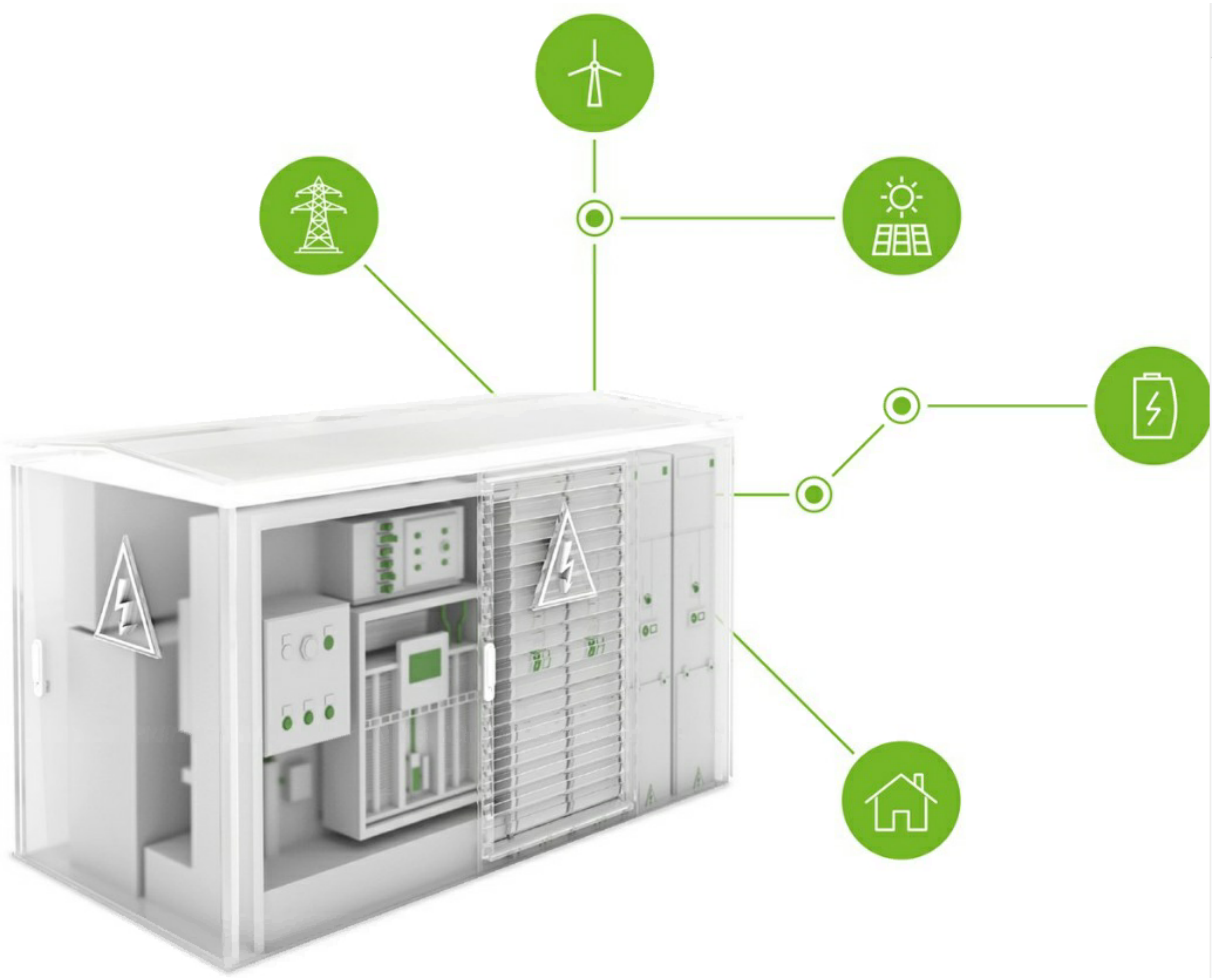
TECHDOCS

WAGO Application
Grid Gateway Operator

E.ON digiONS



Product manual
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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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Table of Contents

1 Provisions

1.1 Typographical Conventions

Number Notation

100	Decimals: Normal notation
0x64	Hexadecimals: C-notation
'100'	Binary: In single quotation marks
'0110.0100'	Nibbles separated by a period

Text Markups

italic	Names of paths or files
bold	Menu items, entry or selection fields, emphasis
`Code`	Excerpts from program code
>	Selection of a menu point from a menu
"Value"	Value entries
[F5]	Identification of buttons or keys

Links

	Link to a topic in a document
	Link to a separate document
	Link to a website
	Link to an email address
Glossary	Link to a glossary entry

Sequence of Action

✓ This symbol identifies a precondition.

1. Action step
2. Action step

   ⇨ This symbol identifies an intermediate result.

➡ This symbol identifies the result of an action.

- Individual action step

Lists

- Lists, first level
  - Lists, second level

Figures

Figures in this documentation are for better understanding and may differ from the actual product design.

Warning Messages

⚠ DANGER

Type and source of hazard

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

- Action step to reduce risk

⚠ WARNING

Type and source of hazard

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

- Action step to reduce risk

⚠ CAUTION

Type and source of hazard

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

- Action step to reduce risk

NOTICE

Type and source of malfunction (property damage only)

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

- Action step to reduce risk

Information Notices

Note

Information

Indicates information, clarifications, recommendations, referrals, etc.

1.2 Legal Information

Subject to Change

The instructions, guidelines, standards, etc., in this manual correspond to state of the art at the time the documentation was created and are not subject to updating service. The installer and operator bear sole responsibility to ensure they are complied with in their currently applicable form. WAGO GmbH & Co. KG retains the right to carry out technical changes

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Licenses

The software and related components are protected by license mechanisms. A license key is required for productive use of the software without time restriction. The software can also be used fully without a license key for 30 days. This trial period only includes the days of actual use. Access without a license key is no longer possible after the trial period. Depending on the type of software license, an Internet connection may be required to activate the license. Please refer to your license certificate for the corresponding information.

Depending on the functionality required, one or more licenses are required (see also Sprungziel: Kopiervorlage). The purchased license keys will be sent to you by email after your order. You need the WAGOupload software in order to load the purchased licenses.

General information on the terms of use of WAGO software can be found in the WAGO software license agreement at General Terms and Conditions: **https://www.wago.com/de/d/softwarelicence**

2 Security

2.1 General Safety Regulations

- This documentation is part of the software. Therefore, keep the documentation for the entire service life of the software. Pass on the documentation to the next user of the software. In addition, ensure that any supplement to this documentation is included, if necessary.
- Any actions related to the use of WAGO software may only be performed by qualified staff with sufficient knowledge to use the respective PC system.
  Steps in which files are created or changed on a PC system may only be performed by qualified employees with sufficient knowledge in the administration of the PC system used in addition to file creation or modification.
  Steps that change the PC system's behavior within a network may only be performed by qualified employees with sufficient knowledge of administration of the responsible network.
- Set up permissions management for authorized persons.
  – Digital access may only be made by authorized persons.
- Comply with the laws, standards, guidelines, local regulations and accepted technology standards and practices applicable at the time of installation.

2.2 Indirect Safety

- If automation solutions are implemented that can lead to personal injury or significant property damage in the event of failure, you must take appropriate measures to ensure that the system remains in a safe operating state even in the event of failure.
- Give all products in a network different IP addresses.
- Never connect a PC on which a DHCP server is installed to a global network. Larger networks usually already have a DHCP server, which can cause collisions that lead to network breakdown.
- Use only the latest security software.
- Uninstall or disable all software components or programs on your PC that are not required for the intended use.
- If problems occur with access to connected devices, check whether the required runtime system is enabled. For programs developed with ***e!****COCKPIT*, ***e!****RUNTIME* must be selected as the runtime system. For programs developed with CODESYS 3.5, CODESYS V3 must be selected as the runtime system. Use a software tool (which depends on the hardware) to perform the check or use the Web-Based Management system.

3 Function Description

The WAGO Application Grid Gateway Operator loads station-specific settings from the settings file on the controller. These settings are not part of the base configuration (Typical file). The user can change these settings and save them back to the controller. The application then saves the updated configuration as a new settings file.

3.1 Supported Products

Table 1: Supported Products

Category	Item No.	Description
Controllers	750-8210*	Controller PFC200; 2nd Generation; 4 x ETHERNET
	750-8210/025-000*	Controller PFC200; 2nd Generation; 4 x ETHERNET; Ext. Temperature
	750-8210/040-000*	Controller PFC200; 2nd Generation; 4 x ETHERNET; Extreme
	750-8212*	Controller PFC200; 2nd Generation; 2 x ETHERNET, RS-232/-485
	750-8212/025-000	Controller PFC200; 2nd Generation; 2 x ETHERNET, RS-232/-485; Ext. Temperature
	750-8212/040-000	Controller PFC200; 2nd Generation; 2 x ETHERNET, RS-232/-485; Extreme
	750-8212/025-001	Controller PFC200; 2nd Generation; 2 x ETHERNET, RS-232/-485; Telecontrol technology; Ext. Temperature
	750-8212/025-002	Controller PFC200; 2nd Generation; 2 x ETHERNET, RS-232/-485; Telecontrol technology; Ext. Temperature; ECO
	750-8212/040-001	Controller PFC200; 2nd Generation; 2 x ETHERNET, RS-232/-485; Telecontrol technology; Extreme
	750-8302	Controller PFC300; 2 x ETHERNET, RS-485
	751-9401	Compact Controller 100; 8DI 4DO 2AI 2AO 2NI1K/PT1K 1RS485; 2 x ETHERNET, CAN, CANopen; SD
	751-9402	Compact Controller 100; 8DI 8DIO 2AI 2AIO 2NI/PT 2RS485; 2 x ETHERNET; SD
	752-8303/8000-002	Edge Controller; 2 x ETHERNET, 2 x USB, 1 x USB-C, HDMI, CAN, DI/DO, RS-232/485, Audio; Control
Serial Interfaces	750-650	RS-232 C Serial Interface; 9600 baud; None; 8/1 bits
	750-652	RS-232/485 Serial Interface
	750-1652	RS-232/485 Serial Interface
	750-653	RS-485 Serial Interface; 9600 baud; None; 8/1 bits
SD Memory Card	758-879/000-001	2 GB SD memory card
	758-879/000-2108	8 GB SD memory card
Software License	2759-0290/****-****	RUNTIME IEC60870 slave single license
Digital Input Modules	All digital input and output modules are supported.	
Digital Output Modules		
Power Measurement Modules	750-494	3-Phase Power Measurement Module; 480 VAC/1 A
	750-494/000-001	3-Phase Power Measurement Module; 480 VAC/5 A
	750-494/025-001	3-Phase Power Measurement Module; 480 VAC/5 A
	795-495	3-Phase Power Measurement Module; 690 VAC/1 A

Category	Item No.	Description
	750-495/040-000	3-Phase Power Measurement Module; 690 VAC / 1 A / XTR
	750-495/000-001	3-Phase Power Measurement Module; 690 VAC/Rogowski Coils
	750-495/000-002	3-Phase Power Measurement Module; 690 VAC/5 A
	750-495/040-001	3-Phase Power Measurement Module; 690 VAC / 5 A / XTR
	750-495/040-002	3-Phase Power Measurement Module; 690 VAC / Rogowski coil / XTR
	750-495/040-010	3-Phase Power Measurement Module; 20 kVAC; 300 A; extreme
RTD/PT100 Modules	All temperature input modules from WAGO are supported.	
Analog Input Modules	All analog input and output modules from WAGO are supported.	
Analog Output Modules		
End Modules	750-600	End module
	750-600/040-000	End module XTR

* These devices require both a Grid Gateway license and an IEC-60870 license.

3.2 Supported Browser

The following browsers have been successfully tested with the application:

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Apple Safari

ⓘ Note

More Browsers

The use of other browsers is possible. Functional restrictions cannot be ruled out in this case.

3.3 System Limits

The system is basically designed for operation with up to 32 local bus modules. The actual number and the permissible module configuration depend on the application and operating conditions and must be checked on a project-specific basis.

Table 2: Modbus Subscribers

	Number of Data Points (Max.)	Number of Devices (Max.)
Modbus® subscribers, generic devices	10000 (independent of function code)	50
Modbus® servers		4
Number of devices per onboard serial interface	/	5

ⓘ Note

5000 data points can be configured via the IEC 60870 telecontrol protocol

The 5000 data point limit applies to IEC servers and clients together. However, it is also possible to use all 5000 data points for the server.

Table 3: IEC 60870 Protocol

	Number of Data Points (Max.)	Number of Devices (Max.)
IEC 60870 Server		3
IEC 60870 devices/substations		5
Messages/commands (IEC 60870 servers and devices together; number available per device)	5000	

Table 4: Sparkplug

	Number of Devices (Max.)	Number of Metrics per Device (Max.)
Sparkplug	30	50

4 Installation

4.1 Installation

1. Open the **Solutions** page in the WAGO Download Center:
   https://downloadcenter.wago.com/solution
2. Download your software package as a zip archive.

Note

Your software package may not be available!

Customer-specific solutions may not be available from the Download Center. If they are not, contact your WAGO representative.

Note

The existing settings are retained!

The configuration parameters as well as the user administration and WBM settings are cached during installation and are retained after the update.

Note

You need the WAGOupload software!

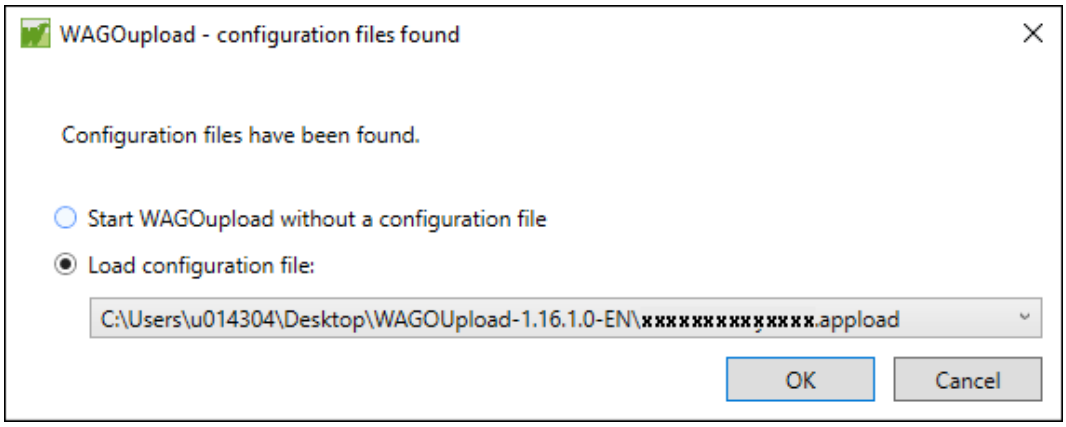
The following steps require you to have downloaded the current version of the "WAGOupload" software. The software is available at www.wago.com for download free of charge.

Note

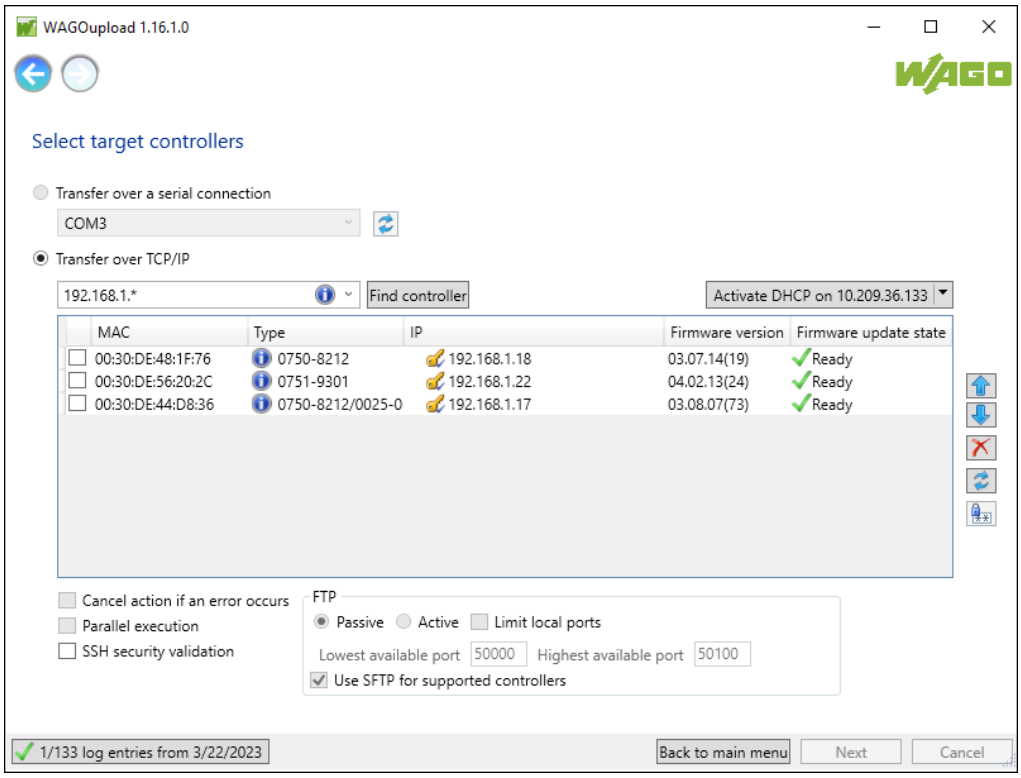
Transfer tutorial for applications using WAGOupload!

You can find the tutorial "WAGOupload – Transfer Applications" on YouTube. This video shows how to use the WAGOupload software to transfer applications to one or more devices.

1. Launch the "WAGOupload" software.
2. Select the menu item "Install an CODESYS or ***e!****RUNTIME* Application".
   Note: If the WAGOupload execution file ".exe" is in the same directory as the installation file ".appload", WAGOupload starts in a simplified view. Step 3 and 4 are skipped.



3. If necessary, select the folder for your specific controller.
4. Select the installation file with the .appload extension and click on **[Next]**.
   Note: For later updates, an installation file with the file format "upd.appload" can be available here.
5. In the dialog, enter the IP address of your controller or launch the search function. The identified devices are listed.



Note: The target controllers must have an IP address to allow installation via WAGOupload!

6. Select the controller where the application should be installed and click **[Next]**.
   Note: Make sure that the SSH security check is disabled!

➡ A summary of the settings previously made is displayed. You can then start the installation by clicking **[Next]**.

Note

Keep the root password available!

You may be prompted to enter the secure password as user "root" at the beginning or during the installation process.

4.1.1 Controller Start-Up

During the controller start-up phase, the vertical LED bar indicates the current status and the progress of the individual phases from bottom (0 %) to top (100 %). There are the following phases:

Phase	LED color	Description
1	Red	Starting the application with self-tests.
2	Orange	Reading in the configuration file. Progress depends on the file size.
3	Green	Translates the read configuration file into the individual software components, such as Modbus devices or 60870 data points. Progress is an approximate indication of how many of the software components are ready. The last LED "waits" for the last component, so to speak. If all LEDs light up green, all software components are ready and the configuration is applied.

Note

The number of LEDs depends on the controller!

The total number of LEDs available for displaying the start-up depends on the controller type.

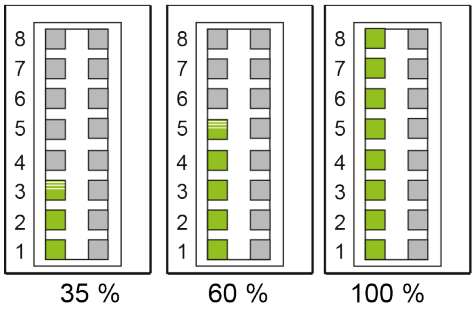


Figure 1: LED progress indicator on example of phase 3

Progress bar sequence (LEDs 1-6)

1. **Ongoing operation**: The LEDs fill up one after the other from bottom to top. The top active LED flashes to indicate the current activity in the current phase.
2. **Progress**: The flashing LED gradually switches to the next higher LED. The underlying LEDs light up continuously.
3. **Termination**: All 6 LEDs light up continuously for one second (no more flashing). The read configuration is then applied to the LEDs.

5 WAGO Application Grid Gateway Operator

5.1 User Interface

5.1.1 Logging On as a User

After you open the application, or when you have logged out, you must log in with your user data.

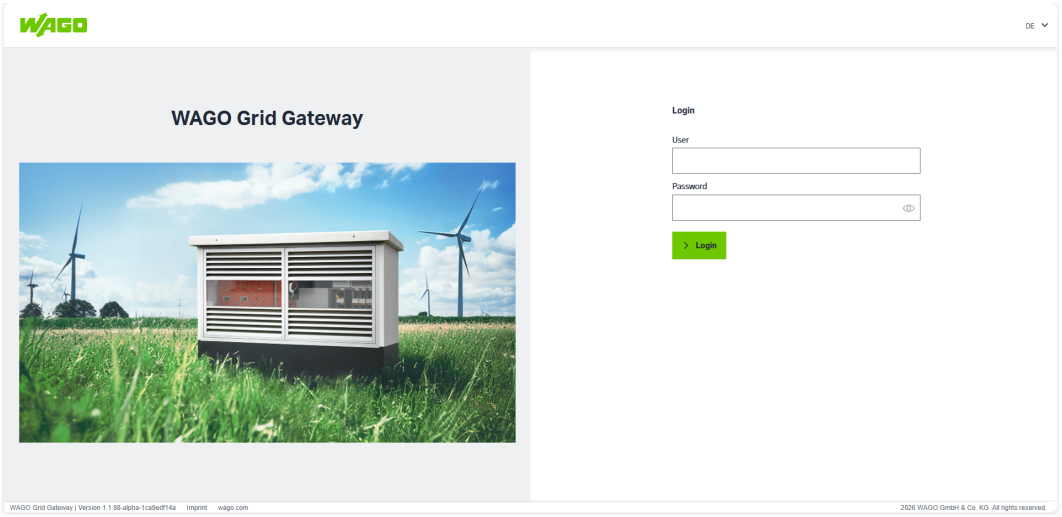


Figure 2: Login

Table 5: Roles and Rights

Role	Rights
admin	▪ Read ▪ Write ▪ Save configuration, upload and download ▪ Reboot system ▪ Edit LDAP settings (admin-role users only)
maintainer	
observer	▪ Read

5.1.2 Header and General Buttons

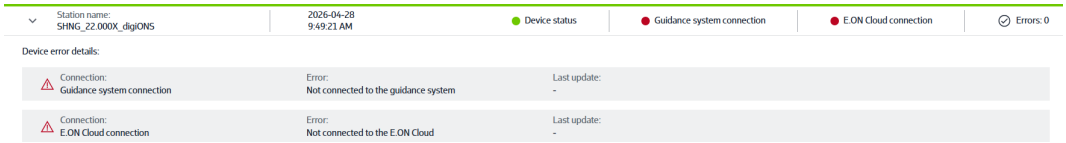


Figure 3: Header

Name	Description
Station name	The displayed station name is defined in the file *application-settings.json*.
Date/time	Current date and device time. **Note: If the time changes, the connection is active.**
Device status	**Green**: Device is connected **Red**: Device is not connected
Guidance system connection	**Green**: Connection to the control system/to the cloud is active **Red**: Connection to the control system/to the cloud is not active
Cloud connection	
Error messages	This displays the number of error messages from the connected devices. Clicking the checkmark on the left displays the errors in detail.

General Buttons and Symbols

Icon / Buttons	Description
[Download]	Downloads the configuration as a JSON file from the controller to a local device.
[Upload]	Uploads the configuration as a JSON file from the local device to the controller.
[Send to device]	Sends inputs for the **settings [▸ 19]** to the controller.
	Edit
	Undoes inputs in the **settings [▸ 19]**.

5.1.3 Dashboard

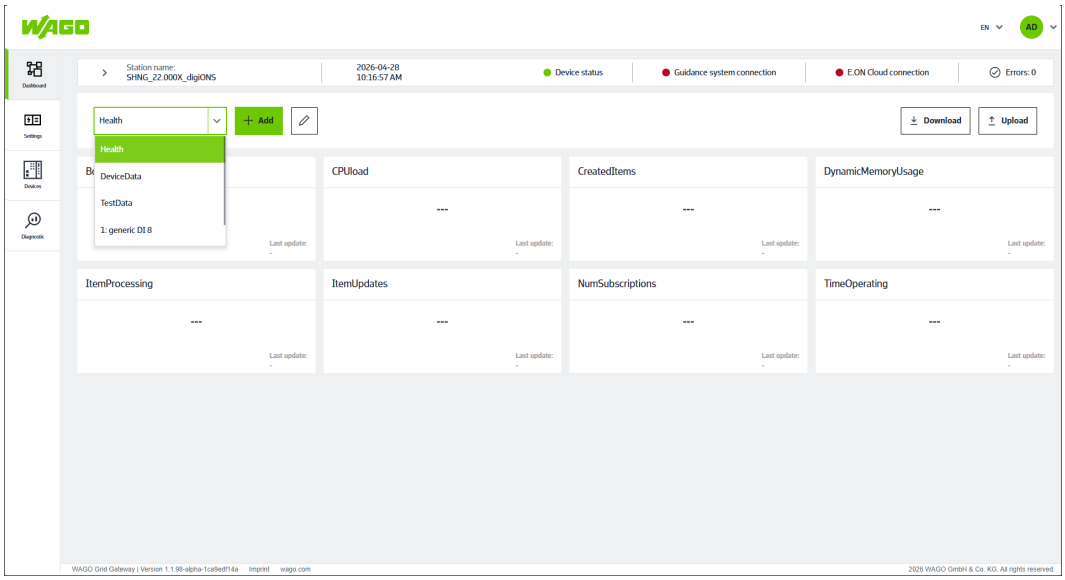


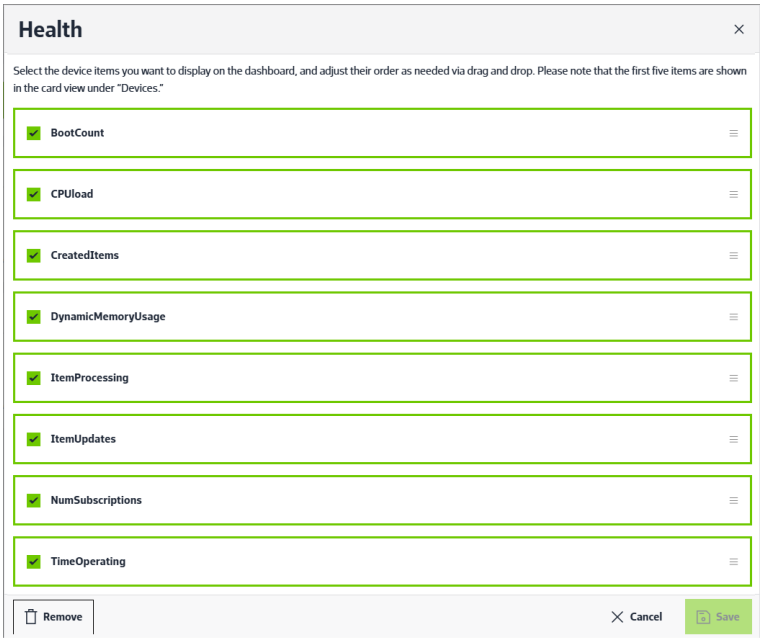
Figure 4: Dashboard

The **Dashboard** menu can be individually configured by the user so that relevant values from the Item Hub are displayed. Depending on the station configuration, connected devices are listed in the selection field.

By default, the system provides the following information for selection:

- **Health [▸ 18]** (performance data, system status)
- **DeviceData [▸ 18]** (device data)

Button / Icon	Description
[+ Add]	Opens a dialog to add more connected devices. 

Button / Icon	Description
	Opens the following dialog. Selecting and deselecting items is done via the check-boxes. **[Remove]**: Deletes the entire device from the dashboard. **[Save]**: Saves the settings for the device. 

5.1.3.1 Health

Name	Description
BootCount	Number of restarts
CPUload	Controller CPU usage
CreatedItems	Number of created data points
DynamicMemoryUsage	Dynamic memory size
ItemProcessing	Number of data point processings
ItemUpdates	Number of data point updates
NumSubscriptions	Number of subscribed data points
TimeOperating	Duration the application has been in operation.

5.1.3.2 DeviceData

Name	Description
Product ID	Item number of the controller
Firmware Version	Firmware version of the controller
Application Version	Application version
BuildDate	Application creation date
IPaddresses	IP address of controller
HWaddresses	MAC address

5.1.4 Settings

5.1.4.1 Device

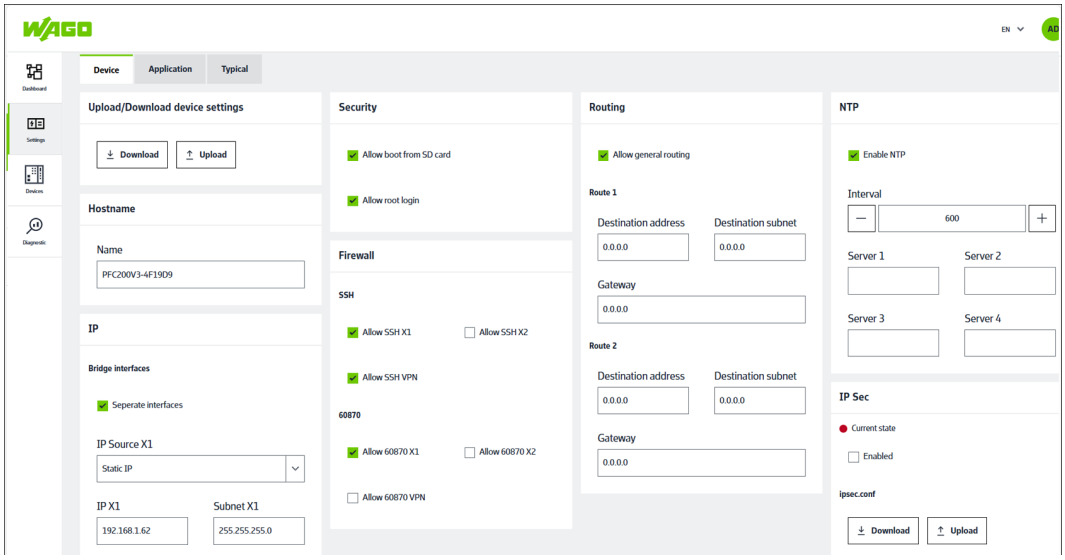
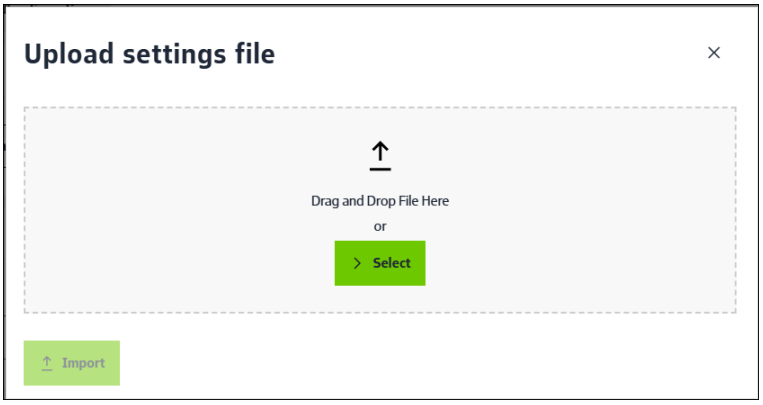


Figure 5: Settings - Device

Upload/Download Device Settings

Buttons	Description
[Upload]	Clicking the button loads a device configuration file into the application. **Note: If a configuration file has been loaded, the settings will be applied to the fields described below!**  **[Import]**: Clicking the button imports the selected file into the application and applies the settings.
[Download]	Clicking the button uploads the current configuration as a JSON file to the controller.

IP

Name	Description
Bridge interfaces	
Separate interfaces	By enabling the checkbox, the X1 and X2 interfaces on the controller can be separated from each other. When the checkbox is enabled, the corresponding settings can be entered for both interfaces.

Name	Description
IP configuration X1/X2	Here you can select the network settings for the X1 interface on the controller. ▪ Static IP ▪ DHCP ▪ External ▪ BootP
IP X1/X2	Enter the IP address of the X1 interface here.
Subnet X1/X2	Enter the address space for the subnet of the X1 interface here.
DNS server	
DNS 1/2	IP address of the DNS server

Security

Name	Description
Allow boot from SD card	Because both system start from SD card and root logon pose a significant security risk, the checkboxes must be enabled by the user!
Allow root login	

Firewall

Name	Description
SSH	
Allow SSH X1/X2	The checkboxes allow enabling the secure network protocol SSH (Secure Shell).
Allow SSH VPN	
60870	
Allow 60870 X1/X2	The checkboxes allow enabling the IEC-60870 telecontrol protocol for the respective interface.
Allow 60870 VPN	
Modbus	
Allow Modbus TCP X2	The checkbox can be used to enable the Modbus protocol for the X2 interface.

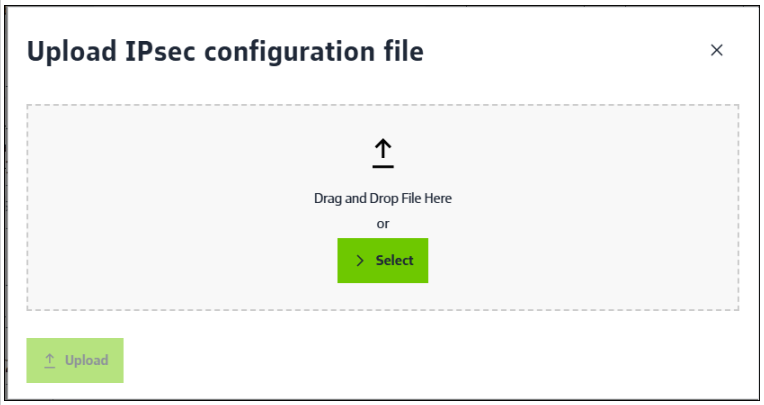
Routing

Name	Description
Allow general routing	The checkbox can be used to enable general routing, where the router determines the best possible path to a destination.
Route 1 / Route 2	
Destination address	IP address of the device on the network defined as the destination.
Destination subnet	Subnet address for forwarding the data packet to a logical network segment.
Gateway	IP address of the router

NTP

Name	Description
Enable NTP	The checkbox can be used to enable the Network Time Protocol (NTP) to synchronize the controller time with Coordinated Universal Time (UTC).
Interval	Here you can enter the interval at which an NTP client sends a time request to a time server.
Server 1 - 4	IP addresses of the servers that send a synchronized time to the controller via NTP.

IP Sec

Buttons	Description
Current state	**Red**: **Green**:
ipsec.conf	
[Upload]	Clicking the button uploads an IPsec configuration file (cfg) to set up an IPsec connection. 
[Download]	Clicking the button loads the current IPsec configuration file (cfg) onto the controller.
ipsec.secrets	
[Upload]	Use the button to upload a configuration file with authentication data (pre-shared keys, RSA private keys, passwords).

5.1.4.2 Application

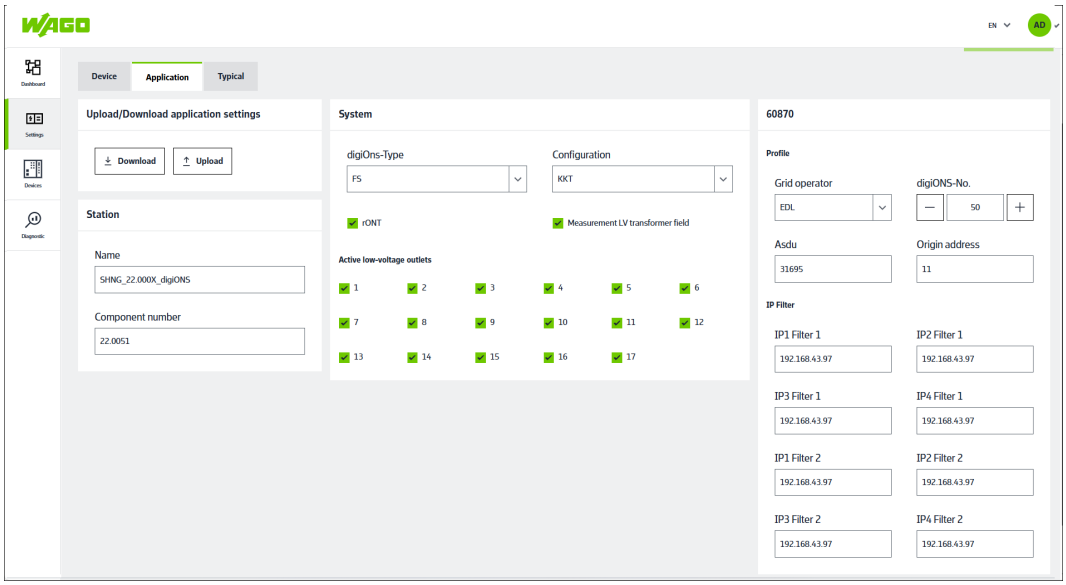
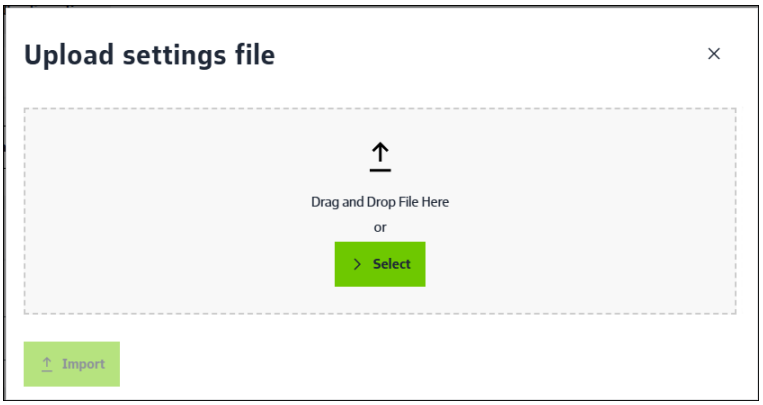


Figure 6: Settings - Application

Upload/Download Application Settings

Buttons	Description
[Upload]	Clicking the button loads the application file ("Application-Settings file"). **Note: When an application file has been loaded, the settings are applied to the fields described below!**  **[Import]**: Clicking the button imports the selected file into the application and applies the settings.
[Download]	Clicking the button saves the current configuration locally as a backup file ("Application-Settings file").

Station

Name	Description
Name	The station name field is editable. The station name is displayed at the top of the header bar.
Component number	The field for the customer-specific identification number is editable.

System

Name	Description
digiONS Type	You can select the system type from the selection field: ▪ FS: digiONS with remote switching capability; the load-break switches of the fields can be operated remotely. ▪ NS: digiONS without remote switching capability; only short circuits are detected, and remote switching operations are not possible. ▪ LO: Without power measurement ▪ LM: With power measurement
Configuration	You can select the system configuration from the selection field. T = Transformer field C = Cable field (medium voltage) ▪ **KKT** ▪ **KKKT** ▪ **KKKKT** ▪ **KKTT**
VRDT (rONT)	Checking this box specifies that a voltage regulating distribution transformer is present.
Measurement LV transformer field	By checking the checkbox, you can set whether a multi-meter for LV measurement is available.
Active low-voltage outlets	Up to 17 low-voltage outlets can be enabled here. **Note: In the delivery state, all low-voltage outlets are disabled.**

60870

Name	Description
Profile	
Grid operator	The data profile of the respective network operator is loaded into this selection field. ▪ EDL - E.ON ▪ LVN - Lechwerke ▪ MN - Mitnetz Strom ▪ SYNA ▪ VSE - Vereinigte Saar Elektrizitätswerke ▪ WEN - Westnetz GmbH
digiONS number	If grid operator EDL is selected, a station number can be entered here; it is then used as the first digit for all unique object addresses (IOA) of the 60870 data points (IOA3).
ASDU	Here you can enter a station address to which telegrams can be sent.
Source address	Here you can enter the source address to identify a command / a query.
IP filter	
	By entering 4 IP addresses for each of the 2 IP filters, only data packets with the specified IP addresses can be permitted.

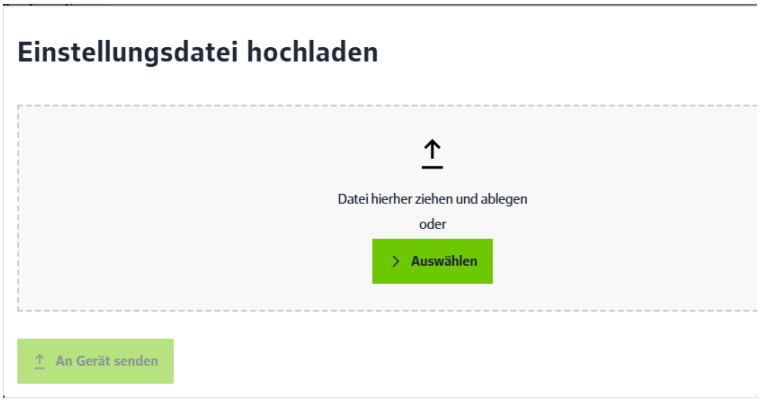
Note

Station Configuration

For commissioning with a backup file (“Typical”), each grid operator profile has a specific device configuration and IEC60870 data point addresses (IOA). These are set by the profile selection and the configuration information in the settings file (“config.txt”). Data points that have the IOA “0” or are “<empty>” in the configuration of the selected grid operator are disabled. The configuration can be modified at runtime. For example, if the station is smaller than planned, data points or devices that are assigned to a cable field that is not present are disabled. Conversely, if additional data points or devices are required, they are enabled according to the station configuration.

5.1.4.3 Basic Configuration

Upload/Download Basic Configuration

Buttons	Description
[Upload]	Clicking the button loads the application file ("Typical file"). **Note: When an application file has been loaded, the settings are applied to the fields described below!**  **[Send to device]**: Clicking the button sends the selected file to the controller.
[Download]	Clicking the button saves the current configuration locally as a backup file ("Typical file").

5.1.5 Devices

After selecting the appropriate category, the current measured values of the connected devices/modules are displayed here. Clicking the arrow icon > opens the **device detail page** **[▸ 25]** for each item.

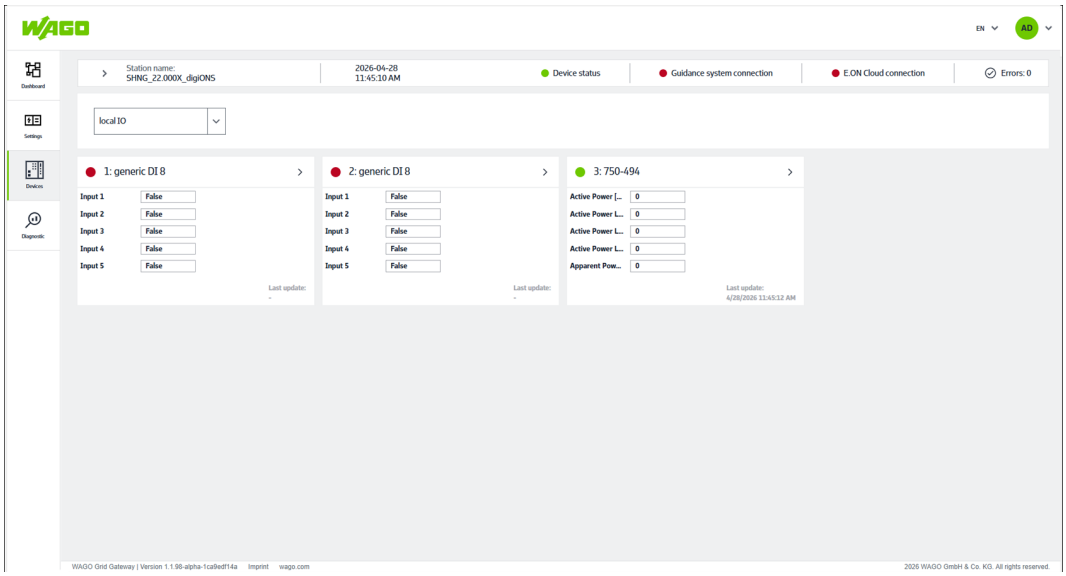


Figure 7: Device Overview

5.1.5.1 Device Details

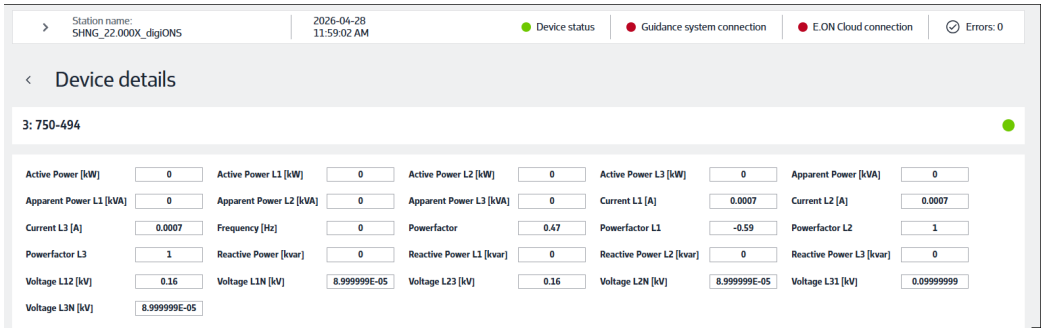


Figure 8: Device Details

5.1.6 Diagnostics

In the **Diagnostics** menu, the displayed tools are available to check functionality and interfaces.

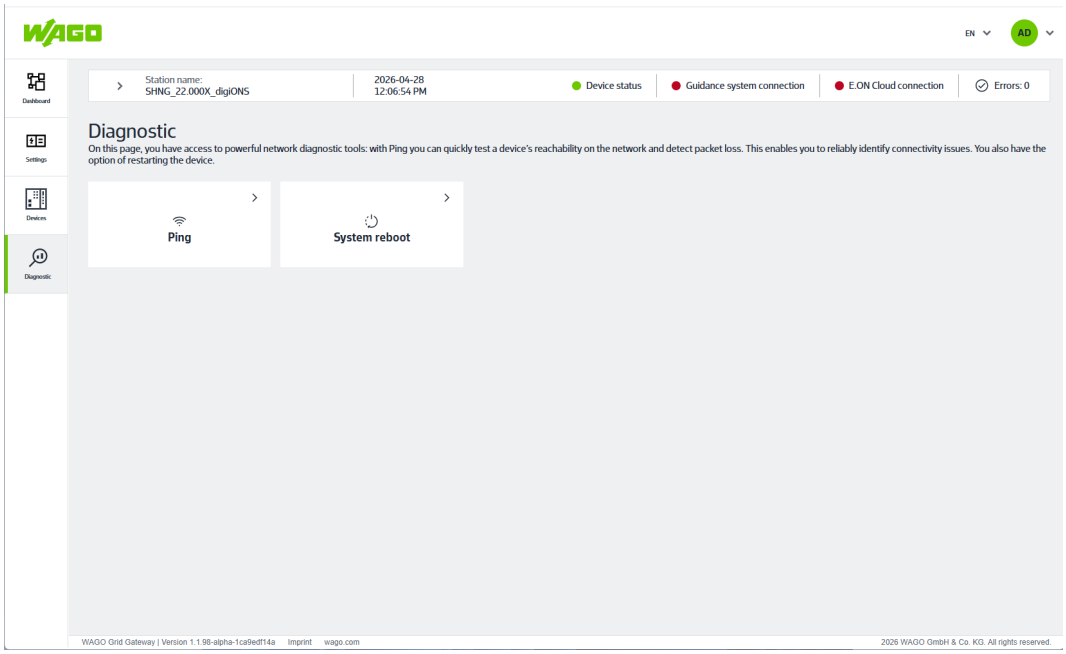
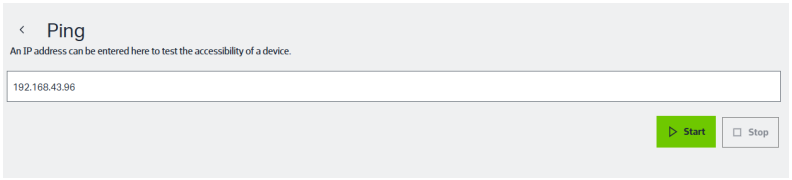
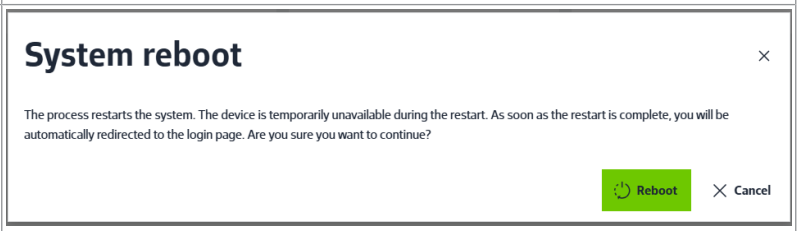


Figure 9: Diagnostics

Button	Description
Ping	 After pressing the **[Start]** button, the device status is displayed at intervals.
System reboot	 Pressing the **[Restart]** button initiates a system restart.

List of Figures

List of Tables

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