostart
Makes it possible to run scripts from a USB drive when the device starts.

USB factory reset
Makes it possible to restore the device to its default settings with a USB storage device (usually a USB drive) configured for this purpose.

→ Abschnitt "Factory reset", Seite 69

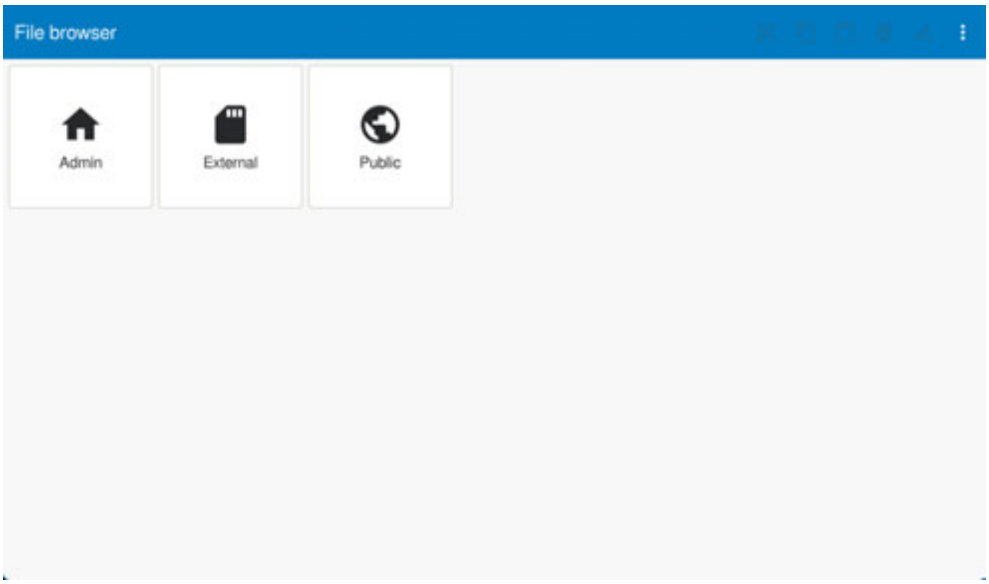
3.2.2 System

This tab can be used to reboot the device or restore it to its default settings.



In addition, you can open the **file browser** here.
This browser can be used to open various directories that provide access to internal memory and external storage devices.

Admin – for the home directory of the admin user (/home/admin)
External – for storage devices (/mnt)
Public – for the shared public directory (/public)



The paths to the external storage devices are:

SD card: /mnt/mmcblk0p1 (p1 stands for the first partition)
USB port: /mnt/sda1

Please note that you will only have access to basic file management functions (files cannot be edited).

Once you select an existing file, the following options will be available:

Takes you back (page by page) to the file browser
If the path you are in contains additional subdirectories, you will need to tap the button multiple times to get all the way back to the browser

Cut

Copy

Paste (grayed out until a file has been copied)

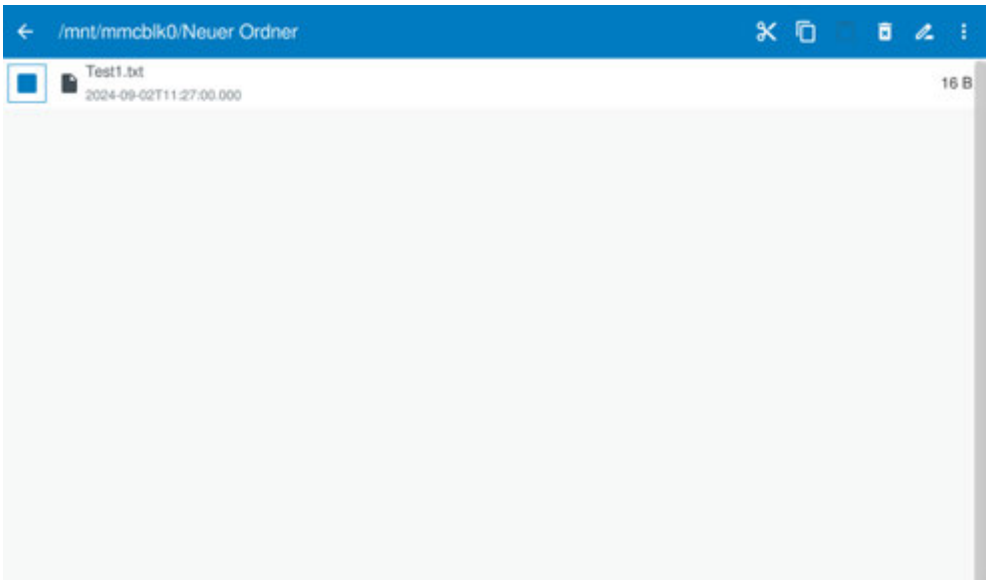
Delete

Rename

Dropdown menu contains

Close; exits the file browser

Depending on how much space is available in the title bar, some options may be moved to a drop-down menu.



Files of any type can be added or created in this created directory.

Backups will be named **backup.zip.gpg** by default.
If you rename a backup (in order to organize a directory, for example), make sure to rename it to **backup.zip.gpg** again before importing it.

3.3 ‹···› — Network

The Network page shows all network-related settings.

The number of tabs will depend on the features of the specific device in question. The ETHERNET2 tab will only show up if the device features a second Ethernet port.

3.3.1 General

Device name

You can enter the device name here. EA-{last three bytes of MAC address}

Conventions: Between 1 and 64 characters long

No spaces

No consecutive periods in the name

The only special characters allowed are periods (.) and hyphens (-)

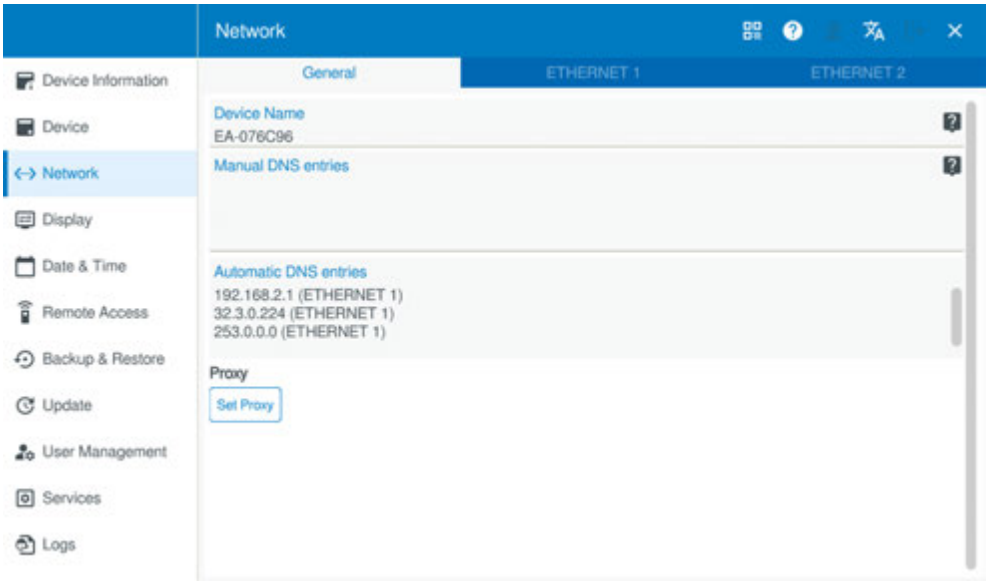
Device names must not end with a hyphen (-)

DNS entries

These address entries can be entered below each other.

→ Manual DNS entries will take priority over automatic DNS entries.

▶ When entering DNS entries, make sure to enter each one in a new line.



Please note that you will only be able to edit manual DNS entries.
The on-screen keyboard will appear automatically, and you can start a new line by tapping Enter.

The automatic entries will be applied automatically by the DHCP server if DHCP is enabled.

Proxy settings

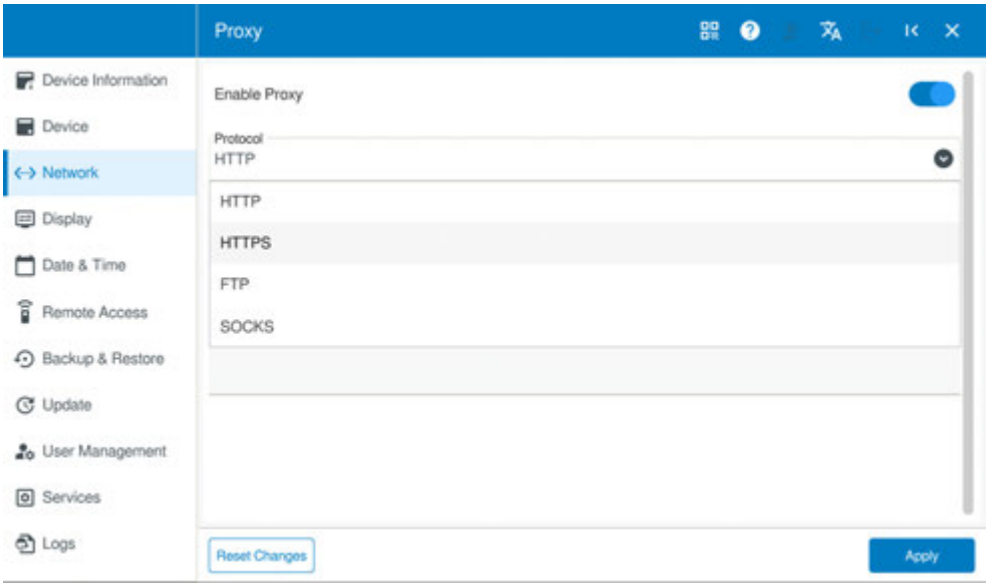
You can use a proxy server.
A proxy server can be needed when you want to access a network from another network (with an example being accessing the Internet from a company's intranet structure).
Please note that transparent proxies do not need to be entered here.

▶ "Set Proxy" will open the "Proxy" page.

You will be able to set up the proxy server after enabling the "Enable Proxy" slider.

▶ To exit this page, click on at the top right of the title bar.

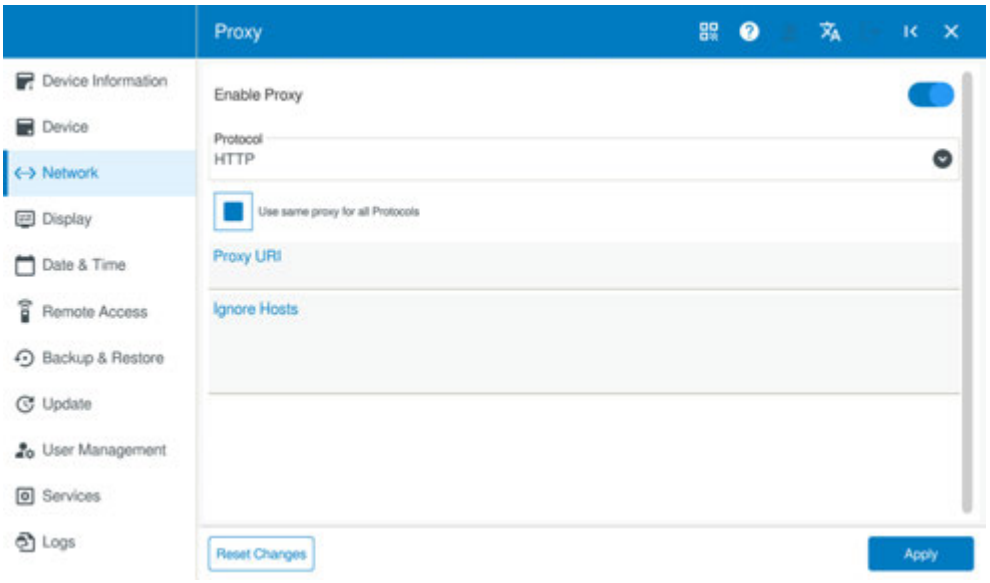
Once you enable the proxy server with the slider, you will be able to select the protocol you want .



The following are available:

- HTTP
- HTTPS
- FTP
- SOCKS

Once you have selected a protocol, you can then enter the proxy URL, as well as any hosts that should ignore the proxy server.



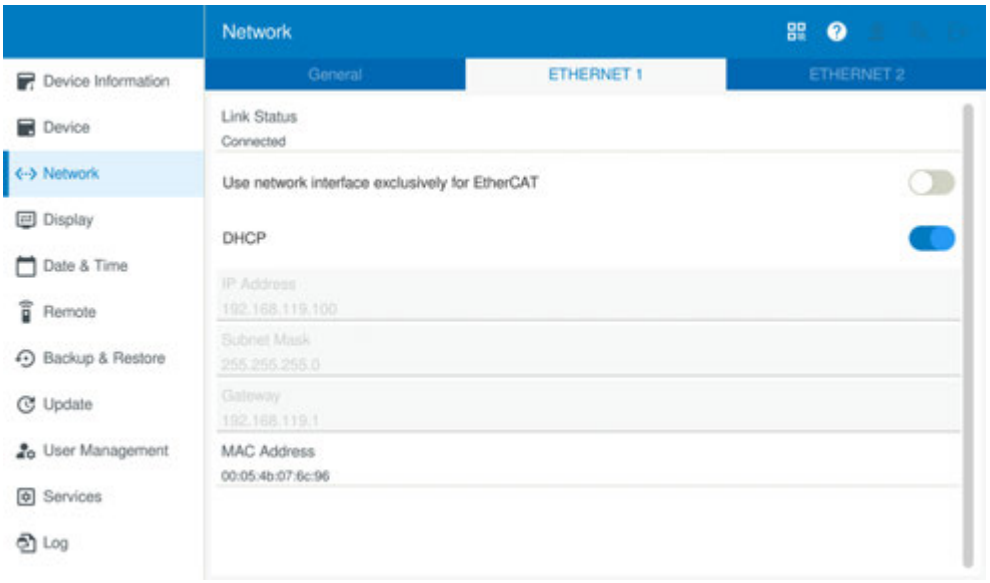
To overwrite all protocols with the proxy URL for the currently selected protocol, enable the Use same proxy for all Protocols option.

If you exit the page with and there are unsaved changes, a dialog box will appear asking whether you want to apply the changes or discard them.

3.3.2 Ethernet

Depending on the specific device model in question, there will be one or two configurable Ethernet interfaces.

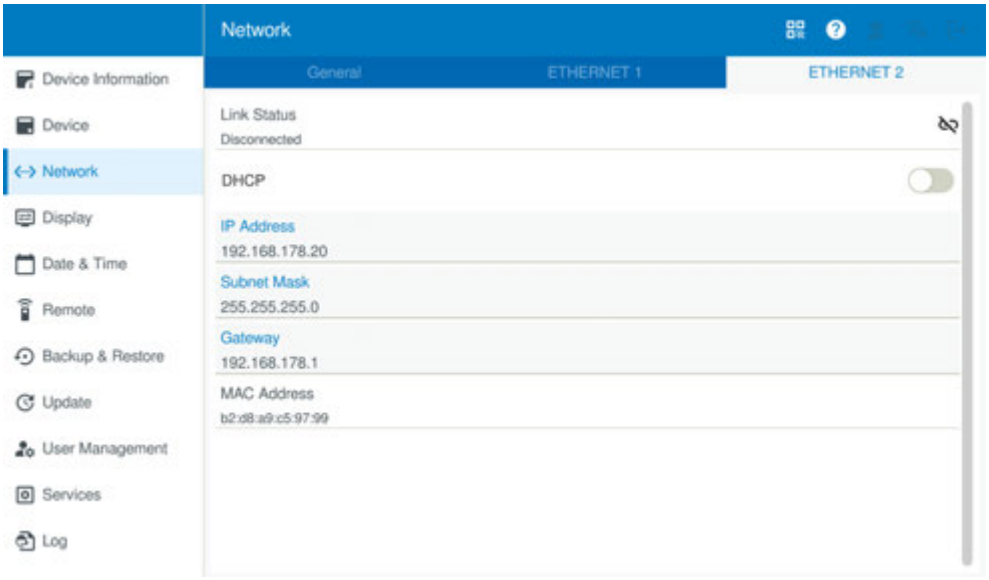
The tab will show the status of the Ethernet interface's connection. Additionally, you can enter the IP address, subnet mask, and gateway here.



For Ethernet 1 only:
There is the option of using the interface for EtherCAT.
Once you enable this option, the device will restart automatically as soon as the setting is applied.

If DHCP is disabled, you
must set up an IP address, subnet mask, and gateway!

Enabling the DHCP option will disable the input fields for the IP address, subnet mask, and gateway.



3.4 — Display

3.4.1 Brightness

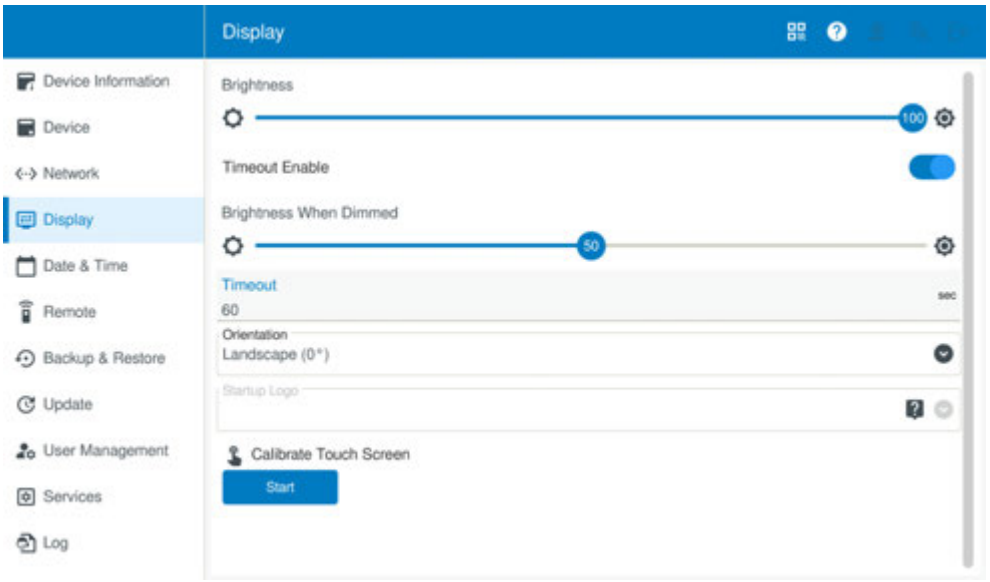
You can adjust the display brightness.

In addition, with Galileo or CODESYS, this brightness setting can also be adjusted with the application.

The upper slider will adjust the display brightness during use.
Meanwhile, the lower Brightness When Dimmed slider can be used to adjust the brightness in an inactive state (that is, while the display is not in use).

A setting of 0 will turn the display off.

The display will only be dimmed if a timeout is set and enabled.



Timeout

This setting can be used to enter a time, in seconds, after which the display will be dimmed or turned off. Once this time elapses, the display brightness will be reduced to the value set with the "Brightness When Dimmed" slider.

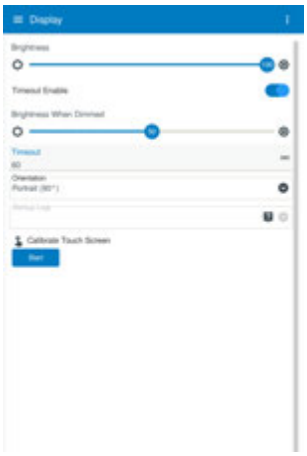
By default, the display will be configured to dim its brightness to 50% after 30 seconds. The set time will restart as soon as the display is touched.

Orientation

You can select the display orientation (0°, 90°, 180°, 270°) in landscape or portrait format.
Changing this orientation will cause the device to restart.

The orientation can be changed with the local configuration and the web configuration.
The web configuration will not be based on the device's orientation (portrait or landscape format).

The local configuration can be set up in various ways depending on the type, size, and orientation of the display, meaning that the main menu pane or the title bar will not always be visible. If need be, it will be necessary to show the menu, open a drop-down menu, or scroll through the pertinent page in order to see all configuration options.



Startup Logo

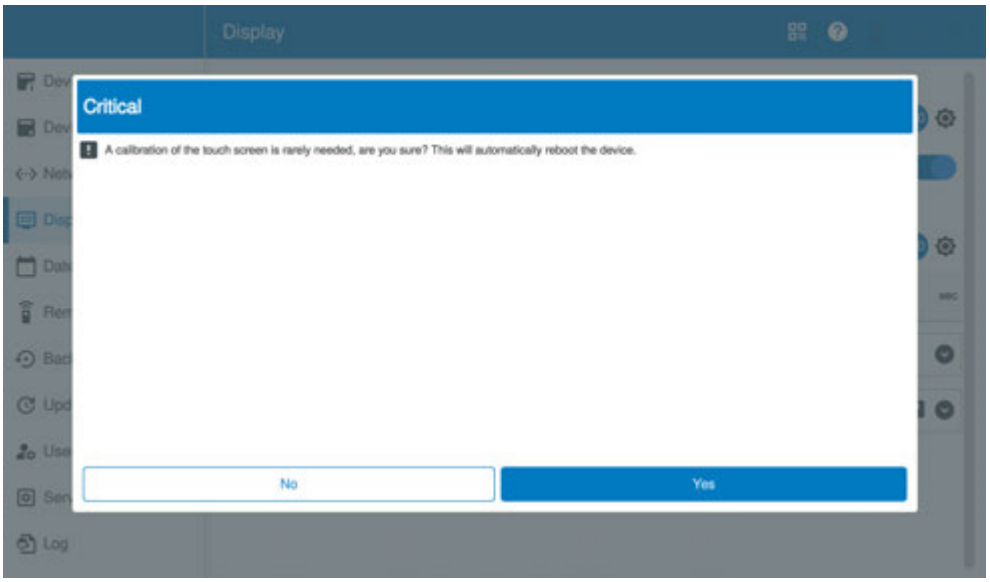
You can select an image here so that it will be shown when the device starts. This image will also be shown if an application without visualization is active (in most cases, a company logo is used for this purpose).

The system supports the PNG image file format. In order for the image to be shown, it needs to have a sufficiently high resolution (this resolution will depend on the size of the device and will be shown with a tooltip, e.g., XV-303 7-inch 1024x600).

Recommendation:
Have the PNG file resolution match the exact screen resolution.

Calibration

Devices already come calibrated from the factory. However, you can recalibrate them if necessary. This option is available both for resistive and capacitive touch panels in the XV100 and XV300 families.



Starting the calibration process will cause the device to restart and activate the calibration routine.

▶ Follow the instructions shown on the device and
click on the individual calibration points shown.

Once you are done, the device will restart again, completing the calibration routine.

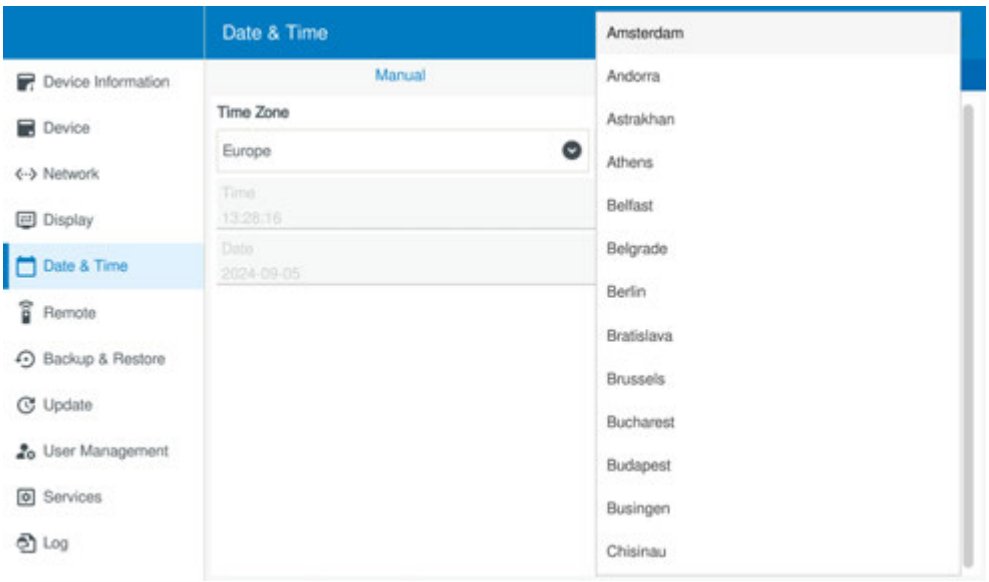
If the device is not calibrated accurately, it might not be possible to operate the device correctly.
In this case, restore the device to its default settings, → Abschnitt "Factory reset", Seite 69

3.5 — Date & Time

3.5.1 Manual

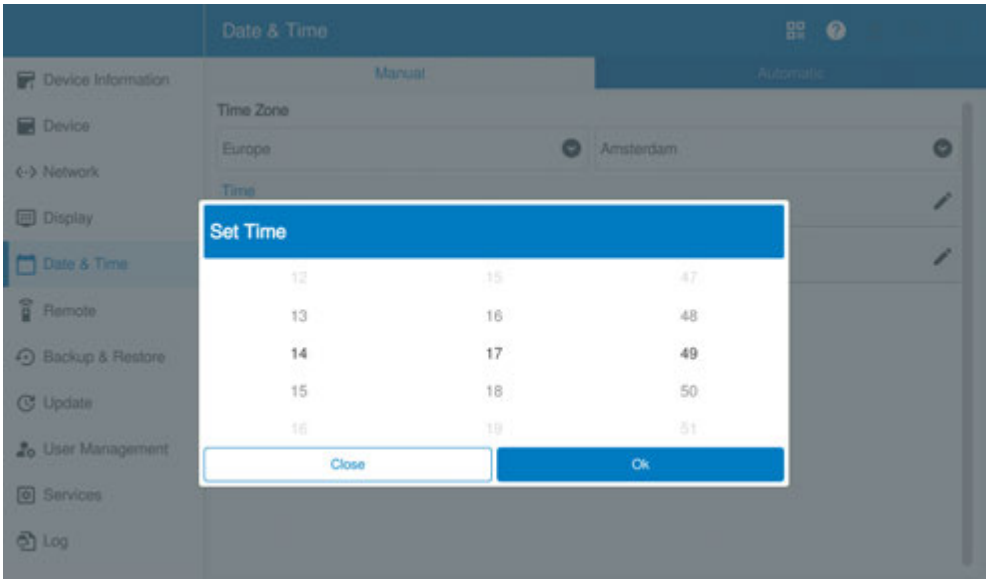
You can set the time zone with the two corresponding drop-down menu options – the first one for the region and the second for the specific city.

Once you select a region and city, daylight savings time updates will be automatically enabled.
If you select "ETC" as a region and, for example, "GMT+1" as a time zone, there will be no daylight savings time updates.



You can adjust the date and time either by editing them in the corresponding fields or with the Set Time dialog box that appears after clicking on the icon.

Please note that you will only be able to enter the date and time manually if the "NTP Server" option under the "Automatic" tab is disabled.



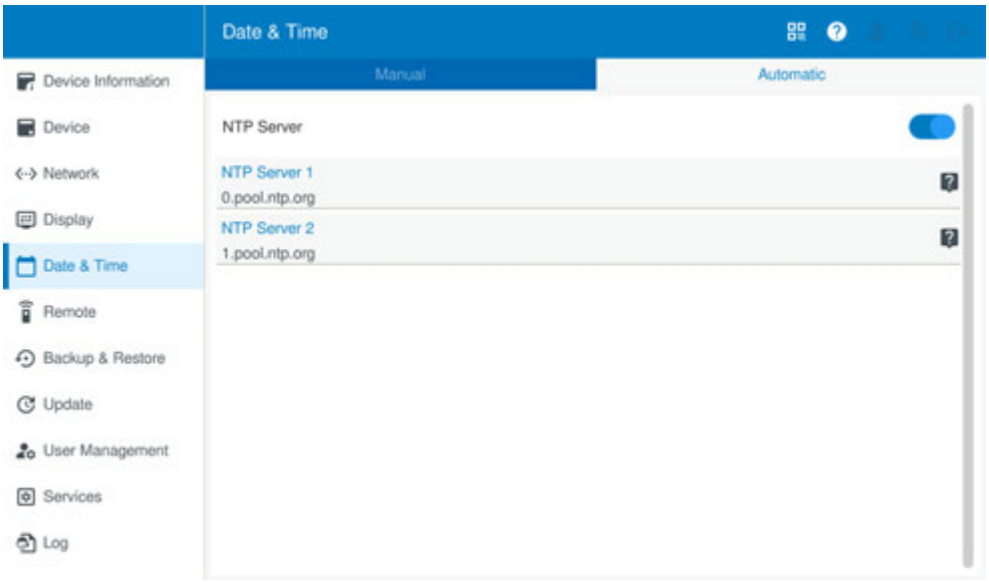
3.5.2 Automatic

In order for the date and time to be updated automatically, you will need to enable the "NTP Server" option.

After this, enter the server address that should be used to synchronize the time automatically.
You can also enter a second server address, which will be used if the first one cannot be reached.

Both addresses will be set to 127.0.0.1 (localhost) by default.
If you only want to enter an address for the first server,
you can simply leave the second one unchanged.

You can enter these server addresses as an IP address or as a host name.



If the device does not update the time with the selected server right away,
restart the device.

If the time is still not updated after this restart,
check your network settings (default gateway, DNS server) and test the connection (with SSH on the Linux console, for example).

3.6 — Remote Access

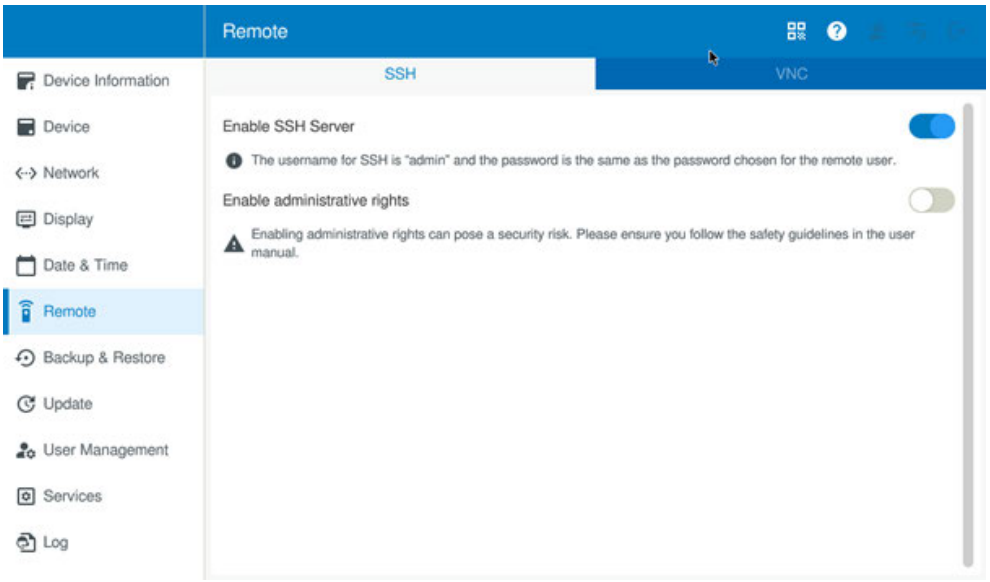
You can set up remote access with Secure Shell (SSH) or Virtual Network Computing (VNC).

3.6.1 SSH

▶ Enable the "Enable SSH Server" option.

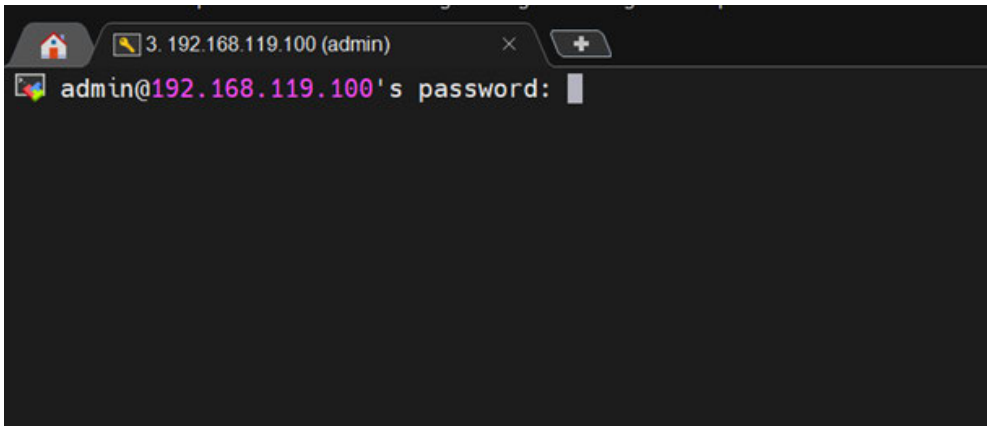
The SSH server will be accessed with "admin" as a username.
The password will be the password set for the web configuration (remote user), → Abschnitt "Manual", Seite 10.

Please note that you can disable the password.



The server will be accessed with a shell client with port 22 (e.g., PuTTY).

The server will either be accessed directly or the corresponding password will be requested.



After logging in, you will be able to access the device.

→ The device runs on Linux as an operating system, meaning that the console commands will be standard Linux commands.
Please note, however, that certain commands will be disabled.

If a command is not available, the shell will display an error message.

Following is the command used to show the device's free and used memory as an example:

```
EA-076C96:~$ free -h
               total        used        free      shared  buff/cache   availabl
e
Mem:           493Mi       111Mi       200Mi        42Mi       181Mi       324M
i
Swap:          482Mi          0B       482Mi
EA-076C96:~$
```

The ability to run commands as a Linux superuser (sudo) needs to be enabled separately.

▶ Enable admin privileges (sudo).

The first time you attempt to use the sudo command, the password will be requested again.

→ If admin privileges have not been granted, the user will be shown a message saying that they do not have the necessary permissions for the command.

```
EA-076C96:~$ sudo -s
Password:
admin is not in the sudoers file.
```

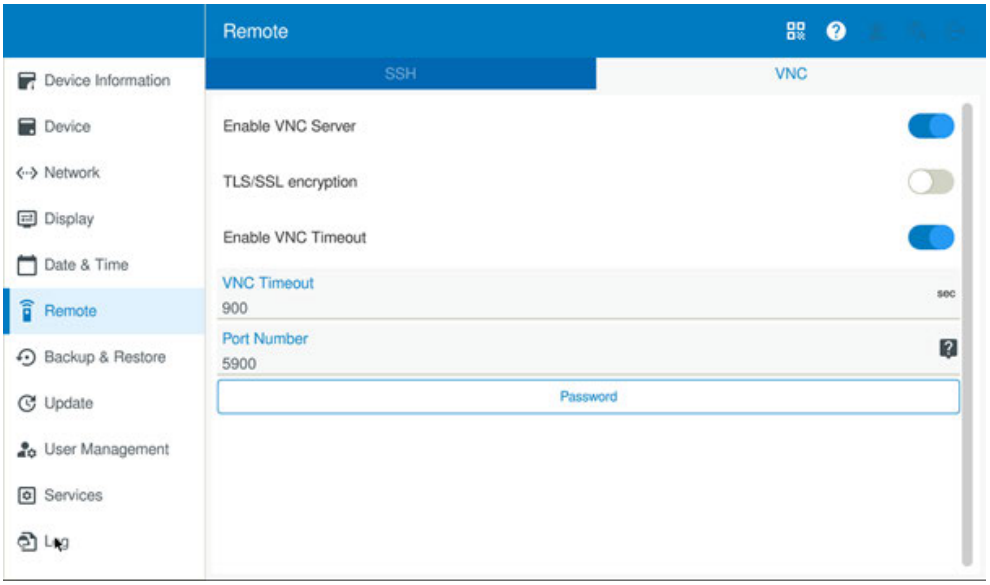
Please note that you can disable the password.

3.6.2 VNC

The VNC server will be **disabled** by default.

Enabling the VNC server with the corresponding option will unlock the settings for the sever. Once you configure these settings, they will be retained even if you disable the VNC server.

→ To restore these settings to the default settings, you will need to carry out a factory reset.



The VNC server can be run using an encrypted connection.

A timeout period of 300 seconds will be set by default.
You can disable this timeout or adjust the time as necessary.

The port will bet set to 5900 by default.
You can change it as necessary.

→ Recommendation
Set the port to a value between 5900 and 5904 so that there will be no overlaps with other services.

In order to be able to use the VNC server, you **must** set a password.

▶ Set the password for VNC server access
(at least eight characters, including at least one uppercase letter, one number, and one special character)

3.7 — Backup & Restore

This page can be used to save a backup of the various settings to a USB storage device.

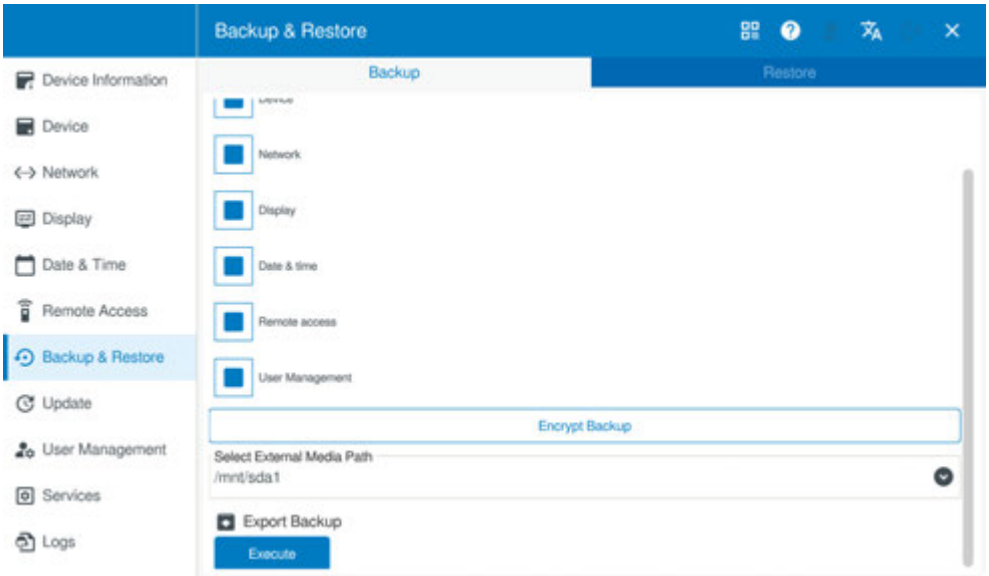
This makes it possible to back up data
so that specific settings can be reproduced
or
so that they can be used with the Import option in the First Start Wizard, → Abschnitt "Import", Seite 12.

3.7.1 Backup file

When creating a backup, you can either back up all application settings or only specific ones.
A full backup will be selected by default, and you can deselect individual items as necessary.
Please note that backups always need to be encrypted, meaning that you will need to set a password.

▶ Set a password for the backup file
(at least eight characters, including at least one uppercase letter, one number, and one special character)

→ If you do not set a password, you will not be able to create the backup file.



As soon as a password has been set, you will be able to save the backup to an external storage device by tapping Execute.

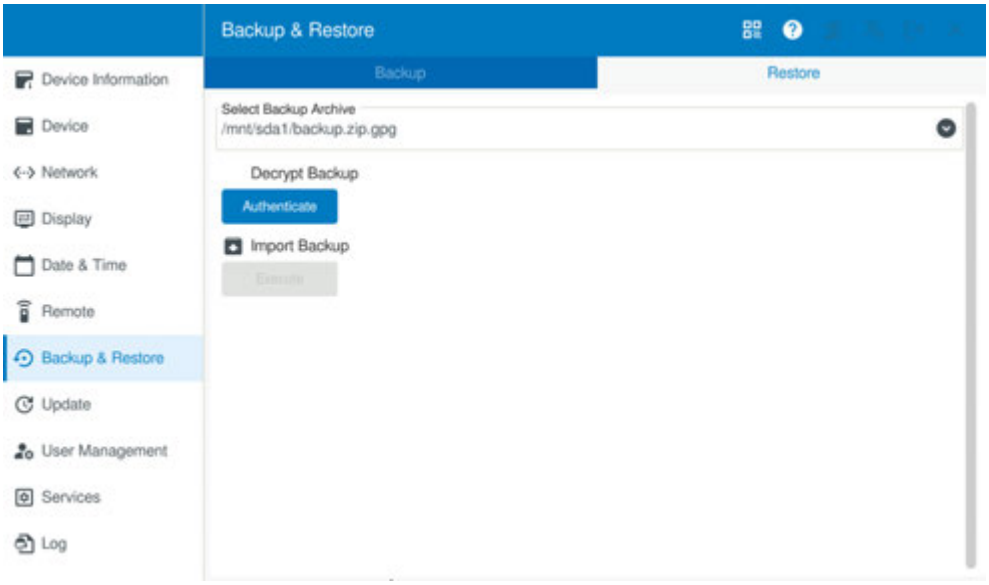
You can take advantage of the increased convenience provided by the → Abschnitt "Web configuration", Seite 65.
If the USB storage device is not detected, try restarting the device.
Also make sure to remove the startup logo, if any, from the backup.

If there is already an existing backup, it will be overwritten with the new backup file.

You can also create a backup in order to overwrite existing settings. One potential use case would be settings that are only required to service a device.

3.7.2 Restore

This page can be used to import a previously created backup into the device.



To restore a selected backup, you will need to enter the corresponding password.

▶ Authenticate yourself with the password.

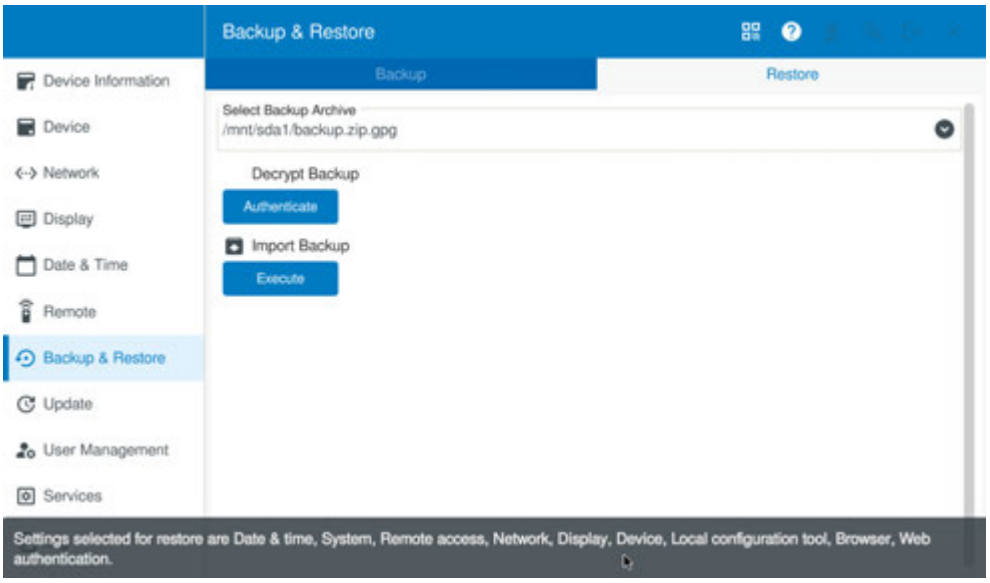
If you do not enter the correct password, you will not be able to import the backup file.

▶ To start the import, tap Execute.

→ What can I do if I have forgotten the password?
There is no way to restore a backup file in this case.
What you can do instead is to use it with the Import option in the First Start Wizard. The password will be read from the corresponding password file in this case.

After successfully restoring a backup, the system will show information indicating what has been overwritten.

Only the settings from the Configuration Tool will be loaded with this restore function. If using the Import option in the First Start Wizard instead, you will also be able to import the operating system, the application, and the Galileo Runtime and/or CODESYS Runtime, → Abschnitt "First Start Wizard", Seite 9.


Backup & Restore
Device Information
Device
Network
Display
Date & Time
Remote
Backup & Restore
Update
User Management
Services
Backup
Restore
Select Backup Archive
/mnt/sda1/backup.zip.gpg
Decrypt Backup
Authenticate
Import Backup
Execute
Settings selected for restore are Date & time, System, Remote access, Network, Display, Device, Local configuration tool, Browser, Web authentication.

3.8 — Update

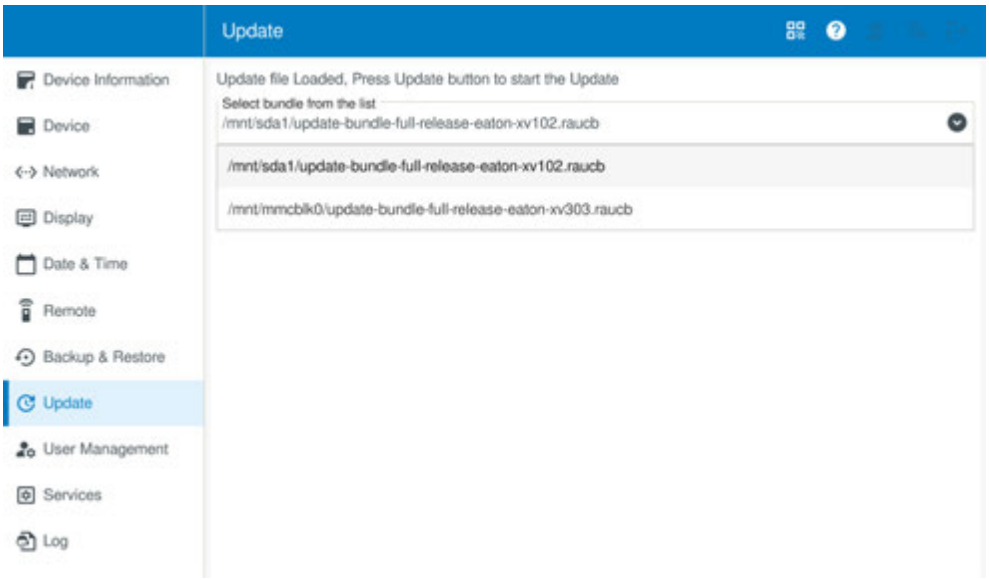
Updates are carried out with RAUC bundles and can be run either with

- The local configuration

or

- the web configuration.

The list will show all available update bundles on the SD card and/or USB storage device. Please note that the list will not be filtered so that it only shows the *.raucb files compatible with the device (i.e., other files will be shown as well).



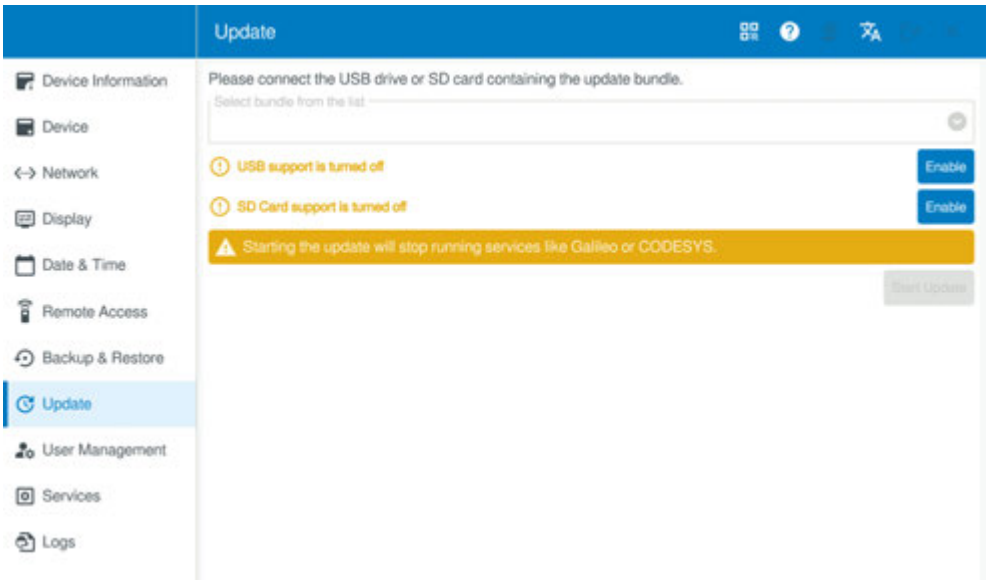
▶ Select the right *.raucb file.

▶ Run the update by tapping Start Update.

The update will be loaded onto the device.

→ Please note that when you start an update, all active services (such as Galileo and CODESYS) on the device will be stopped.

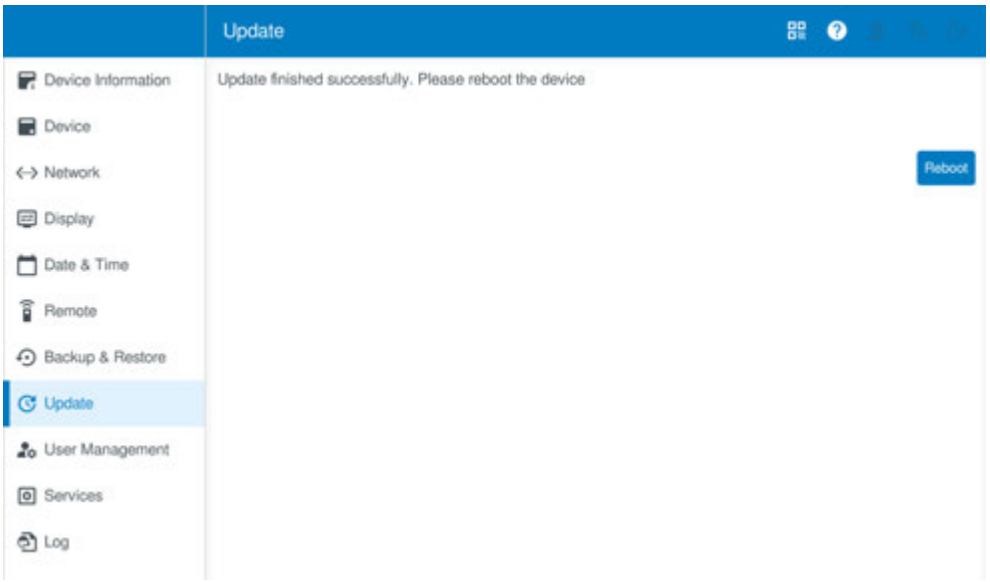
An error message will appear if the SD interface and/or the USB interface is disabled.



If this happens, you can enable the interface with the buttons shown next to the messages in order to allow access to the storage device.

If a valid RAUC bundle is detected, the update will be loaded onto the device.

→ Do not remove power from the device while the update is in progress.



▶ After the update is loaded, restart the device by tapping Reboot.

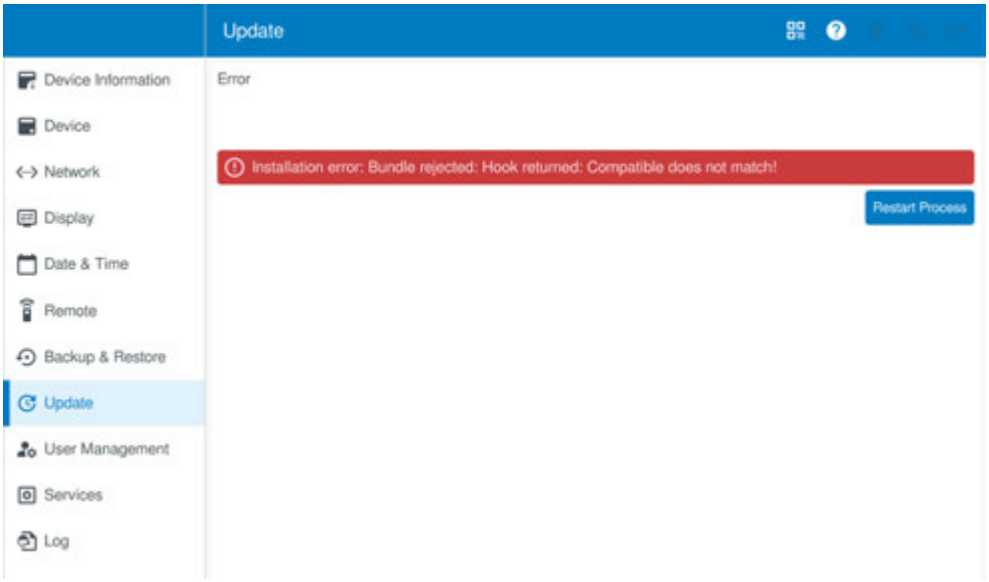
The device will restart multiple times and then open the local configuration.

→ Do not remove power from the device during the restart process.
If an error occurs, you will need to restore the device to factory settings,
→ Abschnitt "Factory reset", Seite 69

3.8.1 Issues that will result in an update being canceled

The update will be canceled and a corresponding message will be shown on the display if:

1. You selected the wrong RAUC bundle for the device.
2. The RAUC bundle you selected does not meet the device's minimum requirement (version comparison)
   ▶ Tap Restart Process to cancel the update.

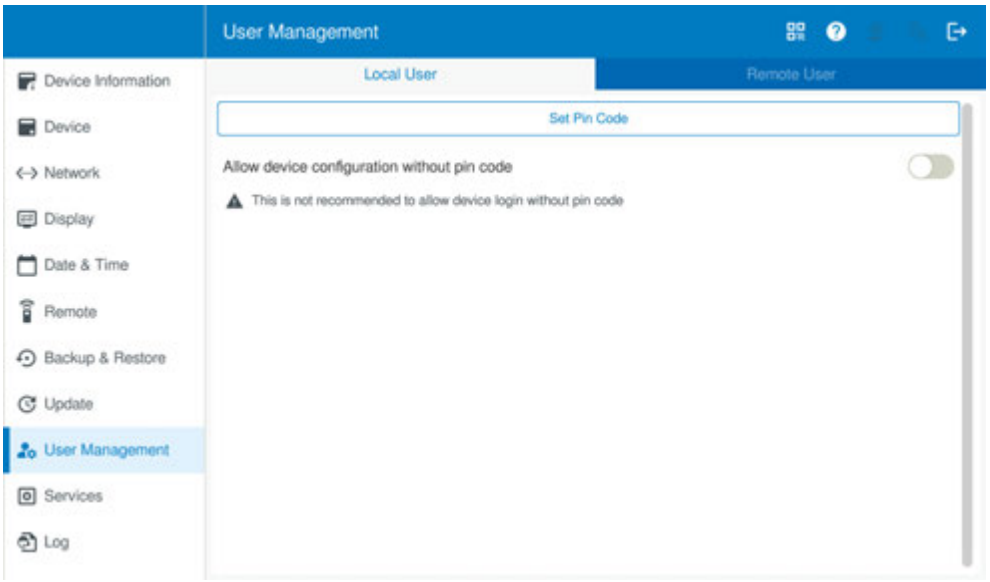


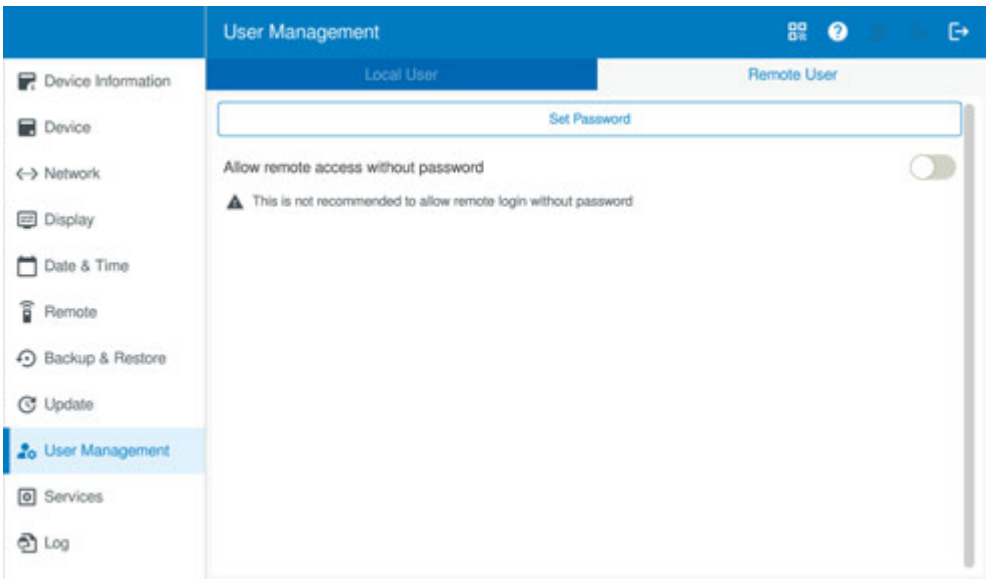
   After a failed update attempt, you will need to restart the device.
   Depending on the reason why the attempt failed, either select the right bundle or run a firmware update before running the update again.
3. The device is disconnected from power during an update
   After power is restored, the device will restart and you will need to run the update again.

3.9 — User Managment

The device has two users: a local user and a remote access user.
No additional users can be set up here.

You can modify the settings you configured in the First Start Wizard here.





To change the PIN (local user) or password (remote access), you will first need to enter the current password. You will then be able to set a new password.

- Set a PIN or a password for the device.
  (PIN: between four and 12 numbers long)
  Password: at least eight characters, which must include at least one uppercase letter, one lowercase letter, one number between 0 and 9, and one of the following special characters: ! @ # $ ^).

You can disable the PIN and/or password.
To do so, you will first need to enable the corresponding option and enter the current PIN
or the current password respectively.

→ You can choose to allow access without a password,
but this is strongly advised against due to cybersecurity concerns.

→ As soon as you set a pin code, users without the PIN will only be able to see device information and legal information.
In addition, these users will not be able to configure any settings.

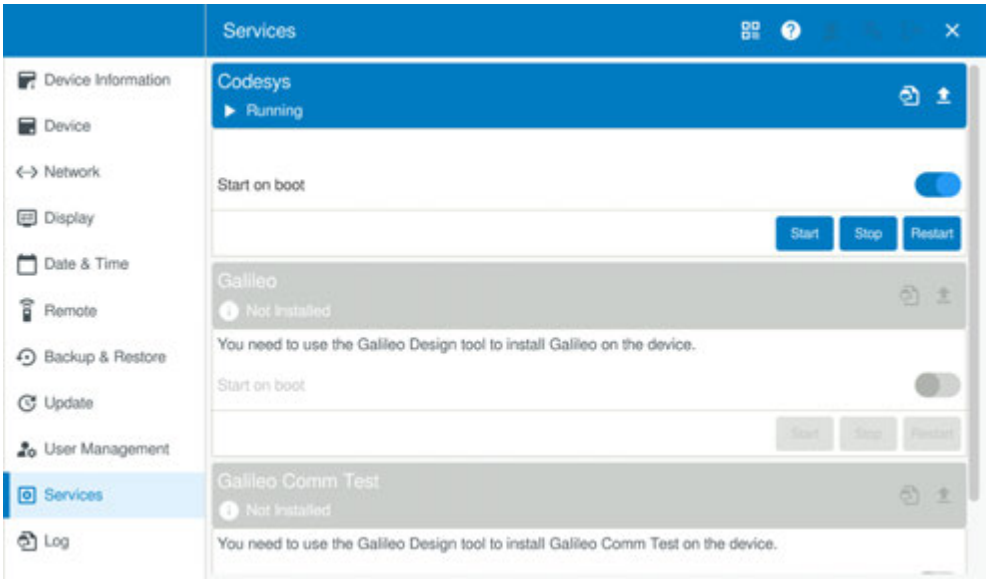
Galileo and CODESYS have their own separate application user management that is independent from the Linux operating system's user management.

3.10 — Services

This page can be used to start and stop the services installed on the device. It can also be used to select whether Galileo or CODESYS will start automatically when the device is started.

Please note that only services checked by Eaton will be installed.

As of this writing, the following are available as services: Galileo, Galileo Comm Test, and CODESYS.



You can explicitly start, stop, or directly restart a service here. In addition, you can disable the Start on boot option.

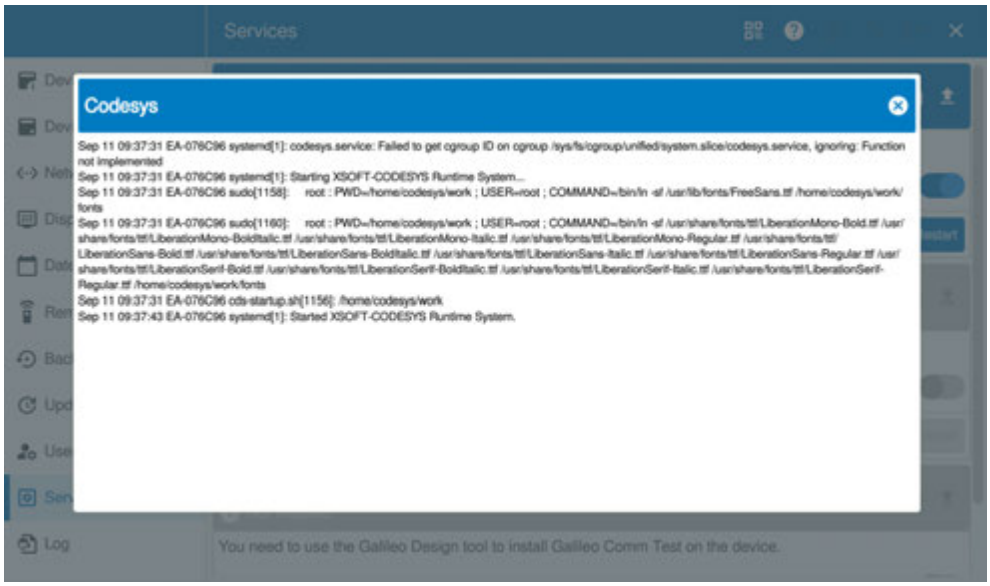
These starting, stopping, and disabling options were implemented this way in order to provide customers with a variety of options. Part of the reason for this was that Linux does not feature a file that can be used to modify the device's startup behavior the way **autoexec.bat** files do.

If you install a new service with the Galileo Design Tool or with the Codesys IDE, the service will start automatically after being installed. In addition, the Start on boot option will become available.

If the CODESYS service without visualization is active on the device, the device will show a black screen with the Eaton logo by default after booting up.
If a startup logo has been set up, that logo will be shown instead.

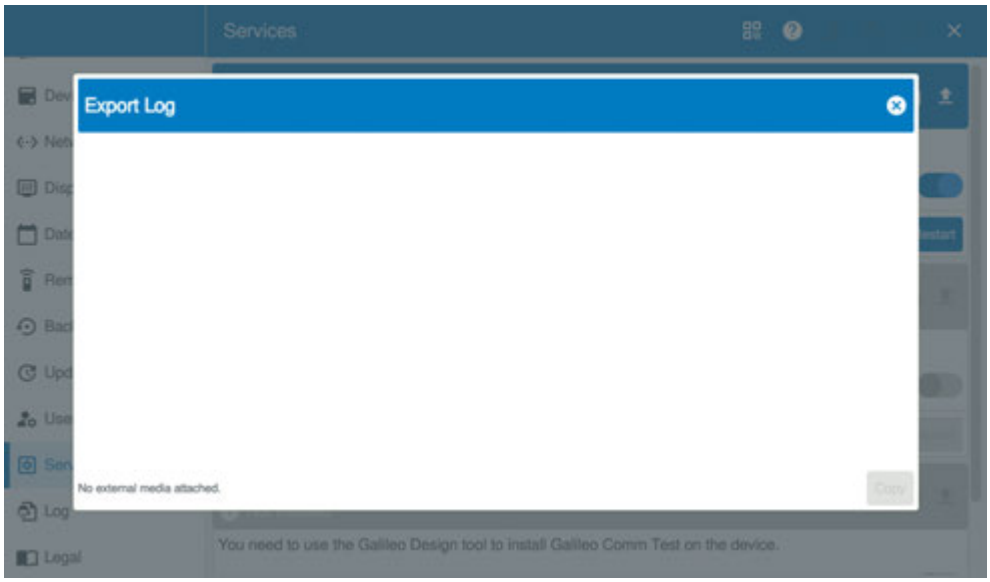
If an application is running on the device and you want to open the Configuration Tool in order to make changes, you can start the tool by pressing the CTRL button on the side of the device.

You can view the service log or download it onto a storage device by tapping the icons on the right.

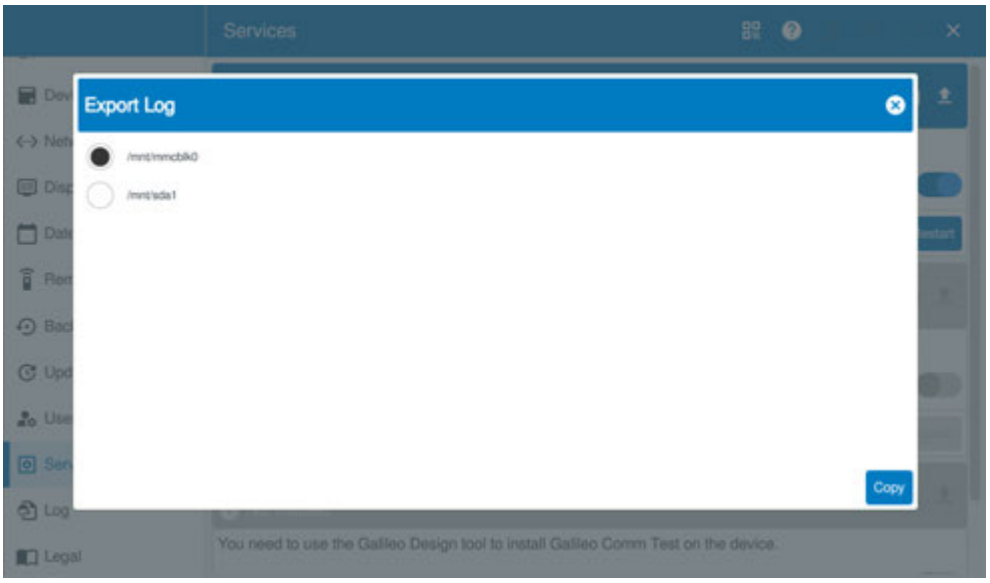


As mentioned above, you can retrieve the log file for a service that is being used and export the file to an external storage device.

→ If USB storage devices and SD cards are not enabled, the storage devices will not be detected, → Abschnitt "Storage", Seite 27.



▶ Select the storage device you want.



▶ Tap Copy to export the log file to the storage device.

You can then remove the storage device.

3.10.1 Installing CODESYS

To install CODESYS Runtime, you will need XSOFT-CODESYS version 3.5.19 BF1 or higher.

To install it, simply use the firmware tab in the device tree for the corresponding device – the installation procedure is self-explanatory.
If you set up a password for the web configuration, you will need to use it here.
CODESYS will be installed through a web API connection.

For more information on how to install CODESYS Runtime, please refer to the XSOFT-CODESYS-3 manual.

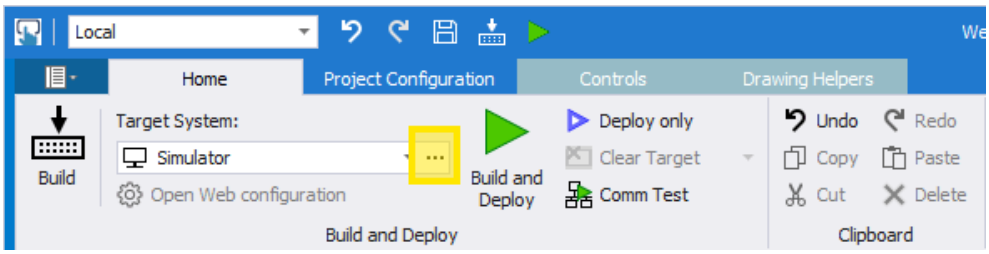
3.10.2 Installing Galileo

Galileo will be installed through a web API connection.

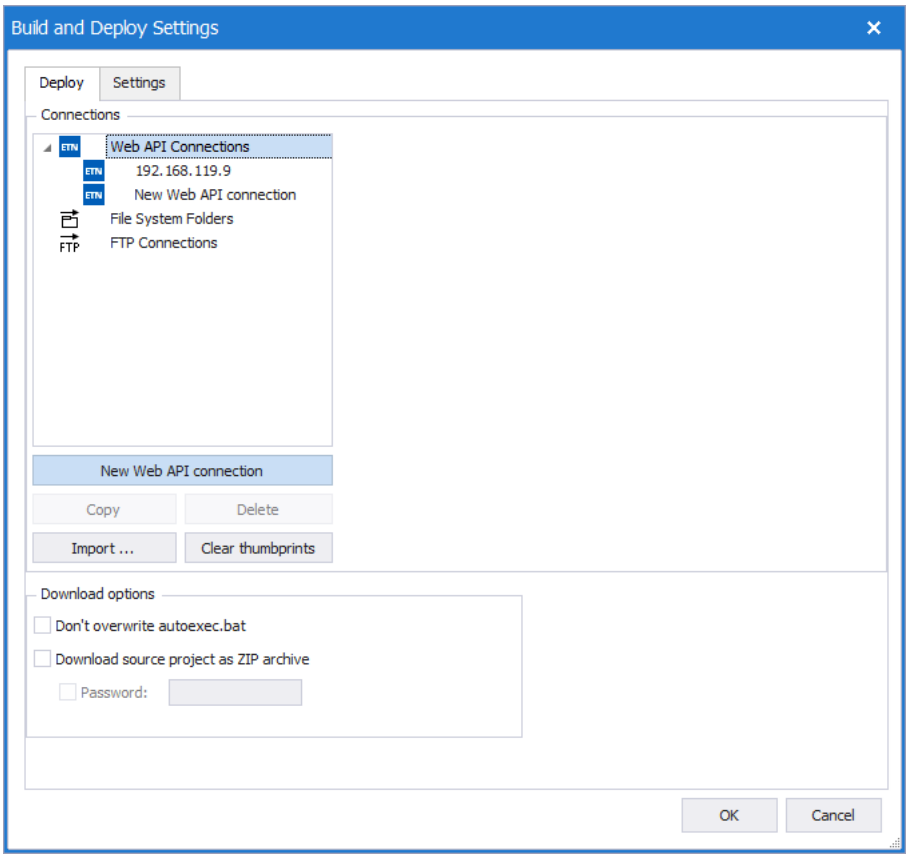
3.10.2.1 Web API connections

In addition to FTP connections and the option of saving Galileo projects in a file directory, Galileo 11 and higher features the option of using a web API connection for devices with an embedded Linux operating system.

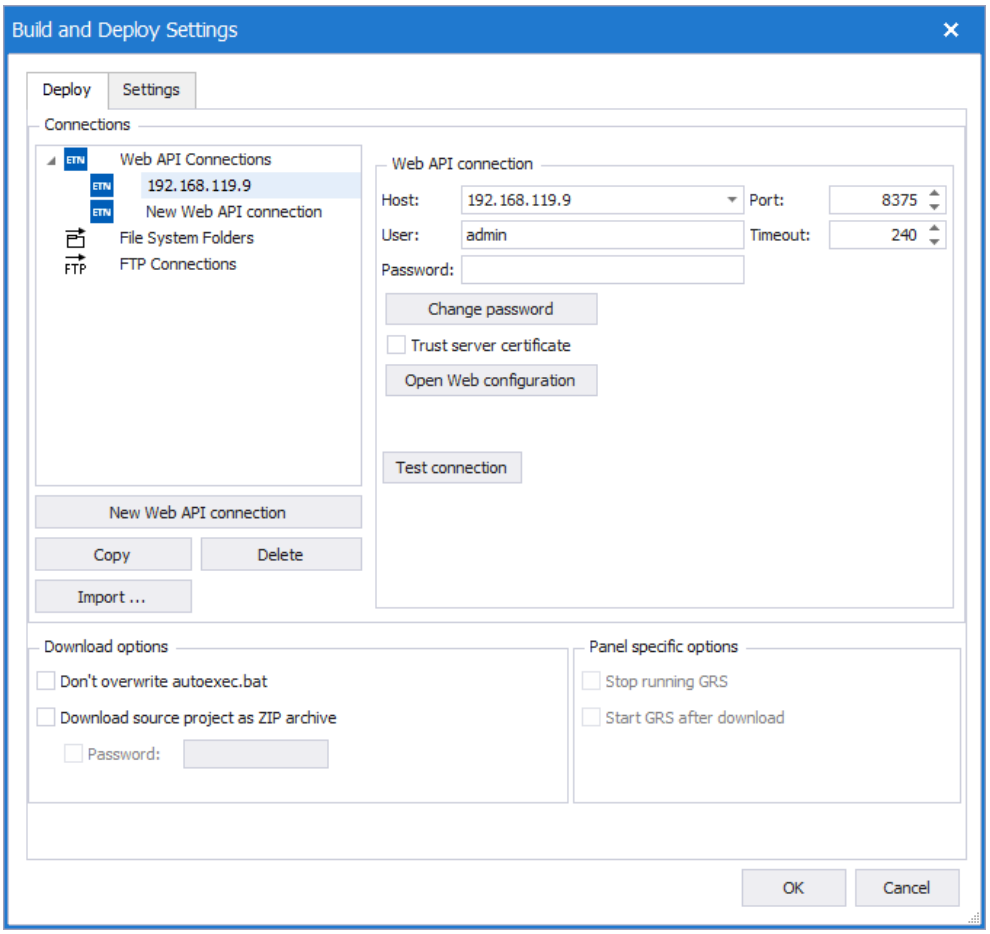
These connections are set up in almost the same way as FTP connections by configuring the target system accordingly in the Galileo project.



▶ Create a new web API connection.



▶ Then configure the new web API connection.



The corresponding port, user, and timeout settings will be filled out by default and should not be changed.

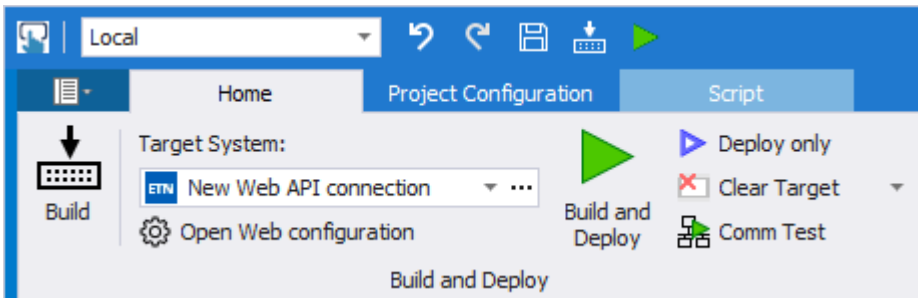
Enter the device's IP address as the host.
Additionally, make sure to enter the password for the web configuration if one was set up. Otherwise leave the field blank (→ Abschnitt "First Start Wizard", Seite 9 or → Abschnitt " — User Managment", Seite 51)

As soon as you enter the IP address, you will be able to access the web configuration directly from this page.

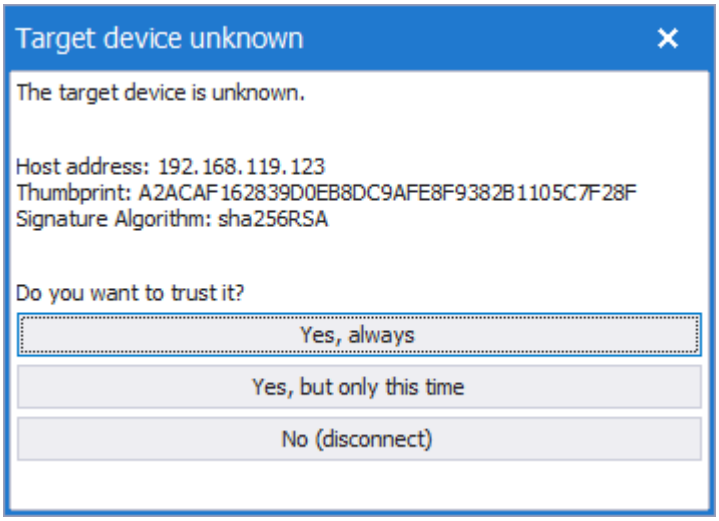
If you enable the Trust server certificate option, the encrypted connection to the device will be automatically established every time without requiring confirmation.

▶ Click on OK to create the web API connection.

The new connection will be selected automatically. After this, you can install the application created with Galileo (Galileo project) on the device by clicking on "Build and Deploy".



If you did not enable the Trust server certificate option, an error message will appear when testing the connection and a prompt saying Unknown target device will appear.



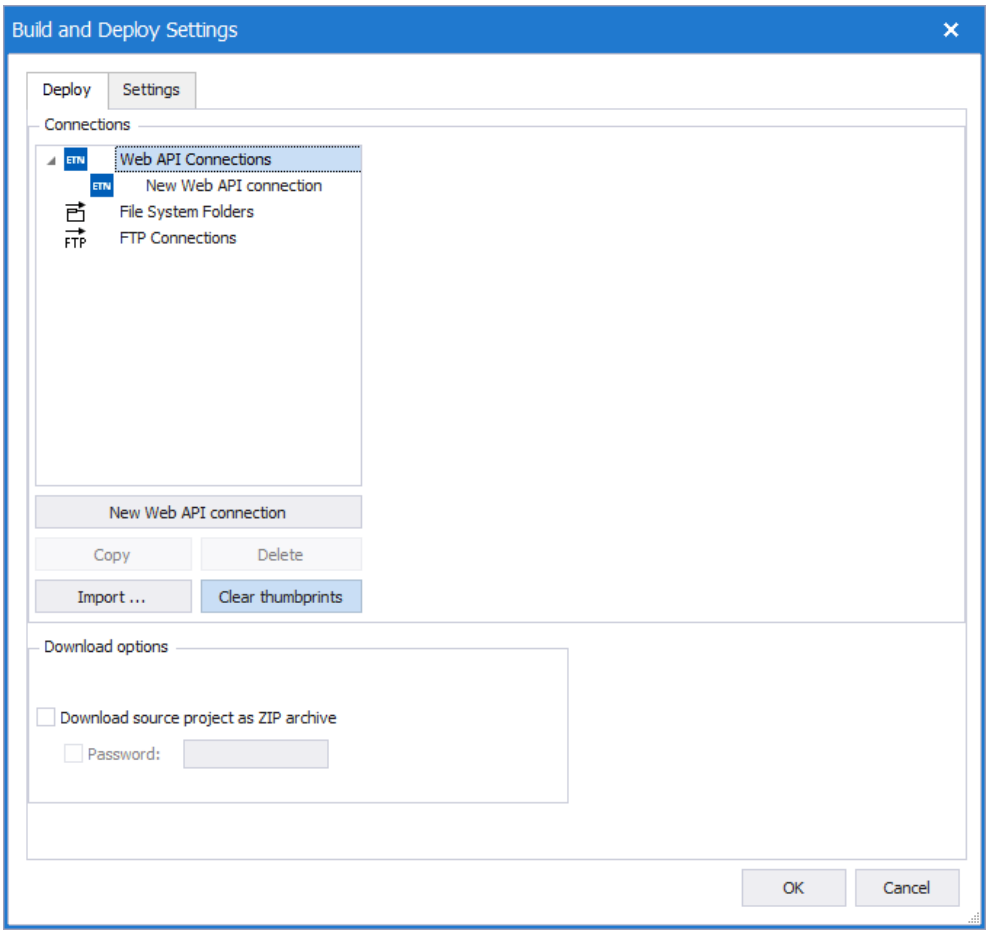
The device will pass a key for establishing a secure connection at this point.

You can accept this key once by clicking on Yes, but only this time.
When you do so, a connection will be established.
This confirmation prompt will then continue to appear every time an attempt is made to establish a connection to the device. In other words, this leaves the option of rejecting the connection.

If you instead click on Yes, always, the device's key will be stored and a connection will always be established in the future without an additional confirmation prompt.

Clearing thumbprints

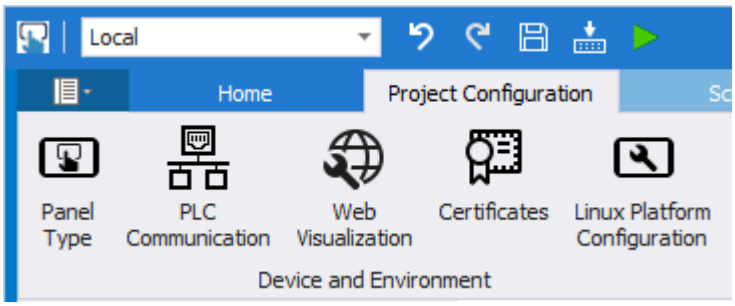
If you want to delete the saved key, open the Galileo project and click on Clear thumbprints in the configuration for the web API connections.

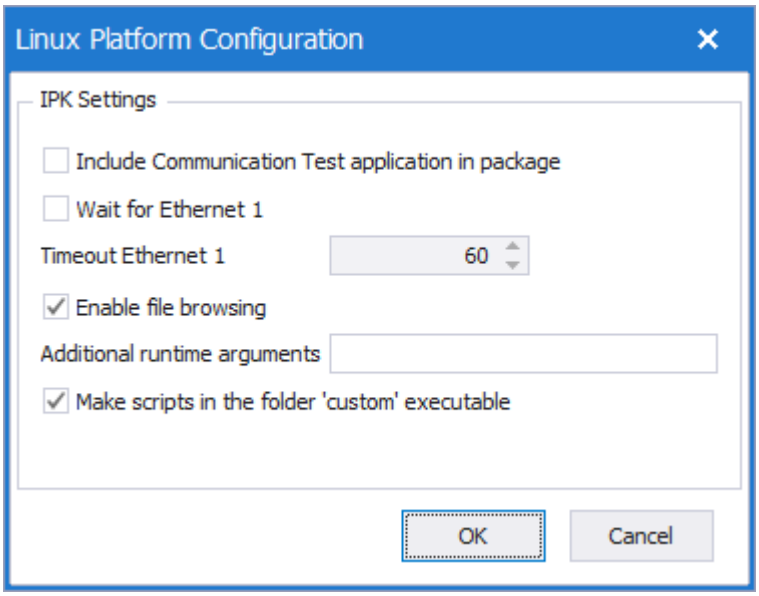


3.10.2.2 Linux Platform Configuration

Additional Galileo application settings can be configured in Galileo.

- To do this, go to the Project Configuration tab in Galileo.
- Open the Linux Platform Configuration dialog box.





IPK settings

Include communication test application in package

The next time you click on "Build and Deploy," the communication test will be added. This test can be used to test the connection to the PLC tags of a PLC connected to the device before the corresponding Galileo project starts.

Wait for Ethernet 1

If a PLC is connected to the Ethernet 1 interface and this PLC transmits tags to the device, you can set a timeout for this option.
In this case, when booting up, the device will wait until the configured time elapses to start Galileo. This will give the PLC enough time to start up and initialize the corresponding tags so that no obsolete tag states are passed to the Galileo project.

→ This can be necessary, for example, if scripts that need correct and valid tag states are configured for when the Galileo project starts.

Enable file browsing

This option is enabled by default.
A Galileo order is created in the file browser during the download.

Disabling this option will prevent access to the Galileo directory through the device's file browser.

Additional runtime arguments

In consultation with Support, you can use this field to enter arguments so that it will be possible, in the event of faulty behavior, to pinpoint the cause. Otherwise, this field **must** be left blank

Make the scripts in the 'custom' folder executable

In order for the Galileo project to be able to run shell scripts, this option needs to be enabled.
The option is disabled by default due to security reasons.

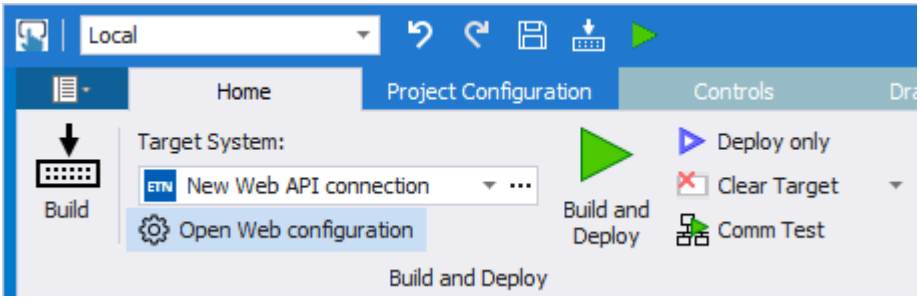
In order to be able to run a shell script, the execute attribute must be set for the file on the Linux filesystem. Without this attribute, it will not be possible to run the script. The attribute should only be set for scripts that need to be run, making it a secure-by-design feature.

▶ Click on OK to apply the settings to the Galileo project.

3.10.2.3 Installing Galileo Comm Test

The Galileo communication test can be enabled with the Linux Platform Configuration options in the Galileo project,→ Abschnitt "Linux Platform Configuration", Seite 59.

After you do this, the communication test will be available in the Configuration Tool under Services.



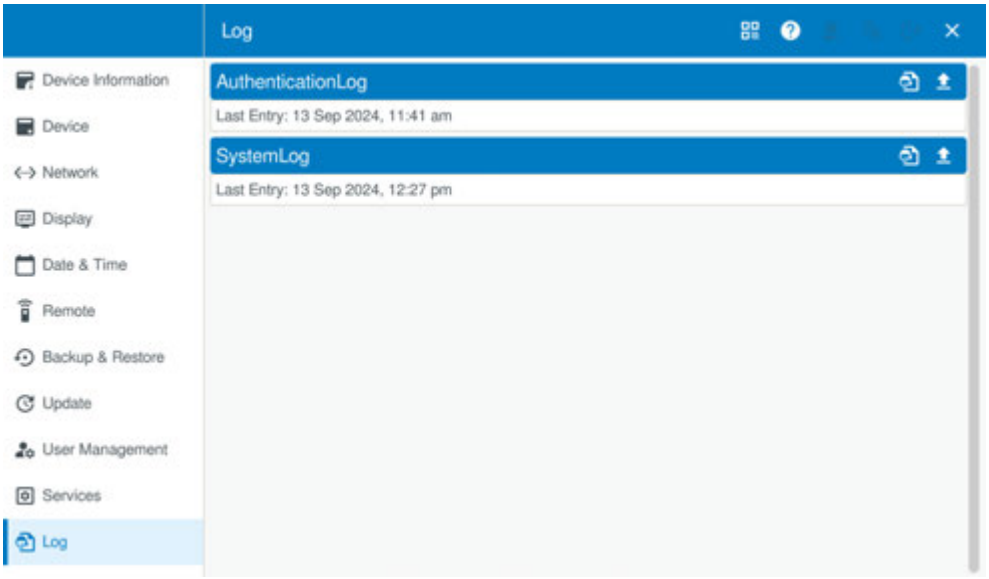
Please note that this application can only be started if no Galileo applications are active.
Either the communication test or Galileo can access the interfaces at any one time.

3.11 — Logs

You can view the device's logs here.

The AuthenticationLog is used to log all user operations.

The SystemLog is used to log all of the device's operations.

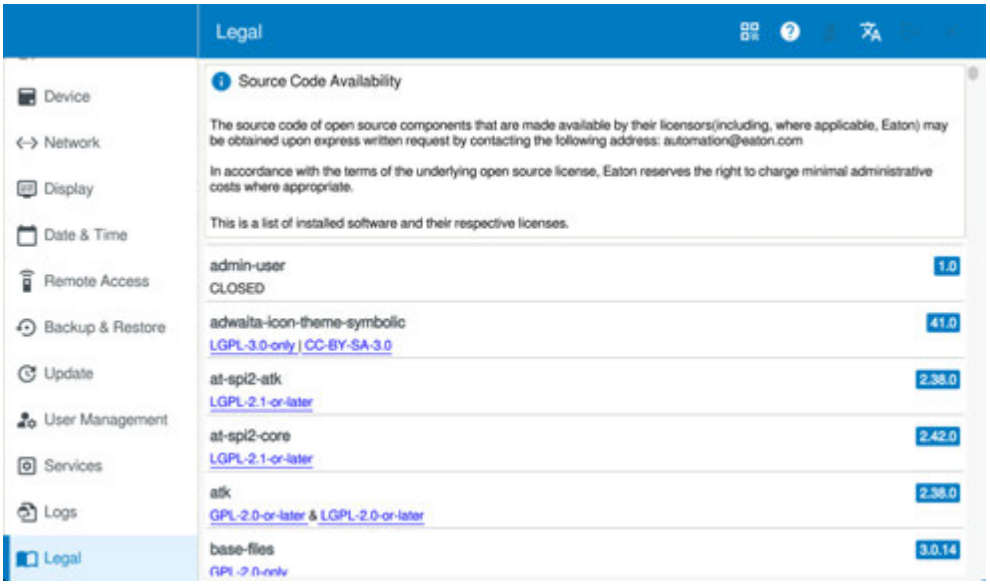


The logs can come in handy for troubleshooting by Support, and can be exported to an external storage device for this purpose.

If USB storage devices and SD cards are not enabled, the storage devices will not be detected, → Abschnitt "Storage", Seite 27.

3.12 — Legal

This menu lists all the open-source licenses used.



3. Local configuration
3.12 — Legal

4. Web configuration

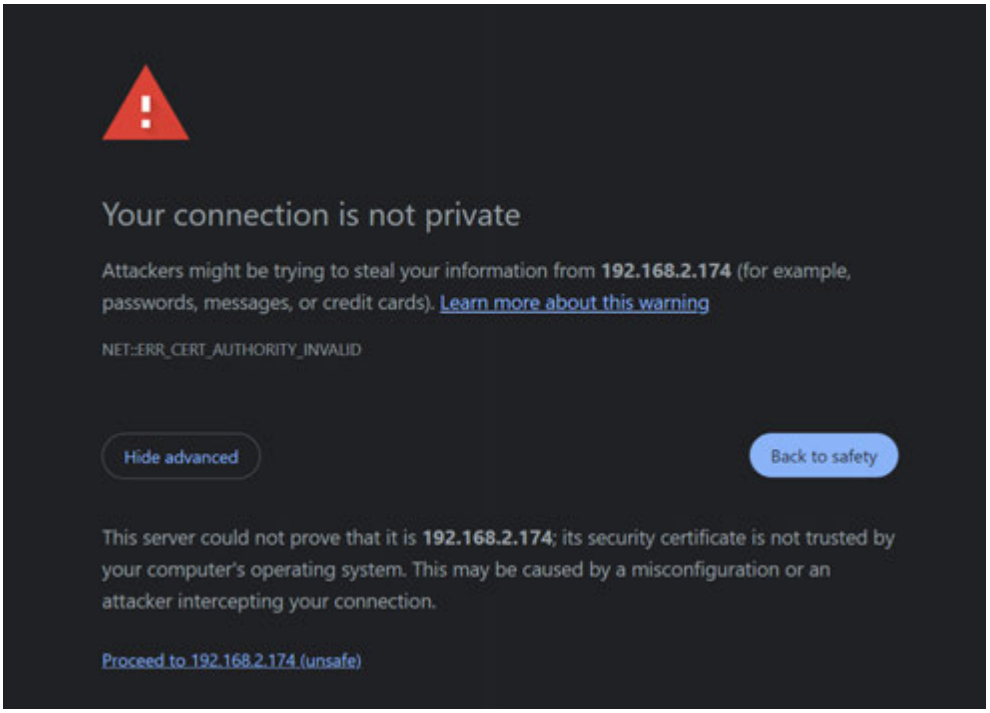
In addition to the local configuration, the device can be configured through a web browser. This web configuration makes it possible to remotely access the device's Configuration Tool.

Pay attention to the local network structure – for instance, it is possible that the device will only be accessible on an internal network and not through the Internet.

The recommended web browsers are Chrome and Edge.
The address for accessing the web configuration is:

https://[IP Adress]:8375
(z.B. https://192.168.119.2:8375)

If the browser warns that the website is not secure, allow it once in order to access the web configuration.



4. Web configuration

The menu structure for the web configuration will be identical to that of the local configuration on the device.

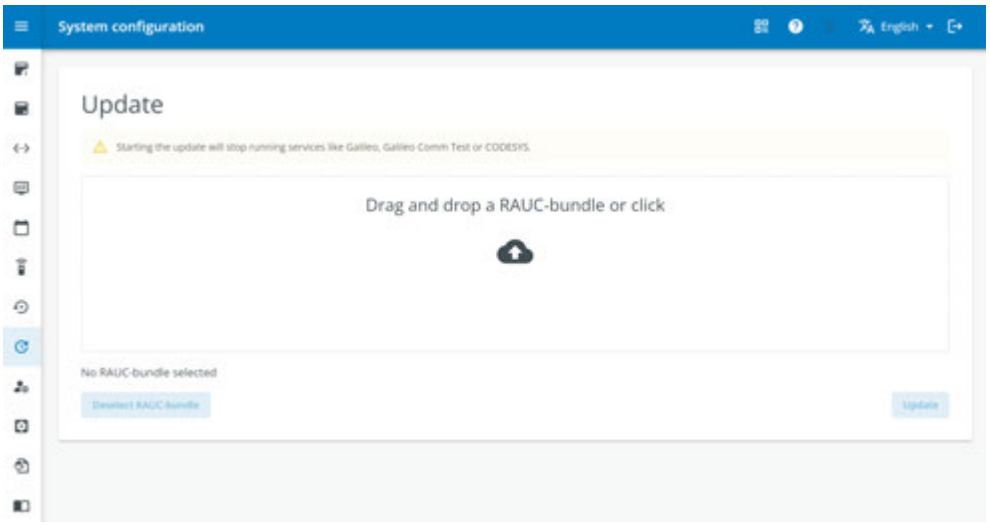
Setting up the device on a PC through a web browser also offers the convenience of an office workstation for the application.
Available menus and pages will be adjusted based on the browser's window size.
Moreover, page contents will be identical to those in the local configuration and are described there, → Abschnitt "Local configuration", Seite 25

4.1 Update via OTA

If the device is connected to the Internet, you will be able to use the web configuration to run over-the-air (OTA) firmware updates directly.

In addition to firmware updates, the startup logo can also be sent over the air.

As an example, you can use this feature to transmit a RAUC bundle for an update from your PC right after downloading the bundle.



The update itself can also be run with the web configuration.
The behavior is described in the sections for the local configuration,→ Abschnitt " — Update", Seite 48.

4.2 Limitations in comparison to the local configuration

1. The web configuration cannot be used to access the device's files.
   This can be done with SCP or SFTP (SSH File Transfer Protocol, SFTP) instead.
2. The touch calibration feature for devices cannot be run through the web configuration.

5. Factory reset

There are various options for restoring the device to its default settings.

5.1 … with the CTRL button

To carry out a factory reset with the CTRL button on the side of the device, follow the steps below:

1. Switch off the device
2. Switch on the device
3. As soon as you see something show up on the display, press the CTRL button and hold it down. The display will show a notification.
4. Hold down the CTRL button for four seconds.
5. Then release the CTRL button within the next four seconds.

The factory reset process will start.

The device will restart several times. Once it is done, the First Start Wizard will appear.

Do not remove power from the device during the process!

5.2 … with the USB port

To reset the device with a USB storage device, the USB Factory reset option must be enabled, → Abschnitt "Storage", Seite 27.

If the USB option is not enabled, the storage device will not be detected.

To carry out a factory reset, you will need to create a **factory-reset.txt** file.
This **factory-reset.txt** file must contain the device's serial number.

ATTENTION In order to ensure that the device cannot be reset without authorization, it must be flush mounted . Otherwise, unauthorized parties will be able to read the serial number on the identification plate.

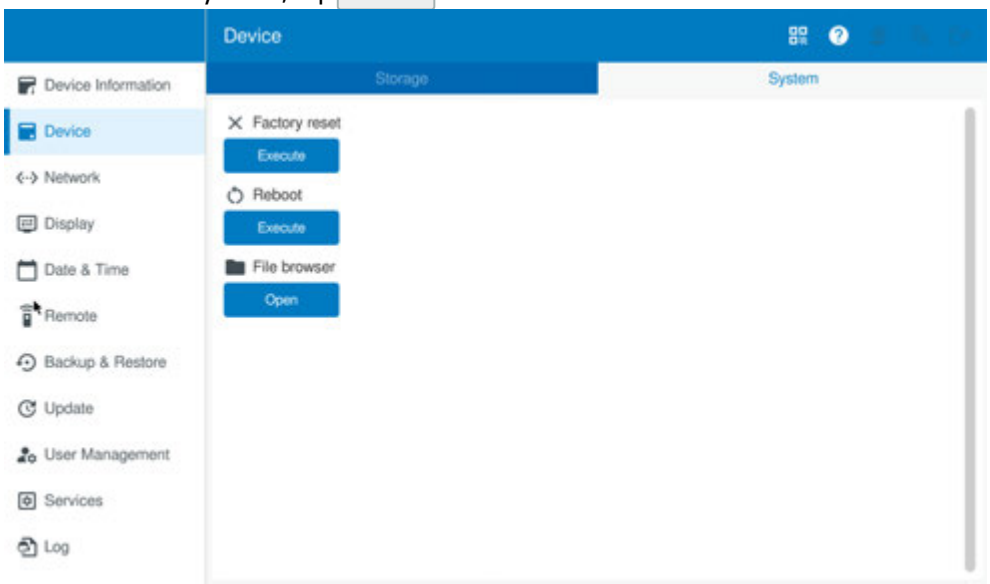
Additionally, the USB factory reset option must be enabled, → Abschnitt " — Device", Seite 27.

The text file must be stored on a USB storage device. The USB storage device can then be plugged into the device.
The next time the device restarts, it will check the USB port. If the file on the USB storage device is named correctly and has a matching serial number, the factory reset process will start.

5.3 … with the local configuration

You can carry out a factory reset directly with the Configuration Tool, → Abschnitt "System", Seite 28.

- To do this, open the System tab in the Device page.
- Under ✕ Factory reset, tap Execute.



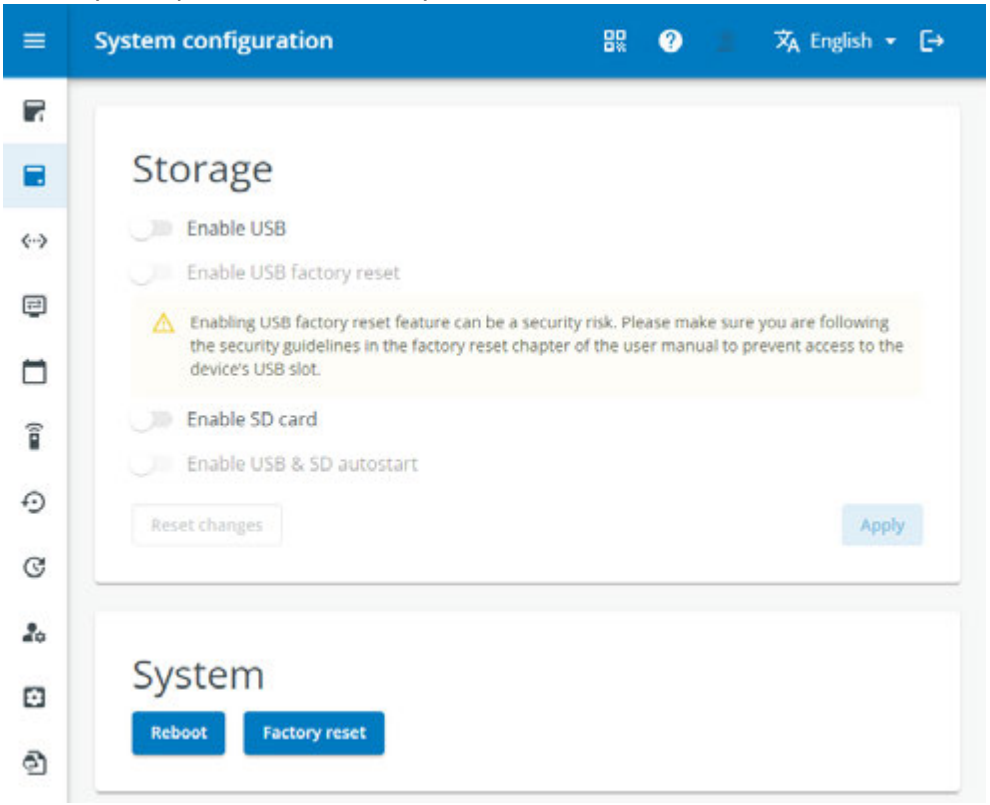
ATTENTION
If a PIN has not been set for the device, any unauthorized person will be able to trigger a factory reset on the device if the device is not flush mounted or if no CODESYS or Galileo service is active on the device.

If the device has been flush mounted and an application is running on it, it will not be possible to press the CTRL button in order to open the Configuration Tool.
In turn, this means that it will not be possible to carry out a factory reset without a PIN.

5.4 … with the web configuration

A factory reset can also be triggered with the web configuration using remote access.

- Open the *Device/Device* page.
- In the System pane, click on Factory reset.



ATTENTION
If a password has not been set for the web configuration, any unauthorized person with a device on the same network will be able to trigger a factory reset with the Configuration Tool.

5. Factory reset
5.4 … with the web configuration

6. Shell scripts

Shell scripts can be used for many things, including adjusting the device's startup behavior according to specific needs.

These shell scripts are the equivalent of batch files for Windows applications.

An example is provided below in order to illustrate how shell scripts are used.

Example 1

The script will be started from Galileo.
To do this, the appropriate settings must first be configured in the Linux Platform Configuration dialog box.

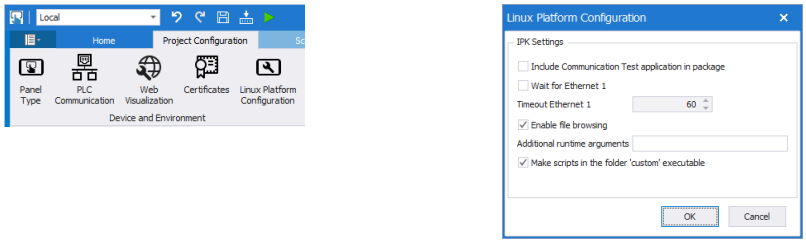


Abb. 3: Galileo, project configuration

▶ Enable the Make scripts in the folder 'custom' executable option.

All the scripts that will be run from Galileo must be found in the "custom" folder.
By default, the folder will be installed in the Galileo project folder on the PC with the Design Tool during installation.
After being downloaded to the device: /home/galileo/custom/

When run, the following script will copy the entire Galileo folder to a USB storage device and will write all operations to a log file on the USB storage device.

6. Shell scripts

```
#!/bin/bash
# Quell- und Zielverzeichnis definieren
source_dir="/home/galileo"
target_dir="/mnt/sdal/galileo/backup"
log_file="/mnt/sdal/logdatei.log"

# Überprüfen, ob das Quellverzeichnis existiert
if [ ! -d "$source_dir" ]; then
    echo "Das Quellverzeichnis existiert nicht: $source_dir" | tee -a "$log_file"
exit 1
fi

# Überprüfen, ob das Zielverzeichnis existiert, ansonsten erstellen
if [ ! -d "$target_dir" ]; then
    mkdir -p "$target_dir"
    if [ $? -ne 0 ]; then
        echo "Fehler beim Erstellen des Zielverzeichnisses: $target_dir" | tee -a "$log_file"
        exit 1
    fi
fi

# Kopieren der Dateien und Umleiten der Fehler in die Log-Datei
cp -r "$source_dir"/* "$target_dir" 2>> "$log_file"

# Überprüfen, ob der Kopiervorgang erfolgreich war
if [ $? -eq 0 ]; then
    echo "Dateien wurden erfolgreich kopiert." | tee -a "$log_file"
else
    echo "Es gab Fehler beim Kopieren der Dateien. Siehe Log-Datei für Details." | tee -a "$log_file"
fi
```

Abb. 4: Script

In order to be able to run the script. all line breaks must be of type LF exclusively.
Enable hidden characters in the editor of your choice in order to be able to check this..

In order to be able to run the script, it must first be stored in the */home/galileo/custom* path on the device.
This will happen automatically in the case of downloads – alternatively, the script can be manually copied and pasted from a USB storage device with the file browser.

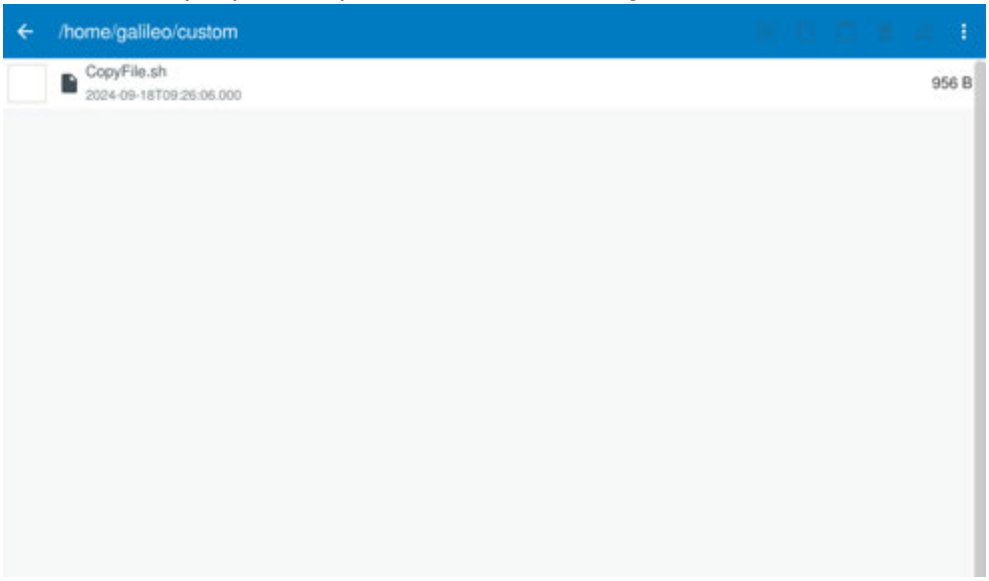


Abb. 5: Script on the device

The Galileo project has various options for running a shell script. These options are described in the Galileo user help.

Example 2

Say that you want to save a backup of the entire Galileo project to the USB storage device once a day.

The call will be triggered with a script and Event Manager. The script will use the execute command to call the shell script.

BackupData *

```
1   System.Execute("/home/galileo/custom/CopyFile.sh");
```

The script will be run once a day in Event Manager.

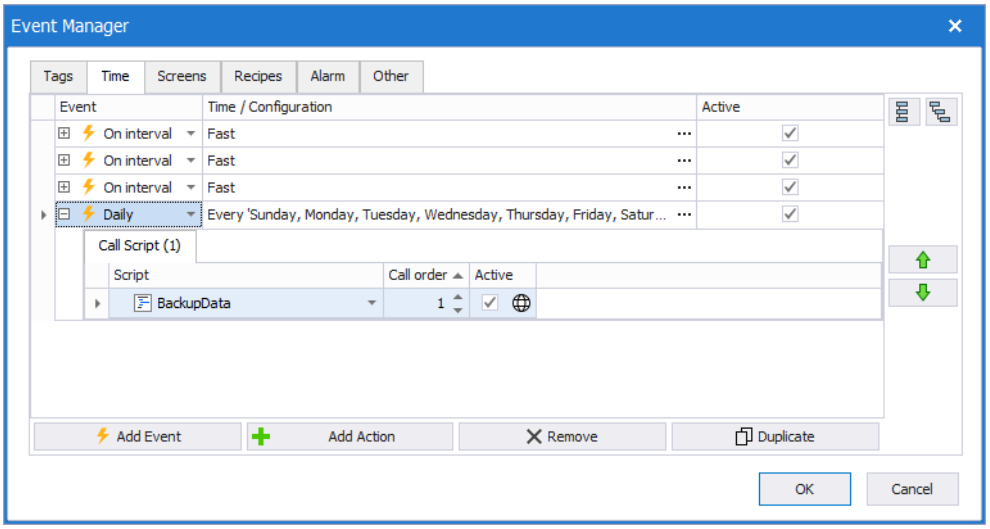


Abb. 6: Galileo project, Event Manager

6. Shell scripts

Appendix

Alphabetical index

P

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T

U

V

W

List of Figures

Glossary

Client
The term "client" refers to an application that requests specific services from a server.

Menu bar Menu bar
Menu ribbon that can be expanded and collapsed and that provides the various available commands

*****

***.bmp**
Pixel-based file format for two-dimensional raster graphics

***.csv**
Comma-Separated Values (Character-Separated Values) Data format for text

***.DLL**
Dynamic link library

***.itf**
Internal Tag Import Format

***.jpg**
Pixel-based file format for the JPEG (Joint Photographics Expert Group) image file format
The JPEG format does not support transparency

***.png**
PNG (Portable Network Graphics) image file format for graphics and video software, The PNG file format supports transparency with its alpha channel

***.prg**
The program created with easySoft is compiled together with the project information and stored on the microSD card as a PRG file.

***.tiff**
Vector-based image file format for graphics and video software, The TIFF format supports transparency, as well as images using 8-bit channels (grayscale, RGB, CMYK, etc.)

***.uf7**
User function block file format

***.zip**
ZIP file format used to compress and archive files

A

Address reference
The term "address reference" refers to the data packet's start address.

Alpha channel
Transparency information for PNG images
Used to specify the degree of transparency for each pixel

API
Application Programming Interface

Application
Short for "application software," a computer program that performs a function useful to the user.

B

Bitmap
Image file in the BMP raster graphics image file format.

Boot
Booting up, starting (up) - automatic process that takes place after the device is switched on, and in which a simple program in ROM memory starts a more complex program.

C

CBA
Communication Board Adapter

CIS
Card Information Structure

Command sequence
Path information List of the commands that the device operator must tap in succession in order to get to the location described; for example: Start\Project Overview\Variables folder.

Communication
The transfer of data between the panel and the PLC, controller, or peripheral connected to it.

D

DHCP (used to obtain an IP address automatically)
You can enable this setting if you do not want to configure every single individual computer within a network, provided there is a DHCP server on the network. When this setting is enabled, the computer will get information such as an IP address, subnet mask, gateway, and DNS from the DHCP server. In most cases, the router used on a network will also feature a DHCP server.

DNS (Domain Name Server)
When you enter an address such as www.intel.com into a browser or FTP client, your computer will first need to ask a server for the IP address behind the name in order to actually be able to reach the address. The server that provides this information is known as a "domain name server." Every single Internet provider provides this service,and most providers have a secondary DNS in case their primary DNS fails. DNS records are the IP addresses for these servers.

DST
Daylight Saving Time

F

FAT
File Allocation Table

File Allocation Table
FATs are used to define filesystems.

Firewall
Firewalls are used to prevent outside attempts to access IP addresses on a private network. In other words, they are used to protect internal data. When configured correctly, they can also be used to set up rules or lists that prevent specific URLs from being requested, e.g., when they are in violation of company policy. A firewall's main task is to use the information in a packet (the source and destination IP addresses, as well as the port) to decide whether the packet should be rejected or allowed to pass. This also prevents packets not meant for the network from subjecting the network to an unnecessary load, as well as packets meant for the private network from reaching the Internet.

FTP
File Transfer Protocol

G

Gateway
Gateway When two computers on different networks want to communicate with each other, the networks need to be connected with a router. For example, surfing on the Internet requires for packets to be routed from the Internet to the network and vice versa. By using a subnet mask, a computer can know whether the receiver can be found on its network or whether it is located outside of it. If it is located outside the network, the computer

will send a packet to the router specified with the gateway IP address.

H

Human-machine interface
Human Machine Interface

I

IL
Installation instructions

IoT
Internet of Things

IP Address
IP addresses are 32 bits (4 bytes) long and are used to uniquely identify networks, subnetworks, and individual computers that work with the TCP/IP protocol. A distinction is drawn between private address spaces for local networks (intranet) and public addresses (Internet).

L

LAN
Local Area Network

Lean Automation
Eaton uses this concept "" to provide users in the machine building and plant engineering industries with unparalleled freedom so that they can design creative and profitable solutions.

Lean Solution
Lean automation strategy in which the I/O level is integrated directly into switchgear.

LSB
Last Significant Bit

M

MDI
Multi Document Interface

MN
Manual - Operation manual

O

Object
Static or dynamic element used for engineering purposes. Static objects are located in the view's background and do not change at runtime. In contrast, dynamic objects are located in the view's foreground, and their appearance can change as a result of data changes.

Operating system
A group of programs that control and manage the processes in a computer and its connected devices.

P

PCMCIA
Personal Computer Memory Card International Association (PCMCIA)

Peer to Peer (P2P)
Peer-to-peer is a term used for computers that are connected to each other in an architecture in which both computers can assume the role of server and client.

PELV (protective extra low voltage)
Protective low voltage that provides protection against electric shock. It refers to how machines are electrically installed – one side of the circuit or a point on the PELV circuit's power source needs to be connected to the protective bonding circuit.

Personal computer

A personal computer is made up of a central processing unit, RAM, external data storage devices, an operating system, and application programs, and is connected to peripheral devices (monitor, printer). PCs can be stationary or portable.

PIN

Personal Identification Number

PLC

Programmable logic controller The controller or peripheral that is connected to the HMI.

PLC(S)

Programmable logic controller The controller or peripheral that is connected to the HMI.

Polling

Cyclical reading of the PLC's addressed variables

Port

Ports can be seen as virtual mailboxes for data packets. A computer can communicate with other computers on 65536 different ports.

Projected capacitive touch

A display designed for high precision, user friendliness, and durability. It is designed to bring the controls that have now become prevalent in consumer electronics to machines, with advantages such as a gesture-based user interface, two-finger multi-touch depending on the application software being used, intuitive operation that enables operators to start working right away, and the fact that no calibration is required

R

Retention

Refers to the ability of operands to retain their value (memory contents) in the event of a loss of voltage

ROM (read-only memory)

Non-volatile read-only memory

Router

Routers are devices used to forward ("route") requests from a network to the Internet (or to another network). Routers provide a measure of security for private networks, as nodes outside of the network will be unable to determine which specific computer requested the data. This is because all the computers on the private network will appear under the same IP address on the Internet.

RTC

Real Time Clock

RxD

Receive cable for received data

S

SD card

Secure Digital memory cards are non-volatile, rewritable flash data storage devices that are used with Eaton and are commonly referred to as microSD cards. Data written to these cards is stored in a non-volatile manner that does not require any additional (secondary) power.

SELV (safety extra low voltage)

Circuit in which no dangerous voltage occurs even in the event of a single fault.

Server:

The term "server" is usually used to refer to computers that provide services on a network. Admittedly, however, this definition is not very precise. More specifically, servers are applications on a computer that are responsible for providing or processing data. In fact, every computer can provide such services. Servers are not active in and of themselves. They wait until they are addressed by a client, after which they perform the corresponding tasks.

Each server application provides its service on the network via a specific port.

Slot

Refers to a slot for a memory card

SNTP

Simple Network Time Protocol

SSL/TLS

Secure Sockets Layer/ Transport Layer Security

Stroke

A hub is a device used to connect various network devices together. Hubs broadcast all data to all connected devices (devices connected with a patch cable).

Subnet mask

A subnet mask is an IP address "filter." It has the same syntax as an IP address. This mask defines which computers can transfer data between themselves within a network. This also means that subnet masks define the maximum size of the corresponding subnetworks.

SWD

Abbreviation or SmartWire-DT

Switch

Switches are networking devices that are more advanced than hubs. One of the main features that sets them apart from the latter is the fact that they are more "intelligent" and forward data packets much more efficiently by sending them only to the devices that need to receive them. Multiple data packets can pass through a switch at the same time. Among other things, this means that switches have a significantly higher total bandwidth (throughput) than hubs. Moreover, switches learn which stations are connected to which ports, meaning that additional data transfers will not result in any ports being subjected to unnecessary loads, i.e., that data will only be forwarded to the port connected to the intended destination. With the exception of their higher price, switches are superior to hubs in every way.

System character set

Font type and size used to output system messages.

T

Tabs

Subpages in a dialog box or object

Toolbar

The toolbar provides all important functions so that they can be accessed directly. All the buttons in a toolbar can also be found as menu options in the menu.

Transfer parameters

Baud rate, data bit, start bit, stop bit, and parity

TxD

Transmit cable for transmitted data

U

URL

Uniform Resource Locator

User

Operator using the device on which the user interface created with Galileo is running.

UTC

Universal Time Coordinated

W

widescreen

Widescreen format

Windows

Dialog boxes, prompts, etc. that open while the application is running and remain on the

current program page Synonyms: dialogue box, dialog These windows are shown by the application in various situations in order to obtain specific input or confirmations from the user. Dialog boxes expect input from the user, while prompts are shown to get the user's confirmation for specific messages.

WINS

Windows Internet Name Service, Name resolution service within Microsoft networks. In order for this service to be used, there must be a WINS server. If there is no WINS server, names will be resolved using broadcasts and other mechanisms. A fixed name can be assigned to an IP address in WINS so that a computer will continue to be recognized even if its IP address changes.

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to help our customers manage power – today and well into the future.
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