HIRSCHMANN

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Reference Manual

GUI Graphical User Interface
Rail Switch Power Lite (RSPL)

RM GUI RSPL
Release 2.0 02/2013

Technical Support
https://hirschmann-support.belden.eu.com

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Contents

About this Manual

The “GUI” reference manual contains detailed information on using the graphical interface to operate the individual functions of the device.

The “Command Line Interface” reference manual contains detailed information on using the Command Line Interface to operate the individual functions of the device.

The “Installation” user manual contains a device description, safety instructions, a description of the display, and the other information that you need to install the device.

The “Basic Configuration” user manual contains the information you need to start operating the device. It takes you step by step from the first startup operation through to the basic settings for operation in your environment.

The “Redundancy Configuration” user manual document contains the information you require to select the suitable redundancy procedure and configure it.

The “HiView” user manual contains information for using the HiView GUI application. This application allows you to use the graphical user interface of Hirschmann devices with management independently of other applications, such as a browser.

The Industrial HiVision Network Management Software provides you with additional options for smooth configuration and monitoring:

- Simultaneous configuration of multiple devices
- Graphical user interface with network layout
- Auto-topology discovery
- Event log
- Event handling
- Client/server structure
- Browser interface
- ActiveX control for SCADA integration
- SNMP/OPC gateway.

Key

The designations used in this manual have the following meanings:

▶	List
□	Work step
■	Subheading
Link	Cross-reference with link
Note:	A note emphasizes an important fact or draws your attention to a dependency.
`Courier`	ASCII representation in user interface

Graphical User Interface

■ System requirements

To open the graphical user interface, you need a Web browser, for example Mozilla Firefox version 3.5 or later, or Microsoft Internet Explorer version 6 or later.

■ Installation

Note: The graphical user interface uses Java 6 or Java 7.

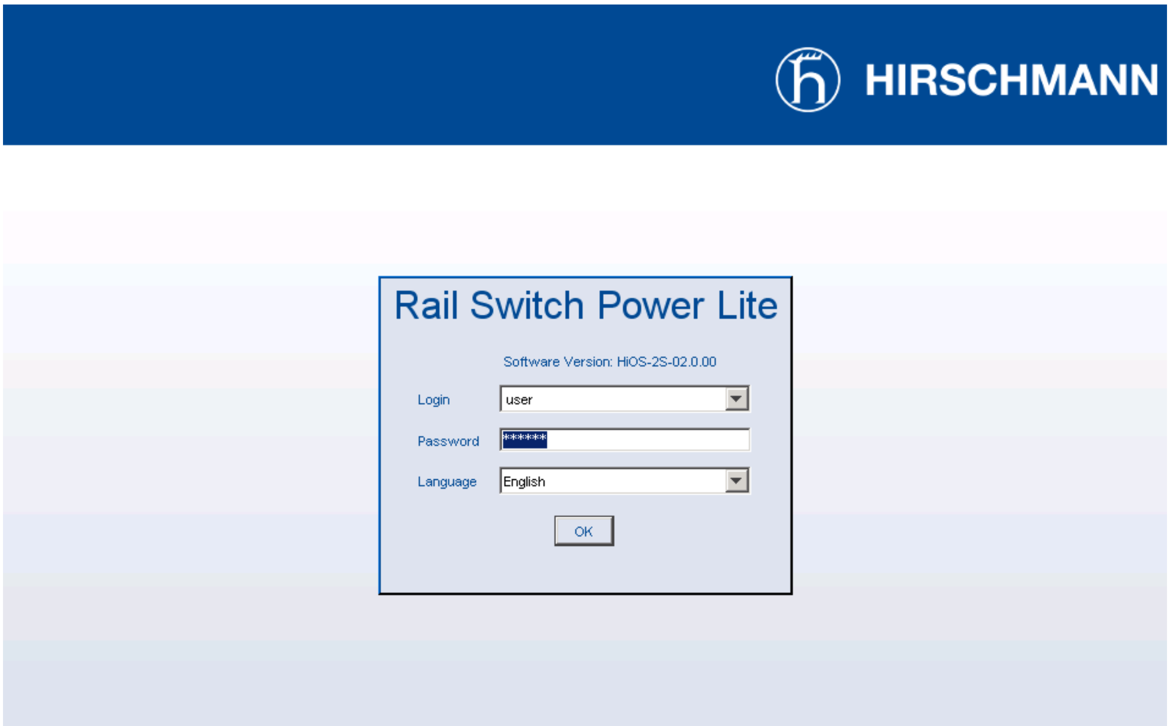
Install the software from the enclosed CD-ROM. To do this, you go to “Additional Software”, select `Java Runtime Environment` and click on “Installation”.

Starting the graphical user interface

The prerequisite for starting the graphical user interface, first configure the IP parameters of the device correctly. The “Basic Configuration” user manual contains detailed information that you need to define the IP parameters.

□ Start your Web browser.
□ Activate Java in the security settings of your Web browser.
□ Write the IP address of the device in the address field of the Web browser. Use the following form: `https://xxx.xxx.xxx.xxx`

The Web browser sets up the connection to the device and shows the login window.



Rail Switch Power Lite

Software Version: HiOS-2S-02.0.00

Login: user

Password: ******

Language: English

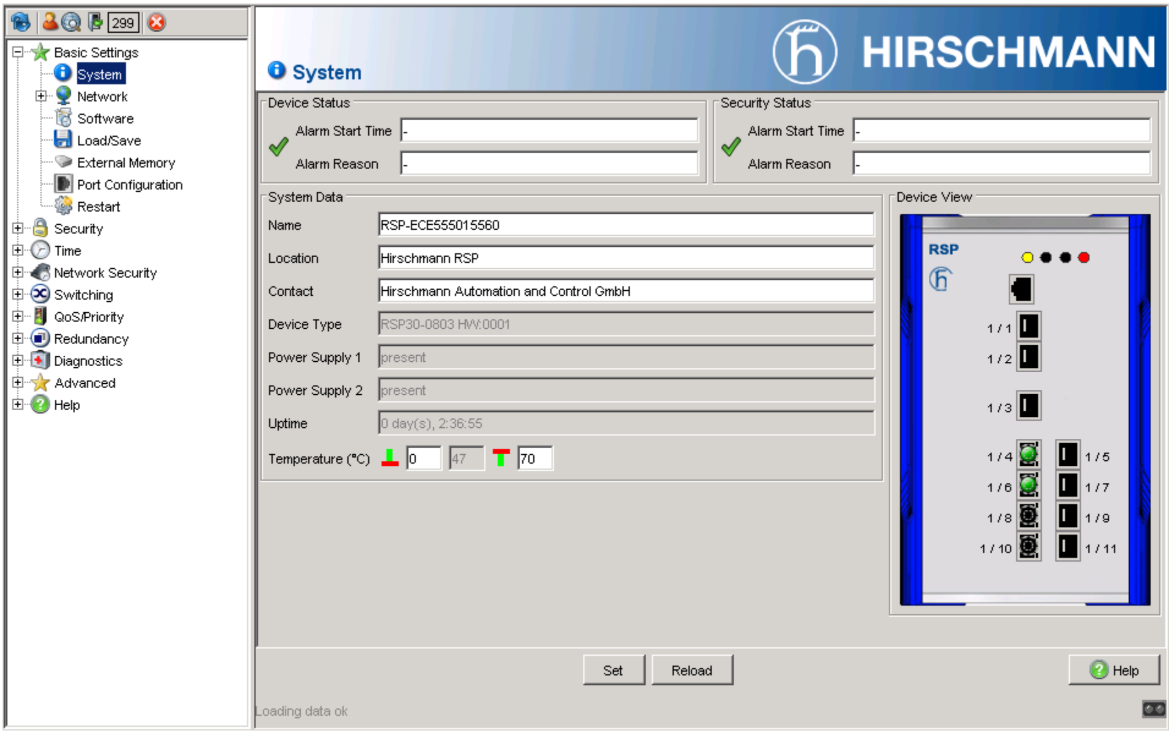
Figure 1: Login window

□ Select the user name and enter the password.
□ Select the language in which you want to use the graphical user interface.
□ Click on OK.

The window with the graphical user interface will appear on the screen.

Operating Instructions

The graphical user interface of the device is divided into the menu part (left) and the dialog part (right).



Device Status

Alarm Start Time: -

Alarm Reason: -

Security Status

Alarm Start Time: -

Alarm Reason: -

System Data

Name: RSP-ECE555015560

Location: Hirschmann RSP

Contact: Hirschmann Automation and Control GmbH

Device Type: RSP30-0803 HW:0001

Power Supply 1: present

Power Supply 2: present

Uptime: 0 day(s), 2:36:55

Temperature (°C): 0 47 70

Loading data ok

Figure 2: Graphical user interface of the device

The menu shows the menu items. When you click a menu item, the user interface displays the corresponding dialog in the dialog area.

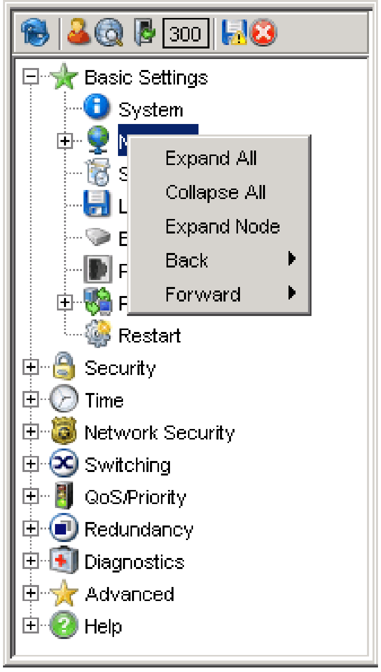


Figure 3: Menu section with context menu

You right-click the menu section to open the context menu.

Designation	Meaning
Expand All	Expands the nodes in the menu tree. The menu section shows the menu items for all levels.
Collaps All	Collapses the nodes in the menu tree. The menu section shows the menu items for the top level.
Expand Node	Expands the selected node and collapses the other nodes in the menu tree. This function allows you to expand a main node without scrolling and without collapsing other nodes manually.
Back	Allows you to quickly jump back to a previously selected menu item.
Forward	Allows you to quickly jump forward to a previously selected menu item when you have previously used the "Back" function.

Table 1: Menu section: Functions in the context menu

The status line is located in the top part of the menu section.

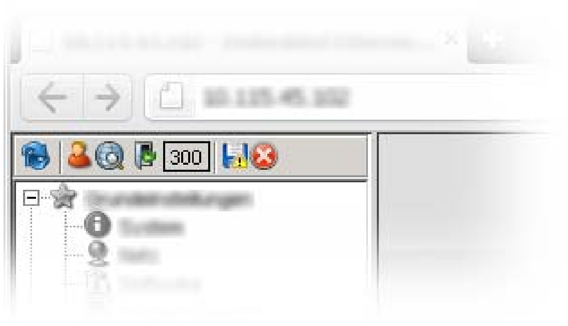


Figure 4: Status line

The status line contains the following buttons:

Button	Function
🔄	Refreshes the status line. The buttons show the values loaded from the volatile memory (`RAM`) of the device.
⊗	Terminates the refreshing of the status line.
👤	When you position the mouse pointer over the button, the user interface opens a bubble help with the following information: ▶ The time at which the device last refreshed the values ▶ Name of the user logged in ▶ Device name ▶ Network protocol by means of which you are logged in to the device. The device automatically refreshes the values once a minute. To refresh the display manually, click the 🔄 button. By right-clicking this symbol you can open the `Basic Settings:System` dialog and the `Basic Settings:Network:Global` dialog directly.
🔍	When you position the mouse pointer over the button, the user interface opens a bubble help with the summary of the `Diagnostics:System:Configuration Check` dialog. To refresh the display, click the 🔄 button. By right-clicking this symbol you can open the `Diagnostics:System:Configuration Check` dialog directly.
⎋	Ends the session and terminates the connection to the device.
297	Shows the time in seconds after which the device automatically ends the session when the user is inactive. You specify the timeout period in the `Security:Management Access:Web` dialog.

Table 2: Buttons in the status line

Button	Function
💾	Shows that the configuration profile in the volatile memory (`RAM`) differs from the "selected" configuration profile in the permanent memory (`NVM`). Save the current device configuration permanently so that the current settings will still be available to you after a restart. To permanently save the changes, choose the "selected" configuration profile in the `Basic Settings:Load/Save` dialog and click "Save". The device automatically compares the configuration profiles once a minute. To refresh the display manually, click the 🔄 button. If the device configurations match, the button is hidden. By right-clicking this symbol you can open the `Basic Settings:Load/Save` dialog directly.
⊗	When you position the mouse pointer over the button, the user interface opens a bubble help with the following information: ▶ The "Last Update" section shows the time at which the device last refreshed the values. ▶ The "Device Status" section shows a compressed view of the "Device Status" frame in the `Basic Settings:System` dialog. The section shows the alarm that is currently active and whose occurrence was recorded first. ▶ The "Security Status" section shows a compressed view of the "Security Status" frame in the `Basic Settings:System` dialog. The section shows the alarm that is currently active and whose occurrence was recorded first. ▶ The "Boot Parameter" section shows a note if you permanently save changes to the device configuration and at least one boot parameter differs from the device configuration used during the last restart. The following settings cause the boot parameters to change: – `Basic Settings:External Memory` dialog, "Enable Automatic Software Update" parameter – `Basic Settings:External Memory` dialog, "Config Priority" parameter – `Security:Management Access:Server` dialog, "SNMP" tab page, "Port Number" parameter – `Diagnostics:System:Selftest` dialog, "RAM Test" parameter – `Diagnostics:System:Selftest` dialog, "Activate SysMon1" parameter – `Diagnostics:System:Selftest` dialog, "Load default config on error" parameter

Table 2: Buttons in the status line (cont.)

Instructions for saving the device configuration

- □ To copy changed settings to the volatile memory (`RAM`), click the "Set" button.
- □ To refresh the display in the dialogs, click the "Reload" button
- □ To keep the changed settings even after restarting the device, click the "Save" button in the `Basic Settings:Load/Save` dialog.

Note: Unintentional changes to the device configuration may cause the connection between your PC and the device to be terminated. Before you change the settings in the device, switch on the function "Undo Modifications of Configuration" in the `Basic Settings:Load/Save` dialog. With this function, the device restores the active device configuration saved in the NVM if the connection is interrupted after the settings have been changed. The device remains reachable.

1 Basic Settings

With this menu you can configure the basic settings of the device.

The menu contains the following dialogs:

- System
- Network
- Software
- Load/Save
- External Memory
- Port Configuration
- Restart

1.1 System

With this dialog you can display device properties and monitor individual operating statuses.

Device Status

The fields in this frame show the device status and inform you about alarms that have occurred. You define the parameters that the device monitors in the `Diagnostics:Status Configuration:Device Status` dialog.

Parameters	Meaning
Symbol	Shows the device status. Possible values: ✓ The device status is OK. The monitored parameters have the desired status. ⊗ An alarm has occurred. At least one monitored parameter differs from the desired status.
Alarm Start Time	Shows the time at which the device triggered the alarm with the current highest priority. Possible values: ▶ Date and time in the format `Month, Day, Year  hh:mm:ss AM/PM`. The device triggers an alarm if a monitored parameter differs from the desired status. In the `Diagnostics:Status Configuration:Device Status` dialog, the parameters are sorted by priority: High priority at the top, low priority at the bottom.
Alarm Reason	Shows the cause of the alarm and the current highest priority.

Table 3: "Device Status" frame in the `Basic Settings:System` dialog

Note: The device reports an alarm if you only connect one power supply unit for the supply voltage to a device with multiple ports. To avoid this alarm, you deactivate the monitoring of the missing power supply units in the `Diagnostics:Status Configuration:Device Status` dialog.

Security Status

The fields in this frame show the security status and inform you about alarms that have occurred. You define the parameters that the device monitors in the `Diagnostics:Status Configuration:Security Status` dialog.

Parameters	Meaning
Symbol	Shows the security status. Possible values: ✓ The device status is OK. The monitored parameters have the desired status. ⊗ An alarm has occurred. At least one monitored parameter differs from the desired status.
Alarm Start Time	Shows the time at which the device triggered the alarm with the current highest priority. Possible values: ▶ Date and time in the format `Month, Day, Year hh:mm:ss AM/PM`. The device triggers an alarm if a monitored parameter differs from the desired status. In the `Diagnostics:Status Configuration:Security Status` dialog, the parameters are sorted by priority: High priority at the top, low priority at the bottom.
Alarm Reason	Shows the cause of the alarm and the current highest priority.

Table 4: "Security Status" frame in the `Basic Settings:System` *dialog*

System Data

The fields in this frame show operating data and information on the location of the device.

Parameters	Meaning
Name	Defines the device name. Possible values: ▶ 0..255 alphanumeric characters
Location	Defines the location of the device. Possible values: ▶ 0..255 alphanumeric characters

Table 5: "System Data" frame in the `Basic Settings:System` *dialog*

Parameters	Meaning
Contact	Defines the contact person for this device. Possible values: ▶ 0..255 alphanumeric characters
Device Type	Shows the product name of the device.
Power Supply P1	Shows the status of the power supply unit on voltage supply connection P1. Possible values: ▶ `Present` ▶ `Not present` ▶ `Defective`
Power Supply P2	Shows the status of the power supply unit on voltage supply connection P2. Possible values: ▶ `Present` ▶ `Not present` ▶ `Defective`
Uptime	Shows the time that has elapsed since this device was last restarted. Possible values: ▶ Time in the format `day(s), hh:mm:ss`
Temperature (°C)	The middle field shows the current temperature in the device in °C. ⊥ This field specifies the lower temperature threshold in °C. If the temperature in the device falls below this value, the device generates an alarm. ⊤ This field specifies the upper temperature threshold in °C. If the temperature in the device exceeds this value, the device generates an alarm. Possible values: ▶ `-99..99` (integer) You activate the monitoring of the temperature thresholds in the `Diagnostics:Status Configuration:Device Status` dialog. The “Installation” user manual contains detailed information about setting the temperature thresholds.

Table 5: "System Data" frame in the `Basic Settings:System` dialog (cont.)

Device View

The display in this frame shows a simplified version of the structure of the device and its equipment. The display also shows the states of the device status LEDs and the device ports at the time of the last update.
The following symbols represent the status of the individual device ports. In some situations, some of these symbols interfere with one another. You get a detailed description of the port status when you position the mouse pointer over the port symbol.

Criterion	Symbol	
Bandwidth of the device port	•	10 Mbit/s Port activated, connection okay, full-duplex mode
	●	100 Mbit/s Port activated, connection okay, full-duplex mode
	⬤	1000 Mbit/s Port activated, connection okay, full-duplex mode
Operating state	⦶	Half-duplex mode activated See the `Basic Settings:Port Configuration` dialog, "Automatic Configuration" checkbox.
	◎	Autonegotiation activated See the `Basic Settings:Port Configuration` dialog, "Automatic Configuration" checkbox.
	⊖	Port is blocked by a redundancy function.
AdminLink	⊖	Port is deactivated, connection okay
	⊖	Port is deactivated, no connection set up See `Basic Settings:Port Configuration` dialog, "Port on" checkbox and "Link/Current Settings" field.

Table 6: Symbols identifying the status of the device ports

Reloading

The graphical user interface automatically updates the display of the dialog every 100 seconds. In the process, it updates the fields and symbols with the values that are saved in the volatile memory (`RAM`) of the device. At the bottom left of the dialog, you will find the time of the next update.

Reloading data in 70 s

Figure 5: Time to next Reload

Note: The graphical user interface uses this function to update only the display in the `Basic Settings:System` dialog.

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 7: Buttons

1.2 Network

This dialog allows you to define settings for the access to the device management via the network. In addition, you see the addresses of the neighboring devices attached to the device and can detect and resolve address conflicts.

The menu contains the following dialogs:

- Global
- ARP Table
- IP Address Conflict Detection

1.2.1 Global

This dialog allows you to define basic settings with which you access the device management via the network.

Management interface

This frame allows you to define the following settings:

- The source from which the device management receives its IP parameters
- VLAN in which the management can be accessed

Parameters	Meaning
IP Address Assignment	Defines the source from which the device receives its IP parameters after starting: Possible values: ▶ BOOTP The device receives its IP parameters from a BOOTP or DHCP server. The server evaluates the MAC address of the device, then assigns the IP parameters. ▶ DHCP (default setting) The device receives its IP parameters from a DHCP server. The server evaluates the MAC address, the DHCP name, or other parameters of the device, then assigns the IP parameters. ▶ Local The device uses the IP parameters from the internal memory. You define the settings for this in the "IP Parameter" frame. **Note:** If there is no response from the BOOTP or DHCP server, the device sets the IP address to 0.0.0.0 and makes another attempt to obtain a valid IP address.
VLAN ID	Defines the ID of the VLAN in which the device management can be accessed via the network. Possible values: ▶ 1..4042 (default setting: 1) You can only access the management via the network via device ports that are members of this VLAN. You can see which VLAN a device port is assigned to in the Switching:VLAN:Current dialog.
MAC Address	Displays the MAC address of the device. The device management can be accessed via the network using the MAC address.

Table 8: "Management Interface" frame in the Basic Settings:Network:Global dialog

■ HiDiscovery Protocol

This frame allows you to define settings for the access to the device using the HiDiscovery protocol.

On a PC the HiDiscovery software shows you the Hirschmann devices in the network that can be accessed on which the HiDiscovery function is switched on. You can access these devices even if they have invalid IP parameters or none at all. The HiDiscovery software allows you to change the IP parameters in the device.

Parameters	Meaning
Operation	Activates/deactivates the HiDiscovery function in the device. Possible values: ▶ `On` (default setting) HiDiscovery is activated. You can use the HiDiscovery software to access the device from your PC. ▶ `Off` HiDiscovery is deactivated.
Access	Activates/deactivates the write access to the device using HiDiscovery. Possible values: ▶ `readWrite` (default setting) The HiDiscovery software is given write access to the device. With this setting you can change the IP parameters in the device. ▶ `readOnly` The HiDiscovery software is given only read access to the device. With this setting you can view the IP parameters in the device. Recommendation: Only change the setting to `readOnly` after putting the device into operation.

Table 9: "HiDiscovery Protocol" frame in the `Basic Settings:Network:Global` *dialog*

Note: With the HiDiscovery software you can only access the device via device ports that are members of the same VLAN as the device management. You can see which VLAN a device port is assigned to in the `Switching:VLAN:Current` dialog.

BOOTP/DHCP

Parameters	Meaning
Client ID	Shows the DHCP client ID that the device sends to the BOOTP or DHCP server. If the server is configured accordingly, it reserves an IP address for this DHCP client ID. Therefore, the device receives the same IP from the server every time it requests it. The DHCP client ID that the device sends is the device name defined in the "Name" field in the `Basic Settings:System` dialog.

Table 10: "BOOTP/DHCP" frame in the `Basic Settings:Network:Global` *dialog*

IP Parameter

This frame allows you to assign the IP parameters manually. These fields can be edited if you have selected the `Local` option in the "IP Address Assignment" field in the "Management Interface" frame.

Parameters	Meaning
IP Address	Defines the IP address under which the device management can be accessed via the network. Possible values: ▶ Valid IPv4 address ▶ Default setting: —
Netmask	Defines the netmask. The netmask identifies the network prefix and the host address of the device in the IP address. Possible values: ▶ Valid IPv4 netmask ▶ Default setting: —
Gateway Address	Defines the IP address of a router via which the device accesses other devices outside its own network. Possible values: ▶ Valid IPv4 address ▶ Default setting: —

Table 11: "IP Parameter" frame in the `Basic Settings:Network:Global` *dialog*

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 12: Buttons

1.2.2 ARP Table

This dialog allows you to display the MAC and IP addresses of the neighboring devices connected to the device. The device determines these addresses using the Address Resolution Protocol (ARP) before the connection to the corresponding neighboring device is set up for the first time.

■ Table

Parameters	Meaning
Port	Number of the device port to which the table entry relates.
MAC Address	Shows the MAC address of a device that responded to an ARP query to this device port.
IP Address	Shows the IP address of a device that responded to an ARP query to this device port.

Table 13: Table in the `Basic Settings:Network:ARP Table` dialog.

Parameters	Meaning
Type	Displays the type of the address entry. Possible values: ▶ static Static ARP entry. This entry is kept when the ARP table is deleted. ▶ dynamic Dynamic entry. The device deletes this entry when the “Aging Time” has been exceeded, if the device does not receive any data from this device during this time.

Table 13: Table in the Basic Settings:Network:ARP Table dialog. (cont.)

To reset the counters, click "Reset ARP table" in the Basic Settings:Restart dialog.

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 14: Buttons

1.2.3 IP Address Conflict Detection

The device allows you to detect whether another device in the network is using its own IP address. Whenever the device detects an address conflict, the status LED of the device flashes red 4 times.

In this dialog you specify the procedure with which the device detects address conflicts and define the required settings for this. In the table the device logs instances of another device in the network using its own IP address.

■ Operation

Parameters	Meaning
Operation	When this function is switched on, the device detects whether another device in the network is using its own IP address. Possible values: ▶ `On` (default setting) The address conflict detection is switched on. ▶ `Off` The address conflict detection is switched off.

Table 15: "Operation" frame in the `Basic Settings:Network:IP Address Conflict Detection` dialog

Configuration

Parameters	Meaning
Detection Mode	Specifies the procedure with which the device detects address conflicts. Possible values: ▶ Active and Passive (default setting) The device uses active and passive address conflict detection. ▶ Active Active address conflict detection. The device actively avoids communicating with an IP address that already exists in the network. The address conflict detection begins as soon as you connect the device to the network or change its IP parameters. – The device sends 4 ARP probe data packets at the interval defined in the "Detection Delay [ms]" field. If the device receives a response to these data packets, there is an address conflict. – If the device does not detect an address conflict, it sends 2 gratuitous ARP data packets as an announcement. The device also sends these data packets when the address conflict detection is switched off. – If the IP address already exists in the network, the device changes back to the previously used IP parameters (if possible). If the device receives its IP parameters from a DHCP server, it sends a DHCPDECLINE message back to the DHCP server. – After the period specified in the "Release Delay [s]" field, the device checks whether the address conflict still exists. If the device detects 10 address conflicts one after the other, it extends the waiting time until the next check to 60 s. – When the address conflict has been resolved, the device management returns to the network again. ▶ Passive Passive address conflict detection. The device analyzes the data traffic in the network. If another device in the network is using the device’s own IP address, the device initially “defends” its IP address. The device stops sending if the other device then keeps sending with the same IP address. – As a “defence” the device sends gratuituous ARP data packets. The device repeats this procedure for the number of times specified in the "Number of Address Protections" field. – If the other device continues sending with the same IP address, after the period specified in the "Release Delay [s]" field, the device periodically checks whether the address conflict still exists. – When the address conflict has been resolved, the device management returns to the network again.

Table 16: "Configuration" frame in the Basic Settings:Network:IP Address Conflict Detection *dialog*

Parameters	Meaning
Send Periodic ARP Probes	Switches the periodic address conflict detection on/off. Possible values: ▶ On (default setting) The periodic address conflict detection is switched on. – The device periodically sends an ARP probe data packet every 90 to 150 seconds and waits for the time specified in the "Detection Delay [ms]" field for a response. – If the device detects an address conflict, it applies the passive detection mode function. If the "Send Trap" function is switched on, it sends an SNMP message (trap). ▶ Off The continuous address conflict detection is switched off.
Detection Delay [ms]	Defines the period in milliseconds for which the device waits for a response after sending an ARP data packet. Possible values: ▶ 20..500 (default setting: 200)
Release Delay [s]	Defines the period in seconds after which the device checks again whether the address conflict still exists. Possible values: ▶ 3..3600 (default setting: 15)
Number of Address Protections	Defines how often the device sends gratuitous ARP data packets in the passive detection mode to “defend” its IP address. Possible values: ▶ 0..100 (default setting: 3)
Protection Interval [ms]	Defines the period in milliseconds after which the device sends gratuitous ARP data packets again in the passive detection mode to “defend” its IP address. Possible values: ▶ 20..5000 (default setting: 200)
Send Trap	Activates/deactivates the sending of an SNMP message (trap) when the device detects an address conflict during the periodic address conflict detection. Possible values: ▶ Selected The device sends an SNMP message. ▶ Not selected (default setting) The device does not send an SNMP message. The prerequisite for sending SNMP messages (traps) is that the function is switched on in the Diagnostics:Status Configuration:Alarms (Traps) dialog and at least 1 SNMP manager is defined.

Table 16: "Configuration" frame in the Basic Settings:Network:IP Address Conflict Detection *dialog (cont.)*

Information

Parameters	Meaning
Conflict detected	Shows whether an address conflict currently exists. Possible values: ▶ `Selected` The device detects an address conflict. ▶ `Not selected` (default setting) The device does not detect an address conflict.

Table 17: "Information" frame in the `Basic Settings:Network:IP Address Conflict Detection` dialog

Table

Parameters	Meaning
Time Stamp	Shows the time at which the device detected an address conflict.
Port	Shows the number of the device port on which the device detected the address conflict.
IP Address	Shows the IP address that is causing the address conflict.
MAC Address	Shows the MAC address of the device with which the address conflict exists.

Table 18: Table in the `Basic Settings:Network:IP Address Conflict Detection` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 19: Buttons

1.3 Software

This dialog allows you to update the device software and display information about the device software.

■ Version

Parameters	Meaning
Stored Version	Shows the version number and creation date of the device software stored in the flash memory. The device loads the device software during the next restart.
Export	Exports the "Stored Version" of the device software and saves it as an image file on your PC.
Running Version	Shows the version number and creation date of the device software that the device loaded during the last restart and is currently running.
Bootcode	Shows the version number and creation date of the boot code.

Table 20: "Version" frame in the `Basic Settings:Software` *dialog*

Software Update

Parameters	Meaning
File	Defines the path and the file name of the image file with which you update the device software. The device gives you the following options for updating the device software: ▶ File upload If the file is located on your PC or on a network drive, click " … " and select the file there. ▶ TFTP upload If the file is located on a TFTP server, enter the URL for the file in the following form: `tftp://<IP address>/<path>/<file name>`. ▶ SCP or SFTP upload If the file is located on an SCP or SFTP server, enter the URL for the file in one of the following forms: – `scp://` or `sftp://<IP address>/<path>/<file name>` When you click "Update", the device displays the "Authentication" dialog. There you enter the "User" and "Password" to login to the server. – `scp://`or `sftp://<user>:<password>@<IP address>/<path>/<file name>`
…	Shows the "Open" dialog. If the image file is located on your PC or on a network drive, you select the image file here.
Update	Updates the device software. In the process, the device copies the selected file into the flash memory and replaces the device software stored there. The device copies the existing "Stored Version" of the device software into the backup area. The device loads the updated device software during the next restart.

Table 21: "Software Update" frame in the `Basic Settings:Software` dialog

■ Table

Parameters	Meaning
File Location	Shows the storage location of the device software. Possible values: ▶ RAM Volatile memory of the device ▶ FLASH Non-volatile memory (NVM) of the device ▶ SD CARD External SD memory (ACA31)
Index	Shows the index of the device software.
File name	Shows the device-internal file name of the device software.
Firmware	Shows the version number and creation date of the device software.
Applet	Shows the version number of the graphical user interface (GUI).
Logic	Shows the version number of the logic module for devices with programmable hardware (FPGA).

Table 22: Table in the `Basic Settings:Software` *dialog.*

■ Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 23: Buttons

1.4 Load/Save

This dialog allows you to save the settings permanently in a configuration profile. When you click "Set" in a dialog while the device is operating, the device only saves the changes temporarily.

The device allows you to keep multiple configuration profiles in the memory so that you can quickly switch to other settings if required. Configuration profiles can be saved in encrypted or unencrypted form. You also have the option to export configuration profiles to a PC or an SCP or FTP server, or to copy them back to the device from there.

Unintentional changes to the settings may cause the connection between your PC and the device to be terminated. To make sure the device remains accessible, switch on the "Undo Modifications of Configuration" function before changing settings. If the connection is then terminated, the device loads the device configuration saved in the non-volatile memory (`NVM`).

■ External Memory

Parameters	Meaning
Selected ENVM	Shows the type of the external memory. Possible values: ▶ `SD` External SD memory (ACA31).
State	Shows the operating state of the external memory. Possible values: ▶ `notPresent` No external memory connected. ▶ `removed` Someone has removed the external memory from the device during operation. ▶ `ok` The external memory is connected and ready for operation. ▶ `outOfMemory` The memory space is occupied on the external memory. ▶ `genericErr` The device has detected an error.

Table 24: "External Memory" frame in the `Basic Settings:Load/Save` dialog

■ Configuration encryption

Parameters	Meaning
Active	Shows whether the configuration encryption is switched on in the device. Possible values: ▶ `Not selected` The configuration encryption is switched off. The device loads a configuration from the non-volatile memory (`NVM`) only if it is unencrypted. ▶ `Selected` The configuration encryption is switched on. The device loads a configuration from the non-volatile memory (`NVM`) only if it is encrypted and the password matches the password stored in the device. If the "Config Priority" field has the value `first`, `second` or `third` and the configuration profile is unencrypted, the "Security Status" frame in the `Basic Settings:System` dialog shows an alarm. In the "Monitoring" frame in the `Diagnostics:Status Configuration:Security Status` dialog, you specify whether the device monitors the parameter "Config load from external NVM unsecure".

Table 25: "Configuration Encryption" frame in the `Basic Settings:Load/Save` dialog (section #x3c;$tblsheetnum> of 2)

Parameters	Meaning
Set Password	Encrypts configuration profiles and uses a password to make unauthorized access more difficult. ☐ Enter the new password in the "Set Password" dialog. ☐ When you are changing an existing password, you also enter the existing password. ☐ Select the "Save Configuration afterwards" checkbox to use encryption for the "Selected" configuration profile in the non-volatile memory (`NVM`) and in the external memory (`ENVM`). **Note:** Only use this function if a maximum of 1 configuration profile is stored in the non-volatile memory (`NVM`) of the device. Before creating additional configuration profiles, decide for or against permanently activated configuration encryption in the device. Save additional configuration profiles either unencrypted or encrypted with the same password. If you are replacing a device with an encrypted configuration profile, e.g. due to a defect, you proceed as follows: ☐ Restart the new device and assign the IP parameters. ☐ Open the `Basic Settings:Load/Save` dialog on the new device. ☐ Encrypt the configuration profile in the new device - see above. Enter the same password you used in the existing device. ☐ Install the external memory from the existing device in the new device. ☐ Restart the new device. When it is restarted, the device loads the configuration profile with the settings of the existing device from the external memory (`ENVM`). The device copies the settings into the volatile memory (`RAM`) and into the non-volatile memory (`NVM`). **Note:** The prerequisite for loading a configuration profile from the external memory (`ENVM`) is that the "Config Priority" field in the `Basic Settings:External Memory` dialog has the value `first`. In the state on delivery, this value is preset.
Delete	Cancels the configuration encryption in the device. ☐ Enter the existing password in the "Remove" dialog. ☐ Select the "Save Configuration afterwards" checkbox to also remove the encryption for the "Selected" configuration profile in the non-volatile memory (`NVM`) and in the external memory (`ENVM`). **Note:** If you are keeping other configuration profiles in encrypted form in the memory, the device prevents you afterwards from activating these configuration profiles or designating them as "Selected".

Table 25: "Configuration Encryption" frame in the `Basic Settings:Load/Save` dialog (section #x3c;$tblsheetnum> of 2)

Information

Parameters	Meaning
NVM synchron to running config	Shows whether the configuration profile in the volatile memory (`RAM`) and the "selected" configuration profile in the non-volatile memory (`NVM`) are the same. Possible values: ▶ `Selected` The configuration profiles are the same. ▶ `Not selected` The configuration profiles are different. Changes in the device are only saved temporarily if, for example, you click on "Set" in a dialog while the device is operating.
ENVM synchron to NVM	Shows whether the "selected" configuration profile in the external memory (`ENVM`) and the "selected" configuration profile in the non-volatile memory (`NVM`) are the same. Possible values: ▶ `Selected` The configuration profiles are the same. ▶ `Not selected` The configuration profiles are different. Possible causes: – No external memory is connected to the device. – In the `Basic Settings:External Memory` dialog, the "Auto-save config on ENVM" function is activated.

Table 26: "Information" frame in the `Basic Settings:Load/Save` dialog

Undo Modifications of Configuration

Parameters	Meaning
Operation	When a user switches on the function, the device continuously checks whether it can still be reached from the IP address of the user. If the connection is lost, after a defined time period the device loads the "Selected" configuration profile from the non-volatile memory (`NVM`). Afterwards, the device can be accessed again. Possible values: ▶ `On` Function is switched on: – You define the time period between the loss of the connection and the loading of the configuration profile in the field "Period to undo while Connection is lost [s]". – If the non-volatile memory (`NVM`) contains multiple configuration profiles, the device loads the configuration profile designated as "Selected". ▶ `Off` (default setting) Function is switched off. Switch the function off again before you close the graphical user interface. You thus prevent the device from restoring the configuration profile designated as "Selected". **Note:** Before you switch on the function, save the settings in the configuration profile. Therefore, current changes that are only saved temporarily in the device are kept.
Period to undo while Connection is lost [s]	Specifies the time in seconds after which the device loads the "selected" configuration profile from the non-volatile memory (`NVM`) if the connection is lost. Possible values: ▶ `30..600` (default setting: `600`) Specify a sufficiently large value. Take into account the time when you are only viewing the dialogs of the graphical user interface without changing or updating them.
Watchdog IP Address	Shows the IP address of the PC on which you have activated the function. Possible values: ▶ IPv4 address (default setting: `0.0.0.0`)

Table 27: "Undo Modification of Configuration" frame in the `Basic Settings:Load/Save` *dialog*

■ Table

Parameters	Meaning
Storage Type	Shows the storage location of the configuration profile. Possible values: ▶ RAM (volatile memory of the device) In the volatile memory the device stores the settings for the current operation. ▶ NVM (non-volatile memory of the device) From the non-volatile memory the device loads the "Selected" configuration profile during a restart or when applying the function "Undo Modification of Configuration". The non-volatile memory provides space for multiple configuration profiles, depending on the number of settings saved in the configuration profile. The device manages a maximum of 20 configuration profiles in the non-volatile memory. If you select a configuration profile in the table and click "Activate", the device loads this configuration profile to the volatile memory (RAM). ▶ ENVM (external memory) On the external memory the device saves a backup copy of the "Selected" configuration profile. The prerequisite for this is that checkmark is selected in the "Auto-save config on ENVM" field in the Basic Settings:External Memory dialog.
Name	Shows the name of the configuration profile. Possible values: ▶ running-config Name of the configuration profile in the volatile memory (RAM). ▶ config Name of the factory setting configuration profile in the non-volatile memory (NVM). ▶ User-defined name The device allows you to save a configuration profile with a user-defined name by selected an existing configuration profile in the table and clicking "Save As…".
Modification Date	Shows the time at which a user last saved the configuration profile.

Table 28: Table in the Basic Settings:Load/Save dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Selected	Shows whether the configuration profile is designated as "Selected". Possible values: ▶ `Selected` The configuration profile is designated as "Selected". – The device loads the configuration profile into the volatile memory (`RAM`) during the restart or when applying the function "Undo Modification of Configuration". – When you click "Save", the device saves the temporarily saved settings in this configuration profile. ▶ `Not selected` Another configuration profile is designated as "Selected". To designate another configuration profile as "Selected", you select the desired configuration profile in the table and click "Select".
Encrypted	Shows whether the configuration profile is encrypted. Possible values: ▶ `Selected` The configuration profile is encrypted. ▶ `Not selected` The configuration profile is unencrypted. You activate/deactivate the encryption of the configuration profile in the "Configuration Encryption" frame.
Encryption Verified	Shows whether the password of the encrypted configuration profile matches the password stored in the device. Possible values: ▶ `Selected` The passwords match. The device is able to unencrypt the configuration profile. ▶ `Not selected` The passwords are different. The device is unable to unencrypt the configuration profile.
Software Version	Shows the version number of the device software that the device ran when it saved the configuration profile.
Fingerprint	Shows the checksum saved in the configuration profile. The device calculates the checksum when saving the settings and inserts it into the configuration profile.

Table 28: Table in the `Basic Settings:Load/Save` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Fingerprint Verified	Shows whether the checksum in the configuration profile is valid. The device calculates the checksum again and compares it with the checksum in the configuration profile. Possible values: ▶ `Selected` The saved settings are consistent. The checksums match. ▶ `Not selected` The configuration profile contains modified settings. The checksums are different. Possible causes: – The file is damaged. – The file system on the external memory is inconsistent. – A user has exported the configuration profile and changed the XML file outside the device. **Note:** This function identifies changes to the settings in the configuration profile. The function does not provide protection against operating the device with modified settings.

Table 28: Table in the `Basic Settings:Load/Save` dialog (section #x3c;$tblsheetnum> of 3)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Save	Transfers the settings from the volatile memory (`RAM`) into the configuration profile designated as "Selected" in the non-volatile memory (`NVM`). If the checkbox in the "Auto-save config on ENVM" field is selected in the `Basic Settings:External Memory` dialog, the device generates a copy of the configuration profile on the external memory.

Table 29: Buttons (section #x3c;$tblsheetnum> of 5)

Button	Meaning
Activate	Loads the settings of the configuration profile selected in the table to the volatile memory (`RAM`). ▶ The device terminates the connection to the graphical user interface. □ Reload the graphical user interface. □ Login again. ▶ The device immediately uses the settings of the configuration profile in the current operation. Switch on the function "Undo Modifications of Configuration" before you activate another configuration profile. If the connection is lost afterwards, the device loads the last configuration profile designated as "Selected" from the non-volatile memory (`NVM`). The device can then be accessed again. If the configuration encryption is inactive, the device loads the configuration profile only if it is unencrypted. If the configuration encryption is active, the device loads the configuration profile only if it is encrypted and the password matches the password stored in the device. When you activate an older configuration profile, the device takes over the settings of the functions contained in this software version. The device sets the settings of newer functions to the state on delivery.
Delete	Removes the configuration profile selected in the table from the non-volatile memory (`NVM`) or from the external memory (`ENVM`). If the configuration profile is designated as "Selected", the device prevents you from removing the configuration profile.

Table 29: Buttons (section #x3c;$tblsheetnum> of 5)

Button	Meaning
Select	Designates the configuration profile selected in the table as "Selected". In the "Selected" column, the checkbox is now selected. The device loads the settings of this configuration profile to the volatile memory (`RAM`) during the restart or when applying the function "Undo Modification of Configuration". ▶ Only designate an unencrypted device configuration as "Selected" when the configuration encryption in the device is switched off. ▶ Only designate an encrypted device configuration as "Selected" when the following prerequisites are fulfilled: – The configuration encryption in the device is switched on. – The password of the configuration profile matches the password stored in the device. Otherwise the device is unable to load and encrypt the settings in the configuration profile the next time it restarts. For this case you specify in the `Diagnostics:System:Selftest` dialog whether the device starts with the factory settings or terminates the restart and stops. **Note:** Only configuration profiles in the non-volatile memory (`NVM`) can be designated as "Selected". If the checkbox in the "Auto-save config on ENVM" field is selected in the `Basic Settings:External Memory` dialog, the device also designates the configuration profile with the same name on the external memory as "Selected".
▼	Opens a menu with the following buttons.
Export...	Exports the configuration profile selected in the table and saves it as an XML file on the PC or on a server. The device gives you the following options for exporting a configuration profile: ▶ Download to PC To save the file on your PC or on a network drive, click " … " and select the directory there. ▶ Download to a TFTP server To save the file on a TFTP server, enter the URL for the file in the following form: `tftp://<IP address>/<path>/<file name>`. ▶ Download to an SCP or SFTP server To save the file on an SCP or SFTP server, enter the URL for the file in one of the following forms: – `scp://` or `sftp://<IP address>/<path>/<file name>` When you click "OK", the device displays the "Authentication" window. There you enter the "User" and "Password" to login to the server. – `scp://`or `sftp://<user>:<password>@<IP address>/<path>/<file name>`

Table 29: Buttons (section #x3c;$tblsheetnum> of 5)

Button	Meaning
Import...	Imports a configuration profile saved in XML format from a PC or from a server in the network. ▶ You specify the storage location for the configuration profile to be imported in the "Storage Type" field. ▶ You specify the name of the configuration profile to be imported in the "Name" field. The device gives you the following options for importing a configuration profile: ▶ File upload If the file is located on your PC or on a network drive, click " … " and select the file there. ▶ TFTP upload If the file is located on a TFTP server, enter the URL for the file in the following form: `tftp://<IP address>/<path>/<file name>`. ▶ SCP or SFTP upload If the file is located on an SCP or SFTP server, enter the URL for the file in one of the following forms: – `scp://` or `sftp://<IP address>/<path>/<file name>` When you click "Update", the device displays the "Authentication" dialog. There you enter the "User" and "Password" to login to the server. – `scp://`or `sftp://<user>:<password>@<IP address>/<path>/<file name>` If the configuration encryption is inactive, the device imports the configuration profile only if it is unencrypted. If the configuration encryption is active, the device imports the device configuration only if it is encrypted and the password matches the password stored in the device.
View...	Shows the settings of the configuration profile selected in the table in clear text as an XML. If the configuration profile is encrypted, enter the password in order to see the settings in clear text.
Save As...	Copies the configuration profile selected in the table and saves it with a user-defined name in the non-volatile memory (`NVM`). The device designates the new configuration profile as "Selected". **Note:** Before creating additional configuration profiles, decide for or against permanently activated configuration encryption in the device. Save additional configuration profiles either unencrypted or encrypted with the same password. If the checkbox in the "Auto-save config on ENVM" field is selected in the `Basic Settings:External Memory` dialog, the device also designates the configuration profile with the same name on the external memory as "Selected".

Table 29: Buttons (section #x3c;$tblsheetnum> of 5)

Button	Meaning
Back to factory defaults...	Resets the settings in the device to the factory settings. ▶ The device deletes the saved configuration profiles from the volatile memory (`RAM`) and from the non-volatile memory (`NVM`). ▶ If an external memory is connected, the device deletes the configuration profiles saved on the external memory (`ENVM`). ▶ After a brief period, the device restarts and loads the factory settings.
Help	Opens the online help.

Table 29: Buttons (section #x3c;$tblsheetnum> of 5)

1.5 External Memory

This dialog allows you to activate functions that the device automatically executes in combination with the external memory (ENVM). The dialog also shows the operating state and identifying characteristics of the external memory.

Table

Parameters	Meaning
Type	Shows the type of the external memory. Possible values: ▶ SD External SD memory (ACA31)
Status	Shows the operating status of the external memory. Possible values: ▶ notPresent No external memory connected. ▶ removed Someone has removed the external memory from the device during operation. ▶ ok The external memory is connected and ready for operation. ▶ outOfMemory The memory space is occupied on the external memory. ▶ genericErr The device has detected an error.
Writable	Shows whether the device has write access to the external memory. Possible values: ▶ Selected The device has write access to the external memory. ▶ Not selected The device only has read access to the external memory. It is possible that write protection is activated on the external memory.
Manufacturer ID	Shows the name of the memory manufacturer.
Product Name	Shows the product name specified by the memory manufacturer.
Version	Shows the version number specified by the memory manufacturer.
Serial Number	Shows the serial number specified by the memory manufacturer.

Table 30: Table in the Basic Settings:External Memory *dialog (section #x3c;$tblsheetnum> of 2)*

Parameters	Meaning
Enable Automatic Software Update	Defines whether the device updates the device software when it restarts. Possible values: ▶ selected (default setting) During a restart the device updates the device software when the following files are located in the external memory: – the image file of the device software – a text file startup.txt with the content autoUpdate=FILE_NAME_OF_THE_IMAGE_FILE ▶ Not selected The device performs the restart without updating the device software.
Config Priority	Specifies which memory the device loads the configuration profile from when it restarts. Possible values: ▶ disable The device loads the configuration profile from the non-volatile memory (NVM). ▶ first, second, third The device loads the configuration profile from the external memory (ENVM). If the device does not find a configuration profile on the external memory, it loads the configuration profile from the non-volatile memory (NVM). **Note:** When loading the configuration profile from the external memory (ENVM), the device overwrites the settings of the "Selected"configuration profile in the non-volatile memory (NVM). If the "Config Priority" field has the value first, second or third and the configuration profile is unencrypted, the "Security Status" frame in the Basic Settings:System dialog shows an alarm. In the "Monitoring" frame in the Diagnostics:Status Configuration:Security Status dialog, you specify whether the device monitors the parameter "Config load from external NVM unsecure".
Auto-save config on envm	Defines whether the device generates a copy on the external memory when saving the configuration profile. Possible values: ▶ selected (default setting) The device generates a copy of the configuration profile on the external memory when you click "Save" in the Basic Settings:Load/Save dialog. ▶ Not selected The device does not generate a copy of the configuration profile.

Table 30: Table in the Basic Settings:External Memory dialog (section #x3c;$tblsheetnum> of 2)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 31: Buttons

1.6 Port Configuration

With this dialog you can define settings for the individual device ports. The dialog also shows the operating mode, connection state, bit rate and duplex mode for every device port.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Name	Name of the device port. Enter the name of your choice. Possible values: ▶ 0..64 alphanumeric characters
Port on	Activates/deactivates the device port. Possible values: ▶ `Selected` (default setting) The device port is activated. ▶ `Not selected` The device port is deactivated. The device port does not send or receive any data.
State	Shows whether the device port is currently physically switched on or off. Possible values: ▶ `Selected` The device port is switched on. ▶ `Not selected` The device port is switched off. If the "Port on" function is switched on, the "Auto Disable" function has switched off the device port. You define the settings for the "Auto Disable" function in the `Diagnostics:Ports:Auto Disable` dialog.

Table 32: Table in the `Basic Settings:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Power State (Port off)	Physically switches off the device port, or leaves it on when you deactivate the "Port on" function. Possible values: ▶ `Selected` The device port remains physically switched on. A connected device receives an active link. ▶ `Not selected` (default setting) The device port is physically switched off.
Auto Power Down	Defines how the device port behaves when no cable is connected. Possible values: ▶ `no-power-save` (default setting) The device port remains activated. ▶ `auto-power-down` The device port switches to the energy-saving mode. ▶ `unsupported` The device port does not support this function and remains activated.
Automatic Configuration	Activates/deactivates the automatic configuration of the device port. Possible values: ▶ `Selected` (default setting) This setting has priority over the manual configuration of the device port. The device port negotiates the operating mode independently using autonegotiation and detects the devices connected to the TP port automatically (Auto Cable Crossing). After the function is switched on, it takes a few seconds for the device port to set the operating mode. ▶ `Not selected` The device port works with the values you defined in the "Manual Configuration" column and the "Manual Cable Crossing (Auto. Conf. off)" column.

Table 32: Table in the `Basic Settings:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Manual Configuration	Defines the operating mode of the device port when the automatic configuration of the device port is deactivated. Possible values: ▶ `10 Mbit/s HDX` Half duplex connection ▶ `10 Mbit/s FDX` Full duplex connection ▶ `100 Mbit/s HDX` Half duplex connection ▶ `100 Mbit/s FDX` (default setting on TP ports) Full duplex connection ▶ `1000 Mbit/s FDX` (default setting on optical ports) Full duplex connection The operating modes actually available depend on the corresponding media module.
Link/Current Settings	Displays the currently set operating mode of the device port. Possible values: ▶ `-` No cable connected, no link. ▶ `10 Mbit/s HDX` Half duplex connection ▶ `10 Mbit/s FDX` Full duplex connection ▶ `100 Mbit/s HDX` Half duplex connection ▶ `100 Mbit/s FDX` Full duplex connection ▶ `1000 Mbit/s FDX` Full duplex connection
Manual Cable Crossing (Auto. Conf. off)	Defines the devices connected to a TP port. Prerequisite: The automatic configuration of the device port is deactivated. Possible values: ▶ `mdi` The device switches the send and receive line pairs at the device port. ▶ `mdix` (default setting on TP ports) The device does not switch any line pairs at the device port. ▶ `auto-mdix` The device detects the send and receive line pairs of the connected device and automatically adapts to them. Example: When you connect a terminal device with a crossed cable, the device automatically resets the port from MDIX to MDI. ▶ `unsupported` (default setting on optical ports or TP-SFP ports) The device port does not support this function.

Table 32: Table in the `Basic Settings:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Flow Control	Activates/deactivates the flow control on the device port. Possible values: ▶ `Not selected` Flow control on the device port is deactivated. ▶ `Selected` (default setting) The sending and evaluating of pause data packets (full-duplex operation) or collisions (half-duplex operation) is activated on the port. □ To switch on the flow control in the device, also switch on the "Activate Flow Control" function in the `Switching:Global` dialog. □ Additionally activate the flow control on the port of the device connected with this port. On an uplink port, activating the flow control can possibly cause undesired sending breaks in the higher-level network segment (“wandering backpressure”). When you are using a redundancy function, you deactivate the flow control on the participating device ports. If the flow control and the redundancy function are active at the same time, there is a risk that the redundancy function will not operate as intended.

Table 32: Table in the `Basic Settings:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 4)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 33: Buttons

1.7 Restart

This dialog allows you to restart the device, reset port counters and address tables, and delete log files.

Restart

Button	Meaning
Cold start...	Triggers a restart of the device. After the start, the device goes through the following phases: ▶ The device performs a RAM test if this function is switched on in the `Diagnostics:System:Selftest` dialog. ▶ The device starts the "Stored Version" of the device software - see the `Basic Settings:Software` dialog. ▶ The device loads the settings of the configuration profile designated as "Selected" - see the `Basic Settings:Load/Save` dialog. **Note:** During the restart, the device does not transfer any data. During this time, the device cannot be accessed by the graphical user interface or other management systems.

Table 34: "Restart" frame in the `Basic Settings:Restart` *dialog*

Buttons

Button	Meaning
Reset MAC Address Table	Removes the MAC addresses designated with the `learned` setup status from the forwarding table - see the `Switching:Filter for MAC Addresses` table.
Reset ARP Table	Removes the dynamically set up addresses from the ARP table - see the `Basic Settings:Network:ARP Table` dialog.
Reset port counters	Resets the counter for the port statistics to `0` - see the `Diagnostics:Ports:Statistics Table` dialog.
Reset IGMP Snooping counters	Removes the IGMP Snooping entries and resets the counter in the "Information" frame to `0` - see the `Switching:IGMP:Snooping` dialog.
Delete Log File	Removes the logged events from the log file - see the `Diagnostics:Report:System Log` dialog.

Table 35: Buttons

Button	Meaning
Delete Persistent Log File	Removes the log files from the external memory - see the `Diagnostics:Report:Persistent Logging` dialog.
Help	Opens the online help.

Table 35: Buttons (cont.)

2 Security

This menu allows you to define the settings for the access to the device.

The menu contains the following dialogs:

- User Management
- Authentication List
- Management Access
- Port Security
- 802.1X Port Authentication
- RADIUS
- Pre-login Banner

2.1 User Management

The device allows users to access its management functions when they log in with valid login data. The device authenticates the users either using the local user management or with a RADIUS server in the network.

In this dialog you manage the users of the local user management. You also define the following settings here:

- Settings for the login
- Settings for saving the passwords
- Define policy for valid passwords

Configuration

This frame allows you to define settings for the login.

Parameters	Meaning
Number of Login Attempts	Number of login attempts possible. Possible values: ▶ `0..5` (default setting: `0`) If the user makes one more unsuccessful login attempt, the device locks access for the user. The device only allows users with the `Administrator` access role to remove the lock. The value `0` deactivates the lock. The user can make unlimited attempts to login.

Table 36: "Configuration" frame in the `Security:User Management` dialog

■ Password policy

This frame allows you to define the policy for valid passwords. The device checks every new password and password change according to this policy.
The settings affect the "Password" field. The prerequisite is that the "Policy Check" must be checkmarked.

Parameters	Meaning
Minimum Password Length	The device accepts the password if it contains at least the number of characters specified here. The device checks the password according to this setting, regardless of the setting for the "Policy Check" checkbox. Possible values: ▶ `6..64` (default setting: `6`)
Minimum Upper Cases	The device accepts the password if it contains at least as many upper-case letters as specified here. Possible values: ▶ `0..16` (default setting: `1`) The value `0` deactivates this setting.
Minimum Lower Cases	The device accepts the password if it contains at least as many lower-case letters as specified here. Possible values: ▶ `0..16` (default setting: `1`) The value `0` deactivates this setting.
Minimum Numbers	The device accepts the password if it contains at least as many numbers as specified here. Possible values: ▶ `0..16` (default setting: `1`) The value `0` deactivates this setting.
Minimum Special Characters	The device accepts the password if it contains at least as many special characters as specified here. Possible values: ▶ `0..16` (default setting: `1`) The value `0` deactivates this setting.

Table 37: "Password Policy" frame in the `Security:User Management` dialog

Table

Every user requires an active user account to gain access to the management functions of the device. The table allows you to set up and manage user accounts.

To change settings click the desired parameter in the table and modify the value.

Parameters	Meaning
User Name	Shows the name of the user account. To create a new user account, you click "Create".
Active	Activates/deactivates the user account. Possible values: ▶ `Selected` The user account is active. The user accepts the login of a user with this user name. ▶ `Not selected` The user account is inactive. The user rejects the login of a user with this user name. If only one user account exists with the `administrator` access role, this user account is always active.
Password	Shows ***** (asterisks) instead of the password with which the user logs in. To change the password, click the relevant field. Possible values: ▶ 6..64 alphanumeric characters ▶ including the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~ The minimum length of the password is defined in the "Password Policy" frame. The device differentiates between upper and lower case. When the checkbox in the "Policy Check" field is selected, the device checks the password according to the policy defined in the "Password Policy" frame. The device always checks the minimum length of the password, even if the checkbox in the "Policy Check" field is not selected.

Table 38: Table in the `Security:User Management` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Access Role	Defines the access role that regulates the user’s access to the individual functions of the device. Possible values: ▶ `guest` The user is authorized to monitor the device. ▶ `operator` The user is authorized to monitor and configure the device - with the exception of security settings for the access to the device. ▶ `administrator` The user is authorized to monitor and configure the device. ▶ `unauthorized` The user is locked, and the device rejects the user’s login. You assign this value to temporarily lock the user account. If an error occurs when another access role is being assigned, the device assigns this access role to the user account.
User locked	Locks/unlocks the user’s access to the management functions of the device. Possible values: ▶ `Selected` The user’s access is locked. The device automatically locks a user if the user makes too many unsuccessful login attempts. ▶ `Not selected` The user’s access is unlocked.
Policy Check	Defines whether the device checks the password according to the defined policy when it is being set up or changed. Possible values: ▶ `Selected` The device checks the password according to the policy defined in the "Password Policy" frame. ▶ `Not selected` The device accepts the password without checking it.
SNMP Auth Type	Defines the authentication protocol that the device applies for user access via SNMPv3. Possible values: ▶ `hmacmd5` For this user account, the device uses protocol HMAC-MD5. ▶ `hmacsha` For this user account, the device uses protocol HMAC-SHA.

Table 38: Table in the `Security:User Management` *dialog (section #x3c;$tblsheetnum> of 3)*

Parameters	Meaning
SNMP Encryption Type	Defines the encryption protocol that the device applies for user access via SNMPv3. Possible values: ▶ `none` No encryption ▶ `des` DES encryption ▶ `aesCfb128` AES-128 encryption

Table 38: Table in the `Security:User Management` dialog (section #x3c;$tblsheetnum> of 3)

■ New Entry

In this frame you set up a new user account. To display the frame, you click the "Create" button.

Parameters	Meaning
User Name	Specifies the name of the user account. Possible values: ▶ 1..32 alphanumeric characters
Active	Activates/deactivates the user account. Possible values: ▶ `Selected` The user account is active. The user accepts the login of a user with this user name. ▶ `Not selected` The user account is inactive. The user rejects the login of a user with this user name.

Table 39: "New Entry" frame in the `Security:User Management` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Password	Specifies the password with which the user logs in. When the checkbox in the "Display Password" field is selected, the password is visible in clear text. Possible values: ▶ 6..64 alphanumeric characters ▶ including the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~ The minimum length of the password is defined in the "Password Policy" frame. The device differentiates between upper and lower case. When the checkbox in the "Policy Check" field is selected, the device checks the password according to the policy defined in the "Password Policy" frame. The device always checks the minimum length of the password, even if the checkbox in the "Policy Check" field is not selected.
Display Password	Specifies how the adjacent "Password" field displays the password. Possible values: ▶ `Not selected` (default setting) The "Password" field displays *** (asterisks) instead of the password. ▶ `Selected` The "Password" field displays the password in clear text.
Access Role	Defines the access role profile that regulates the user’s access to the individual functions of the device. Possible values: ▶ `guest` The user is authorized to monitor the device. ▶ `operator` The user is authorized to monitor and configure the device - with the exception of security settings for the access to the device. ▶ `administrator` The user is authorized to monitor and configure the device. ▶ `unauthorized` The user is blocked, and the device rejects the user’s login. You assign this value to temporarily lock the user account. If an error occurs when another access role is being assigned, the device assigns this access role to the user account.
User locked	Locks/unlocks the user’s access to the management functions of the device. Possible values: ▶ `Selected` The user’s access is locked. ▶ `Not selected` The user’s access is unlocked.

Table 39: "New Entry" frame in the `Security:User Management` *dialog (section #x3c;$tblsheetnum> of 3)*

Parameters	Meaning
Policy Check	Defines whether the device checks the password according to the defined policy when it is being set up or changed. Possible values: ▶ `Selected` The device checks the password according to the policy defined in the "Password Policy" frame. ▶ `Not selected` The device accepts the password without checking it.
SNMP Auth Type	Defines the authentication protocol that the device applies for user access via SNMPv3. Possible values: ▶ `hmacmd5` For this user account, the device uses protocol HMAC-MD5. ▶ `hmacsha` For this user account, the device uses protocol HMAC-SHA.
SNMP Encryption Type	Defines the encryption protocol that the device applies for user access via SNMPv3. Possible values: ▶ `none` No encryption ▶ `des` DES encryption ▶ `aesCfb128` AES-128 encryption

Table 39: "New Entry" frame in the `Security:User Management` dialog (section #x3c;$tblsheetnum> of 3)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Set and back	Transfers the changes to the volatile memory (`RAM`) of the device and goes back to the previous dialog.
Back	Displays the previous dialog again. Changes are lost.
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Remove	Removes the selected table entry.
Create	Adds a new table entry.
Help	Opens the online help.

Table 40: Buttons

2.2 Authentication List

The device only allows users to access its management functions when they log in with valid login data. The device authenticates the users either using the local user management or with a RADIUS server in the network.

With the port-based access control according to IEEE 802.1X, the device only allows connected terminal devices to access the network when they log in with valid login data. The device authenticates the terminal devices either with a RADIUS server in the network or with an integrated authentication server implemented in the device.

In this dialog you manage the authentication lists. In a list you define which method the device uses for the authentication. Here you have the option to differentiate the application with which the device is accessed, e.g. via a console or with the graphical user interface.

■ Table

Parameters	Meaning
Name	Shows the name of the list. To create a new list, you click "Create".

Table 41: Table in the `Security:Authentication List` *dialog*

Parameters	Meaning
Policy 1 Policy 2 Policy 3 Policy 4 Policy 5	Shows the authentication method that the device uses for access via the application specified in the "Dedicated Applications" field. To change the value, click the relevant field. The device gives you the option of a fall-back solution. For this, you specify one other method in each of the "Policy 2" to "Policy 5" fields. If the authentication with the specified method is not successful, the device uses the next policy. Possible values: ▶ `local` The device authenticates the users by using the local user management - see the `Security:User Management` dialog. ▶ `radius` The device authenticates the users with a RADIUS server in the network. You specify the RADIUS server in the `Security:RADIUS:Authentication Server` dialog. ▶ `ias` The device authenticates the terminal devices logging in via 802.1X with the integrated authentication server (IAS) implemented in the device. The integrated authentication server manages the login data in a separate database - see the `Security:802.1X Port Authentication:Integrated Authentication Server` dialog. ▶ `reject` The device rejects the authentication request from the user.
Dedicated Applications	Shows the dedicated applications. When users access the device with the relevant application, the device uses the defined policies for the authentication. To allocate another application to the list or remove the allocation, you click "Allocate Applications". Every application can always be allocated to exactly one list.
Active	Activates/deactivates the list. Possible values: ▶ `Selected` The list is activated. The device uses the policies in this list when users access the device with the relevant application. ▶ `Not selected` The list is deactivated.

Table 41: Table in the `Security:Authentication List` dialog (cont.)

Note: If the table does not contain a list, it is only possible to access the device using CLI via the V.24 interface. In this case, the device authenticates the user by using the local user management - see the `Security:User Management` dialog.

New Entry

In this frame you set up a new authentication list. To display the frame, you click the "Create" button.

Parameters	Meaning
Name	Specifies the name of the list. Possible values: ▶ 1..32 alphanumeric characters
Policy 1 Policy 2 Policy 3 Policy 4 Policy 5	Specifies the authentication method that the device uses. The device gives you the option of a fall-back solution. For this, you specify one other method in each of the "Policy 2" to "Policy 5" fields. Possible values: ▶ `local` The device authenticates the users by using the local user management - see the `Security:User Management` dialog. ▶ `radius` The device authenticates the users with a RADIUS server in the network. You specify the RADIUS server in the `Security:RADIUS:Authentication Server` dialog. ▶ `ias` The device authenticates the terminal devices logging in via 802.1X with the integrated authentication server (IAS) implemented in the device. The integrated authentication server manages the login data in a separate database - see the `Security:802.1X Port Authentication:Integrated Authentication Server` dialog. ▶ `reject` The device rejects the authentication request from the user.
Active	Activates/deactivates the list. Possible values: ▶ `Selected` The list is activated. The device uses the policies in this list when users access the device with the relevant application. ▶ `Not selected` The list is deactivated.

Table 42: "New Entry" frame in the `Security:Authentication List` dialog

Allocate Applications

In this frame you specify the accesses for which the device uses the selected list. For example, to only use the list for accesses via the V.24 interface, you assign the `Console (V.24)` application.

To display the frame, you click the "Allocate Applications" button.

Parameters	Description
Possible Applications	This column contains the applications that can be allocated to the selected list. Possible values: ▶ `Console (V.24)` for accessing the management via the V.24 interface ▶ `SSH` for accessing the management via SSH ▶ `Telnet` for accessing the management via Telnet ▶ `Web Interface` for accessing the management via the graphical user interface ▶ `8021x` for accessing the network via 802.1X **Note:** Every application can always be allocated to exactly one list. It is possible that the applications in this column are already allocated to another list. If you allocate an application to the list that is already allocated to another list, the device removes the original allocation.
Dedicated Applications	This column contains the applications that are allocated to the selected list.

Table 43: "Allocate Applications" frame in the `Security:Authentication List` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Set and back	Transfers the changes to the volatile memory (`RAM`) of the device and goes back to the previous dialog.
Back	Displays the previous dialog again. Changes are lost.

Table 44: Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Remove	Removes the selected table entry.
Create	Adds a new table entry.
Allocate Applications	Displays the "Allocate Applications" dialog.
Help	Opens the online help.
>	Moves the selected entry to the right column.
>>	Moves all entries to the right column.
<	Moves the selected entry to the left column.
<<	Moves all entries to the left column.

Table 44: Buttons (cont.)

2.3 Management Access

This dialog allows you to set up the server services with which users or applications can access the management functions of the device. You also have the option of restricting the access for IP address ranges and individual management services.

The menu contains the following dialogs:

- Server
- SNMPv1/v2 Community
- IP Access Restriction
- Web
- CLI

2.3.1 Server

This dialog allows you to set up the server services with which users or applications can access the management functions of the device.

The dialog contains the following tabs:

- Server: SNMP
- Server: Telnet
- Server: HTTP
- Server: HTTPS
- Server: SSH

2.3.2 Server: SNMP

This tab allows you to define settings for the SNMP server of the device and to switch on/off the access to the device with different SNMP versions.

The SNMP server enables access to the management functions of the device with SNMP-based applications, e.g. with the graphical user interface.

■ Configuration

Parameters	Meaning
SNMPv1 enabled	Activates/deactivates the access to the device with SNMP version 1. Possible values: ▶ `Selected` (default setting) Access activated. ▶ `Not selected` Access deactivated. You define the community name in the `Security:Management Access:SNMPv1/v2 Community` dialog.
SNMPv2 enabled	Activates/deactivates the access to the device with SNMP version 2. Possible values: ▶ `Selected` (default setting) Access activated. ▶ `Not selected` Access deactivated. You define the community name in the `Security:Management Access:SNMPv1/v2 Community` dialog.
SNMPv3 enabled	Activates/deactivates the access to the device with SNMP version 3. Possible values: ▶ `Selected` (default setting) Access activated. ▶ `Not selected` Access deactivated. This function is used, for example, by the Industrial HiVision network management software to make changes to the settings.

Table 45: "Configuration" frame in the `Security:Management Access:Server` dialog, "SNMP" tab page

Parameters	Meaning
Port number	Defines the number of the UDP port from which the SNMP server receives requests from clients. Possible values: ▶ `1..65535` (default setting: `161`) Exception: Port `2222` is reserved for internal functions. To get the server to use the new port after a change, you proceed as follows: □ Click on "Set". □ Select the active device configuration in the `Basic Settings:Load/Save` dialog and click "Save". □ Restart the device.
SNMPover802 enabled	Activates/deactivates the access with SNMP via IEEE 802 networks. Possible values: ▶ `not selected` (default setting) Access deactivated. ▶ `selected` Access activated. This function uses, for example, the HiDiscovery software to configure devices without an IP address.

Table 45: "Configuration" frame in the `Security:Management Access:Server` dialog, "SNMP" tab page (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 46: Buttons

2.3.3 Server: Telnet

This tab allows you to define settings for the Telnet server of the device and to switch the server on/off.

The Telnet server enables access to the management functions of the device with the Command Line Interface via a Telnet connection.

■ Operation

Parameters	Meaning
Operation	If the function is switched on, the Telnet server is activated. Possible values: ▶ `Off` Server is deactivated. ▶ `On` (default setting) Server is activated. You can access the management functions of the device via Telnet.

Table 47: "Operation" frame in the `Security:Management Access:Server` *dialog, "Telnet" tab page*

■ Configuration

Parameters	Meaning
Listen TCP Port	Defines the number of the TCP port from which the server receives requests from clients. Possible values: ▶ `1..65535` (default setting: `23`) Exception: Port `2222` is reserved for internal functions. The server restarts automatically after the port is changed. Existing connections remain in place.
Connection Count	Shows how many clients are currently logged on to the server. Possible values: ▶ `0..5`

Table 48: "Configuration" frame in the `Security:Management Access:Server` *dialog, "Telnet" tab page (section #x3c;$tblsheetnum> of 2)*

Parameters	Meaning
Max. Number of Connections	Defines how many clients can be logged on to the server at the same time. Possible values: ▶ 0..5
Session Timeout [min]	Defines the timeout in minutes. After the device has been inactive for this time it ends the session for the user logged on. Possible values: ▶ 0..160 (default setting: 5) The value 0 deactivates the function. The user remains logged on when inactive.

Table 48: "Configuration" frame in the `Security:Management Access:Server` dialog, "Telnet" tab page (section #x3c;$tblsheetnum> of 2)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 49: Buttons

2.3.4 Server: HTTP

This tab allows you to define settings for the HTTP server of the device and to switch the server on/off.

The HTTP server provides the graphical user interface (GUI) via an HTTP connection. The graphical user interface communicates with the device based on SNMP and enables access to the management functions.

The device supports up to 10 simultaneous connections via HTTP or HTTPS.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device supplies the graphical user interface (GUI) via an HTTP connection. Possible values: ▶ `Off` Server is deactivated. ▶ `On` (default setting) Server is activated. You can access the management functions of the device via HTTP.

Table 50: "Operation" frame in the `Security:Management Access:Server` dialog, "HTTP" tab page

■ Configuration

Parameters	Meaning
Listen TCP Port	Defines the number of the TCP port on which the server receives requests from clients. Possible values: ▶ `1..65535` (default setting: `80`) Exception: Port `2222` is reserved for internal functions. The server restarts automatically after the port is changed. In the process, the device terminates open connections to the server.

Table 51: "Configuration" frame in the `Security:Management Access:Server` dialog, "HTTP" tab page

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 52: Buttons

2.3.5 Server: HTTPS

This tab allows you to define settings for the HTTPS server of the device and to switch the server on/off.

The HTTP server provides the graphical user interface (GUI) via an encrypted HTTP connection. The graphical user interface communicates with the device based on SNMP via the encrypted HTTP connection and enables access to the management functions.

The device supports up to 10 simultaneous connections via HTTP or HTTPS.

A digital certificate is required for the encryption of the HTTP connection. The device allows you to create this certificate yourself or to load an existing certificate onto the device.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device supplies the graphical user interface (GUI) via an encrypted HTTP connection. Possible values: ▶ `Off` Server is deactivated. The management functions of the device can only be accessed via the Command Line Interface (CLI). ▶ `On` (default setting) Server is activated. You can access the management functions of the device via HTTPS. The device can then only be started if there is a certificate on the device.

Table 53: "Operation" frame in the `Security:Management Access:Server` dialog, "HTTPS" tab page

Note: When you switch off the server, the connection between the graphical user interface (GUI) and the device is interrupted. To continue working with the graphical user interface, switch the server on again via the Command Line Interface (CLI).

Configuration

Parameters	Meaning
Listen TCP Port	Defines the number of the TCP port on which the server receives requests from clients. Possible values: ▶ `1..65535` (default setting: `443`) Exception: Port `2222` is reserved for internal functions. The server restarts automatically after the port is changed. In the process, the device terminates open connections to the server.

Table 54: "Configuration" frame in the `Security:Management Access:Server` *dialog, "HTTPS" tab page*

Certificate

Parameters	Meaning
Present	Shows whether the digital certificate is present in the device. Possible values: ▶ `Selected` The certificate is present. ▶ `Not selected` The certificate has been removed.
Create	Creates a digital certificate on the device. To get the server to use this certificate, you click "Set" and restart the server. You can only restart the server via the Command Line Interface (CLI). Alternatively, you can copy your own certificate to the device - see the "Certificate Import" dialog.
Delete	Deletes the digital certificate. To permanently remove the certificate from the device, save the changes. In the process, the device switches off the HTTPS server.

Table 55: "Certificate" frame in the `Security:Management Access:Server` *dialog, "HTTPS" tab page*

Note: In the Web browser, a warning appears when you are loading the graphical user interface if you are using a certificate that has not been verified by a certifying organization. To load the graphical user interface, add an exception rule for the certificate in the Web browser.

Certificate Import

Parameters	Meaning
URL	Defines the path and file name of the certificate. X.509 certificates (PEM) are permitted. The device gives you the following options for copying the certificate to the device: ▶ File upload If the certificate is on your PC or on a network drive, click " … " and select the file that contains the signature key. ▶ TFTP upload If the certificate is on a TFTP server, enter the URL for the file in the following form: `tftp://<IP address>/<path>/<file name>`. ▶ SCP or SFTP upload If the certificate is on an SCP or SFTP server, you enter the URL for the file in the following form: – `scp://` or `sftp://<IP address>/<path>/<file name>` When you click "Import...", the device displays the "Authentication" window. There you enter the "User" and "Password" to login to the server. – `scp://`or `sftp://<user>:<password>@<IP address>/<path>/<file name>`
…	Shows the "Open" dialog. Here you select the certificate file to be copied if the file is located on your PC or on a network drive.
Import	Copies the certificate defined in the "File" field to the device. To get the server to use this certificate, you click "Set" and restart the server. You can only restart the server via the Command Line Interface (CLI).

Table 56: "Certificate Import" frame in the `Security:Management Access:Server` dialog, "HTTPS" tab page

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 57: Buttons

2.3.6 Server: SSH

This tab allows you to switch the SSH server on/off in the device and define its settings.

The server works with SSH version 2. The SSH server enables access to the management functions of the device with the Command Line Interface via an encrypted connection (secure shell).

The SSH server identifies itself to the clients using its public RSA or DSA key. When first setting up the connection, the client program shows the user the fingerprint of this key. The fingerprint contains a hexadecimal number sequence that is easy to check. When you make this number sequence available to the users via a reliable channel, they have the option to compare both fingerprints. If the number sequences match, the client is connected to the correct server.

The device allows you to create the private and public keys (host keys) required for RSA and DSA directly on the device. Otherwise you have the option to copy your own keys to the device in PEM format.

■ Operation

Parameters	Meaning
Operation	If the function is switched on, encrypted access to the management functions of the device is possible via the Command Line Interface (CLI). Possible values: ▶ `Off` Server is deactivated. ▶ `On` (default setting) Server is activated. You can access the management functions of the device via SSH. The server can only be started if there is an RSA or DSA signature on the device. When the function is switched off, existing connections remain in place. However, the device prevents new connections from being set up.

Table 58: "Operation" frame in the `Security:Management Access:Server` dialog, "SSH" tab page

■ Configuration

Parameters	Meaning
Listen TCP Port	Defines the number of the TCP port on which the server receives requests from clients. Possible values: ▶ `1..65535` (default setting: `22`) Exception: Port `2222` is reserved for internal functions. The server restarts automatically after the port is changed. Existing connections remain in place.
Session Count	Shows how many connections to the server are currently set up.
Max. Number of Sessions	Defines the maximum number of connections to the server that can be set up simultaneously. Possible values: ▶ `1..5` (default setting: `5`)
Session Timeout [min]	Defines the timeout in minutes. After the device has been inactive for this time it ends the session for the user logged on. Possible values: ▶ `1..160` (default setting: `5`) The value `0` deactivates the function. The user remains logged on when inactive.

Table 59: "Configuration" frame in the `Security:Management Access:Server` *dialog, "SSH" tab page*

■ Fingerprint

The fingerprint is an easily verified hexadecimal number sequence that uniquely identifies the RSA or DSA key (host key) of the SSH server.

Parameters	Meaning
DSA	Number sequence of the public DSA key of the server.
RSA	Number sequence of the public RSA key of the server.

Table 60: "Server" dialog, "SSH" tab, "Fingerprint" frame

After importing a new RSA or DSA key, the device continues to display the existing fingerprint until you restart the server.

■ Signature

Parameters	Meaning
DSA Present	Shows whether a DSA key (host key) is present in the device. Possible values: ▶ `selected` A key is present. ▶ `not selected` No key is present.
RSA Present	Shows whether an RSA key (host key) is present in the device. Possible values: ▶ `selected` A key is present. ▶ `not selected` No key is present.
Create	Creates a key (host key) on the device. The device only creates the key when the server is deactivated. Length of the key created: ▶ 2048 bit (RSA) ▶ 1024 bit (DSA) To get the server to use the key created, you click "Set". Then you switch the server `on`. Alternatively, you can copy your own key to the device in PEM format - see the "Import" frame.
Delete	Removes the key (host key) from the device. To permanently remove the key from the device, click "Set". Until you restart the server, the existing connections remain in place. However, the device prevents new connections from being set up.

Table 61: "Signature" frame in the `Security:Management Access:Server` dialog, "SSH" tab page

■ Key Import

Parameters	Meaning
URL	Defines the path and file name of your own DSA/RSA key (host key). The device accepts the DSA/RSA key if it has the following key length: ▶ 2048 bit (RSA) ▶ 1024 bit (DSA) The device gives you the following options for copying the key to the device: ▶ File upload If the key is on your PC or on a network drive, click " … " and select the file that contains the key (host key). ▶ TFTP upload If the key is on a TFTP server, enter the URL for the file in the following form: `tftp://<IP address>/<path>/<file name>`. ▶ SCP or SFTP upload If the key is on an SCP or SFTP server, you enter the URL for the file in the following form: – `scp://` or `sftp://<IP address>/<path>/<file name>` When you click "Import...", the device displays the "Authentication" window. There you enter the "User" and "Password" to login to the server. – `scp://`or `sftp://<user>:<password>@<IP address>/<path>/<file name>`
…	Shows the "Open" dialog. Here you select the key to be copied if the file is located on your PC or on a network drive.
Import	Copies the key (host key) defined in the "File" field to the device. To get the server to use this key, you click "Set" and restart the server.

Table 62: "Key Import" frame in the `Security:Management Access:Server` dialog, "SSH" tab page

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 63: Buttons

2.3.7 SNMPv1/v2 Community

With this dialog you can define the community name for SNMPv1/v2 applications.

Applications send requests via SNMPv1/v2 with a community name in the SNMP data packet header. Depending on the community name, the application gets read authorization or read and write authorization for the device.

You activate the access to the device via SNMPv1/v2 in the `Security:Management Access:Server` dialog.

■ Table

Parameters	Meaning
Community	Shows the authorization for SNMPv1/v2 applications to the device: ▶ `Write` For requests with the community name entered beside this, the application gets read and write authorization for the device. ▶ `Read` For requests with the community name entered here, the application gets read authorization for the device.
Name	Defines the community name for the authorization entered beside it. Possible values: ▶ 0..32 alphanumeric characters ▶ including spaces and the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~ ▶ `private` (default setting for read and write authorization) ▶ `public` (default setting for read authorization)

Table 64: Table in the `Security:Management Access:SNMPv1/v2 Community` dialog.

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".

Table 65: Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 65: Buttons (cont.)

2.3.8 IP Access Restriction

This dialog enables you to restrict the access to the management functions of the device to specific IP address ranges and selected IP-based applications.

- If the function is switched off, you can access the management functions of the device from any IP address and via all applications.
- If the function is switched on, the access is restricted. You can only access the management functions under the following conditions:
  - At least one table entry is activated.
    and
  - You are accessing the device with a permitted application from a permitted IP address range.

Operation

Parameters	Meaning
Operation	If the function is switched on, the access to the management functions of the device is restricted. Possible values: ▶ Off (default setting). ▶ On Access to the management functions of the device is restricted.

Table 66: "Operation" frame in the Security:Management Access:IP Access Restriction dialog

Note: Before switching on the function, make sure that at least one active entry in the table allows you access: Otherwise the connection to the device terminates when you change the device configuration. It is then only possible to access the management functions using CLI via the V.24 interface of the device.

Table

You have the option of defining up to 16 table entries and activating them separately.

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. The device automatically defines this number. Possible values: ▶ `1..16` When you delete a table entry, this leaves a gap in the numbering. When you create a new table entry, the device fills the first gap.
IP Address Range	Specifies the IP address range for which you define the access to the management functions with this table entry. Possible values: ▶ Valid IPv4 address and netmask in CIDR notation ▶ `0.0.0.0/0` (default setting for all newly created entries)
HTTP	Activates/deactivates the HTTP access. Possible values: ▶ `selected` (default setting) Access is activated for the adjacent IP address range. ▶ `not selected` Access is deactivated.
HTTPS	Activates/deactivates the HTTPS access. Possible values: ▶ `Selected` (default setting) Access is activated for the adjacent IP address range. ▶ `Not selected` Access is deactivated.

Table 67: Table in the `Security:Management Access:IP Access Restriction` *dialog*

Parameters	Meaning
SNMP	Activates/deactivates the SNMP access. Possible values: ▶ `Selected` (default setting) Access is activated for the adjacent IP address range. ▶ `Not selected` Access is deactivated.
Telnet	Activates/deactivates the Telnet access. Possible values: ▶ `selected` (default setting) Access is activated for the adjacent IP address range. ▶ `not selected` Access is deactivated.
SSH	Activates/deactivates the SSH access. Possible values: ▶ `Selected` (default setting) Access is activated for the adjacent IP address range. ▶ `Not selected` Access is deactivated.
Active	Activates/deactivates the table entry. Possible values: ▶ `Selected` (default setting) Table entry is activated. The device restricts access to its management functions to the adjacent IP address range and the selected IP-based applications. ▶ `Not selected` Table entry is deactivated.

Table 67: Table in the `Security:Management Access:IP Access Restriction` *dialog (cont.)*

In the state on delivery, there is a default entry in the table for the IP address range `0.0.0.0/0`, in which the access for all applications is activated. This table entry allows you access to the device regardless of your location, e.g. to initially configure the function. You have the option to change or delete this table entry. When you create a new table entry it has the same properties.

Note: To start the graphical user interface in a Web browser, you require the "HTTP" or "HTTPS" service. For the graphical user interface to have access to the device, the "SNMP" service is also required. If you are using the graphical user interface outside the Web browser, you only require the "SNMP" service.

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 68: Buttons

2.3.9 Web

With this dialog you can define settings for the graphical user interface (Web-based interface).

Configuration

Parameters	Meaning
Web Interface Session Timeout [min]	Defines the timeout in minutes. After the device has been inactive for this time it ends the session for the user logged on. Possible values: ▶ 0..160 (default setting: 5) The value 0 deactivates the function, and the user remains logged on when inactive.

Table 69: "Configuration" frame in the Security:Management Access:Web dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 70: Buttons

2.3.10 CLI

With this dialog you can define settings for the Command Line Interface (CLI). You will find detailed information on the Command Line Interface in the “Command Line Interface” reference manual.

The dialog contains the following tabs:
- CLI: Global
- CLI Login Banner

2.3.11 CLI: Global

This tab allows you to change the CLI prompt and to define the automatic closing of sessions via the V.24 interface when they have been inactive.

■ Configuration

Parameters	Meaning
Login Prompt	Defines the character string that the device displays in the Command Line Interface (CLI) at the start of every command line. Possible values: ▶ 0..32 alphanumeric characters Default setting: (RSPL) ▶ including spaces and the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~ Changes to this setting are immediately effective in the active CLI session.
V.24 Timeout [min]	Defines the time in minutes after which the device automatically closes the session of a logged on user in the Command Line Interface via the V.24 interface when it has been inactive. Possible values: ▶ 0..160 (default setting: 5) The value 0 deactivates the function, and the user remains logged on when inactive. For Telnet and SSH, you define the timeout in the Security:Management Access:Server dialog.

Table 71: "Configuration" frame in the Security:Management Access:CLI dialog, "Global" tab page

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 72: Buttons

2.3.12 CLI Login Banner

This tab page allows you to replace the CLI start screen with your own text.

In the state on delivery, the CLI start screen shows information about the device, such as the software version and the device settings. With the function on this tab page, you deactivate this information and replace it with an individually defined text.

To display your own text in the CLI and in the graphical user interface before the login, you use the `Security:Pre-login Banner` dialog.

■ Operation

Parameters	Meaning
Operation	When this function is switched on, the device shows the text information defined in the "Banner Text" field to all the users that login to the device via the Command Line Interface (CLI). When the function is switched off, the CLI start screen shows information about the device. The text information in the "Banner Text" field is kept. Possible values: ▶ `Off` (default setting). ▶ `On`

Table 73: "Operation" frame in the `Security:Management Access:CLI` dialog, "Login Banner" tab page

■ Banner Text

Parameters	Meaning
Banner Text	Defines the character string that the device displays in the Command Line Interface at the start of every command line. Possible values: ▶ 0..1024 alphanumeric characters ▶ including spaces, tabs, line breaks and the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~

Table 74: "Banner Text" frame in the `Security:Management Access:CLI` dialog, "Login Banner" tab page

Parameters	Meaning
Remaining Characters	Shows how many characters are still remaining in the "Banner Text" field for the text information.

Table 74: "Banner Text" frame in the `Security:Management Access:CLI` dialog, "Login Banner" tab page (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 75: Buttons

2.4 Port Security

The device allows you to only transmit data packets from desired senders. When this function is switched on, the device checks the VLAN ID and MAC address of the sender before it transmits a data packet. The device discards data packets from other senders and logs this event. This restriction makes MAC Spoofing attacks more difficult.

In this dialog a "Wizard" helps you to connect the device ports with one or more desired senders. In the device these addresses are known as "Static Addresses".

To keep the setup process as simple as possible, the device allows you to record the desired senders automatically. The device “learns” the senders by evaluating the received data packets. In the device these addresses are known as "Dynamic Addresses". When a user-defined upper limit has been reached ("Dynamic Limit"), the device stops the “learning” on the relevant port and only transmits the data packets of the senders already recorded. When you adjust the upper limit to the number of expected senders, you thus make MAC Flooding attacks more difficult.

Note: With the automatic recording of the "Dynamic Addresses", the device always discards the 1st data packet from unknown senders. Using this 1st data packet, the device checks whether the upper limit has been reached. The device records the sender until the upper limit is reached. Afterwards, the device transmits data packets that it receives on the relevant port from this sender.

■ Operation

Parameters	Meaning
Operation	When this function is switched on, the device checks the VLAN ID and MAC address of the sender before it transmits a data packet. Possible values: ▶ On The device only transmits a received data packet if its sender is desired on the relevant device port. Also activate the checking of the sender on the relevant device ports. ▶ Off (default setting) The device transmits every received data packet without checking the sender.

Table 76: "Operation" frame in the Security:Port Security *dialog*

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Active	Activates/deactivates the checking of the sender on the device port. Possible values: ▶ Selected The device checks every data packet received on the device port and transmits it if its sender is desired. You also switch on the function in the "Operation" frame. ▶ Not selected (default setting) The device transmits every data packet received on the port without checking the sender. **Note:** If you are operating the device as an active subscriber within an MRP ring, we recommend setting the value of the field to Not selected.

Table 77: Table in the Security:Port Security *dialog*

Parameters	Meaning
Violation Traps	Activates/deactivates the sending of an SNMP message (trap) when the device discards data packets from an undesired sender on the port. Possible values: ▶ Selected The device sends an SNMP message when it discards data packets from an undesired sender on the port. ▶ Not selected (default setting) The device does not send any SNMP messages. The prerequisite for sending SNMP messages (traps) is that the function is switched on in the Diagnostics:Status Configuration:Alarms (Traps) dialog and at least 1 SNMP manager is defined.
Violation Trap Frequency [s]	Defines the waiting time in seconds that the device waits after sending an SNMP message (trap) before sending the next SNMP message. Possible values: ▶ 0..3600 (default setting: 0) The value 0 deactivates the waiting time.
Dynamic Limit	Specifies the upper limit for the number of automatically recorded senders ("Dynamic Addresses"). When the upper limit has been reached, the device stops the “learning” on this port. Adjust the value to the number of expected senders. Possible values: ▶ 0..600 (default setting: 600) The value 0 deactivates the automatic recording of the senders on this port.
Static Limit	Specifies the upper limit for the number of senders connected to the port ("Static Addresses"). The "Wizard" helps you to connect the port with one or more desired senders. Possible values: ▶ 0..64 (default setting: 64) The value 0 prevents you from connecting a sender with the port.
Current Dynamic	Shows the number of automatically recorded senders ("Dynamic Addresses").
Current Static	Shows the number of senders connected to the port ("Static Addresses").
Last Violating VLAN ID/MAC	Shows the VLAN ID and MAC address of an undesired sender whose data packets the device last discarded on this port.
Trapped Violations	Shows the number of discarded data packets on this device port that caused the device to send an SNMP message (trap).

Table 77: Table in the Security:Port Security dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Wizard	Opens the "Wizard". With the "Wizard" you assign the permitted MAC addresses to a port.
Help	Opens the online help.

Table 78: Buttons

■ Wizard – Select Port

The "Wizard" helps you to connect the device ports with one or more desired senders.

Parameters	Meaning
Select Port	Defines the device port that you assign to the sender in the next step.

Table 79: Wizard in the `Security:Port Security` dialog, "Select Port" page

■ Wizard – Addresses

The "Wizard" helps you to connect the device ports with one or more desired senders. When you have defined the settings, click "Finish". To save the changes afterwards, click `Set` in the "Security:Port Security" dialog.

Parameters	Meaning
VLAN	Specifies the VLAN ID of the desired sender. Possible values: ▶ `1..4042` Click "Add" to transfer the VLAN ID and the MAC address to the "Static Addresses" field.

Table 80: Wizard in the `Security:Port Security` dialog, "Addresses" page

Parameters	Meaning
MAC Address	Specifies the MAC address of the desired sender. Possible values: ▶ Valid Unicast MAC address Enter the value in one of the following formats: – without a separator, e.g. `001122334455` – separated by spaces, e.g. `00 11 22 33 44 55` – separated by colons, e.g. `00:11:22:33:44:55` – separated by hyphens, e.g. `00-11-22-33-44-55` – separated by points, e.g. `00.11.22.33.44.55` – separated by points after every 4th character, e.g. `0011.2233.4455` Click "Add" to transfer the VLAN ID and the MAC address to the "Static Addresses" field.
Add	Transfers the values specified in the "VLAN ID" and "MAC Address" fields to the "Static Addresses" field.
Static Addresses	Shows the VLAN ID and MAC address of desired senders connected to the port. The device uses this field to show the number of senders connected to the port and the upper limit. You specify the upper limit for the number of entries in the table, "Static Limit" field.
Remove	Removes the entries selected in the "Static Addresses" field.
<	Moves the entries selected in the "Dynamic Addresses" field to the "Static Addresses" field.
<<	Moves every entry from the "Dynamic Addresses" field to the "Static Addresses" field. If the "Dynamic Addresses" field contains more entries than are allowed in the "Static Addresses" field, the device moves the foremost entries until the upper limit is reached.
Dynamic Addresses	Shows in ascending order the VLAN ID and MAC address of the senders automatically recorded on this port. The device transmits data packets from these senders when it receives the data packets on this port. You specify the upper limit for the number of entries in the table, "Dynamic Limit" field. The " < " and " << " buttons allow you to transfer entries from this field into the "Static Addresses" field. In this way, you connect relevant sender with the port.

Table 80: Wizard in the `Security:Port Security` dialog, "Addresses" page (cont.)

Button	Meaning
Back	Displays the previous page again. Changes are lost.
Next	Saves the changes and opens the next page.
Finish	Saves the changes and completes the configuration.

Table 81: Buttons

Button	Meaning
Cancel	Closes the Wizard. Changes are lost.

Table 81: Buttons (cont.)

After closing the Wizard, click "Set" to save your settings.

Note: The device stores the senders connected with the port until you deactivate the checking of the sender on the relevant port or in the "Operation" frame.

2.5 802.1X Port Authentication

With the port-based access control according to IEEE 802.1X, the device monitors the access to the network from connected terminal devices. The device (authenticator) only allows a terminal device (supplicant) to access the network when it logs in with valid login data. The authenticator and the terminal devices communicate via the EAPoL (Extensible Authentication Protocol over LANs) authentication protocol.

The device supports the following methods to authenticate terminal devices:

- `radius`
  A RADIUS server in the network authenticates the terminal devices.
- `ias`
  The Integrated Authentication Server (IAS) implemented in the device authenticates the terminal devices. Compared to RADIUS, the IAS only provides basic functions.

The menu contains the following dialogs:

- 802.1X Global
- Port Configuration
- Port Clients
- Statistics
- Port Authentication History
- Integrated Authentication Server

2.5.1 802.1X Global

With this dialog you can define basic settings for the port-based access control.

Operation

Parameters	Meaning
Operation	When this function is switched on, the device checks the access to the network from connected terminal devices. Possible values: ▶ On The port-based access control is activated. ▶ Off (default setting) The port-based access control is deactivated.

Table 82: "Operation" frame in the Security:802.1X Port Authentication:Global dialog

Configuration

Parameters	Meaning
Activate VLAN Assignment	When this function is switched on, the RADIUS authentication server assigns the relevant device port to a VLAN. This function allows you to provide selected services to the connected terminal device in this VLAN. Possible values: ▶ Not selected (default setting) The function is deactivated. The relevant device port is assigned to the VLAN specified in the Security:802.1X Port Authentication:Port Configuration dialog, "Assigned VLAN ID" column. ▶ Selected The function is activated. If the terminal device successfully authenticates itself, the device assigns to the relevant device port the VLAN ID transferred by the RADIUS authentication server.

Table 83: "Configuration" frame in the Security:802.1X Port Authentication:Global dialog

Parameters	Meaning
Activate Dynamic VLAN Creation	When this function is switched on, the device creates the VLAN assigned by the RADIUS authentication server if it does not exist. Possible values: ▶ `Not selected` (default setting) The function is deactivated. If the assigned VLAN does not exist, the port remains assigned to the original VLAN. ▶ `Selected` The function is activated. The device creates the VLAN if it does not exist.
Activate Monitor Mode	Activates/deactivates the Telnet access. When the monitor mode is switched on, the device monitors the authentication and helps with error diagnostics. If a terminal device has not logged in successfully, the device gives the terminal device access to the network. Possible values: ▶ `Not selected` (default setting) The monitor mode is switched off. ▶ `Selected` The monitor mode is switched on.

Table 83: "Configuration" frame in the `Security:802.1X Port Authentication:Global` dialog (cont.)

■ Information

Parameters	Meaning
Monitor Mode Clients	Shows the number of terminal devices to which the device gave network access even though they did not login successfully. The prerequisite is that the "Activate Monitor Mode" function is switched on - see the "Configuration" frame.
Non Monitor Mode Clients	Shows the number of terminal devices to which the device gave network access after they logged in successfully.
Authentication Method	Shows the method that the device currently uses to authenticate the terminal devices using IEEE 802.1X. You specify the method to be used in the `Security:Authentication List` dialog. □ To authenticate the terminal devices via a RADIUS server, you assign the `radius` policy to the `8021x` list. □ To authenticate the terminal devices via the Integrated Authentication Server (IAS) you assign the `ias` policy to the `8021x` list.

Table 84: "Information" frame in the `Security:802.1X Port Authentication:Global` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 85: Buttons

2.5.2 Port Configuration

This dialog allows you to define the access settings for every device port.

Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Port Initialization	Initializes the device port in order to activate the access control on the port or reset it to its initial state. Only use this function if the value auto is specified for the port in the "Port Control" column. Possible values: ▶ Not selected (default setting) Keeps the current state of the device port. ▶ Selected Initializes the device port. When the initialization is complete, the device changes the value to Not selected again.

Table 86: Table in the Security:802.1X Port Authentication:Port Configuration dialog. (section #x3c;$tblsheetnum> of 5)

Parameters	Meaning
Port Reauthentication	If this function is switched on, the authenticator requests the terminal device to login again. Only use this function if the value `auto` is specified for the port in the "Port Control" column. Possible values: ▶ `Not selected` (default setting) Keeps the terminal device logged in. ▶ `Selected` Requests the terminal device to login again. Afterwards, the device changes the value to `Not selected` again. The device also allows you to periodically request the terminal device to login again - see the "Reauthentication Enabled" column.
Authentication Activity	Displays the current state of the authenticator (authenticator PAE state). Possible values: ▶ `initialize` ▶ `disconnected` ▶ `connecting` ▶ `authenticating` ▶ `authenticated` ▶ `aborting authenticating` ▶ `held` ▶ `force Authorized` ▶ `force Unauthorized`
Backend Authentication State	Shows the current state of the connection to the authentication server (backend authentication state). Possible values: ▶ `request` ▶ `response` ▶ `success` ▶ `fail` ▶ `timeout` ▶ `idle` ▶ `initialize`
Authentication State	Shows the current state of the authentication on the device port (controlled port status). Possible values: ▶ `authorized` The terminal device is logged in successfully. ▶ `unauthorized` The terminal device is not logged in.

Table 86: Table in the `Security:802.1X Port Authentication:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 5)

Parameters	Meaning
Port Control	Defines how the device grants access to the network (port control mode). Possible values: ▶ `ForceUnauthorized:` The device blocks the access to the network. You use this setting if a terminal device is connected to the port that does not receive access to the network. ▶ `auto` The device grants access to the network if the terminal device has logged in successfully. You use this setting if a terminal device is connected to the port that logs in at the authenticator. If other terminal devices are connected via the same port, they get access to the network without additional authentication. ▶ `ForceAuthorized` (default setting) The device grants access to the network. You use this setting if a terminal device is connected to the port that receives access to the network without logging in. ▶ `macBased` The device grants access to the network if the terminal device logs in successfully. If the terminal device does not send any EAPoL data packets, the device grants or denies access to the network individually depending on the MAC address of the terminal device. See the "MAC Authorized Bypass Enabled" field. You use this setting if multiple terminal devices are connected to the port.
Quiet Period [s]	Defines the time period in seconds in which the authenticator does not accept any more logins from the terminal device after an unsuccessful login attempt. Possible values: ▶ `0..65535` (default setting: `60`)
Transmit Period [s]	Defines the period in seconds after which the authenticator requests the terminal device to login again. After this waiting period, the device sends an EAP request/identity data packet to the terminal device. Possible values: ▶ `1..65535` (default setting: `30`)
Supplicant Timeout Period [s]	Defines the period in seconds for which the authenticator waits for the login of the terminal device. Possible values: ▶ `1..65535` (default setting: `30`)
Server Timeout [s]	Defines the period in seconds for which the authenticator waits for the response from the authentication server (RADIUS or IAS). Possible values: ▶ `1..65535` (default setting: `30`)

Table 86: Table in the `Security:802.1X Port Authentication:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 5)

Parameters	Meaning
Max Request Constant	Defines how often the authenticator requests the terminal device to login until the time specified in the "Supplicant Timeout Period [s]" has elapsed. The device sends an EAP request/identity data packet to the terminal device as often as specified here. Possible values: ▶ `0..10` (default setting: `2`)
Assigned VLAN ID	Shows the ID of the VLAN that the authenticator assigned to the port. This value only applies if the value `auto` is specified for the port in the "Port Control" column. Possible values: ▶ `0..4042` (default setting: `0`) You will find the VLAN ID that the authenticator assigned to the device ports in the `Security:802.1X Port Authentication:Port Clients` dialog. If the value `macBased` is specified for the port in the "Port Control" column: The device assigns the VLAN tag based on the MAC address of the terminal device when it receives data packets without a VLAN tag.
Assignment Reason	Shows the reason for the assignment of the VLAN ID. This value only applies if the value `auto` is specified for the port in the "Port Control" column. Possible values: ▶ `notAssigned` (default setting) ▶ `radius` ▶ `guestVlan` ▶ `unauthenticatedVLAN` You will find the VLAN ID that the authenticator assigned to the device ports in the `Security:802.1X Port Authentication:Port Clients` dialog.
Reauthentication Period [s]	Defines the period in seconds after which the authenticator periodically requests the terminal device to login again. Possible values: ▶ `1..65535` (default setting: `3600`)
Reauthentication Enabled	If this function is switched on, the authenticator periodically requests the terminal device to login again. Possible values: ▶ `Selected` Periodically requests the terminal device to login again. You specify this time period in the "Reauthentication Period [s]" field. This setting becomes ineffective if the authenticator has assigned the terminal device the ID of a Voice, Unauthenticated or Guest VLAN. ▶ `Not selected` (default setting) Keeps the terminal device logged in.

Table 86: Table in the `Security:802.1X Port Authentication:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 5)

Parameters	Meaning
Guest VLAN ID	Specifies the ID of the VLAN that the authenticator assigns to the port if the terminal device does not login during the time period specified in the "Guest VLAN Period" field. This value only applies if the value `auto` is specified for the port in the "Port Control" column. This function allows you to grant terminal devices without 802.1X support access to selected services in the network. Possible values: ▶ `0..4042` (default setting: `0`) The effect of the value `0` is that the authenticator does not assign a guest VLAN to the port. When you switch on the function in the "MAC Authorized Bypass Enabled" field, the device automatically sets the value to `0`. **Note:** Only assign a VLAN set up statically in the device to the port.
Guest VLAN Period	Defines the period in seconds for which the authenticator waits for EAPOL data packets after the terminal device is connected. If this period elapses, the authenticator grants the terminal device access to the network and assigns the port to the guest VLAN specified in the "Guest VLAN ID" field. Possible values: ▶ `1..300` (default setting: `90`)
Unauthenticated VLAN ID	Specifies the ID of the VLAN that the authenticator assigns to the port if the terminal device does not login successfully. This value only applies if the value `auto` is specified for the port in the "Port Control" column. This function allows you to grant terminal devices without valid login data access to selected services in the network. Possible values: ▶ `0..4042` (default setting: `0`) The effect of the value `0` is that the authenticator does not assign an unauthenticated VLAN to the port. **Note:** Only assign a VLAN set up statically in the device to the port.

Table 86: Table in the `Security:802.1X Port Authentication:Port Configuration` dialog. (section #x3c;$tblsheetnum> of 5)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 87: Buttons

2.5.3 Port Clients

This dialog shows information on the connected terminal devices.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
User Name	Shows the user name with which the terminal device logged in.
MAC Address	Shows the MAC address of the terminal device.
Assigned VLAN ID	Shows the VLAN ID that the authenticator assigned to the port after the successful authentication of the terminal device. If the value macBased is specified for the port in the Security:802.1X Port Authentication:Port Configuration dialog, "Port Control" column: The device assigns the VLAN tag based on the MAC address of the terminal device when it receives data packets without a VLAN tag.

Table 88: Table in the Security:802.1X Port Authentication:Port Clients dialog.

Parameters	Meaning
Assignment Reason	Shows the reason for the assignment of the VLAN. Possible values: ▶ `default` ▶ `radius` ▶ `unauthenticatedVLAN` ▶ `guestVlan` ▶ `monitorVlan` ▶ `invalid` The field only shows a valid value as long as the client is authenticated.
Session Timeout	Shows the remaining time in seconds until the login of the terminal device expires. This value only applies if the value `auto` is specified for the port in the `Security:802.1X Port Authentication:Port Configuration` dialog, "Port Control" column. The authentication server assigns the timeout period to the device via RADIUS. The value `0` means that the authentication server has not assigned a timeout.
Termination Action	Shows the action performed by the device when the login has elapsed. Possible values: ▶ `default` ▶ `reauthenticate`

Table 88: Table in the `Security:802.1X Port Authentication:Port Clients` dialog. (cont.)

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 89: Buttons

2.5.4 Statistics

This dialog shows which EAPoL data packets the terminal device has sent and received for the authentication of the terminal devices.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Received Frames	Shows the total number of EAPOL data packets that the device received on the port.
Transmitted Frames	Shows the total number of EAPOL data packets that the device sent on the port.
Start Frames	Shows the number of EAPOL start data packets that the device received on the port.
Logoff Frames	Shows the number of EAPOL logoff data packets that the device received on the port.
Response/ID Frames	Shows the number of EAP response/identity data packets that the device received on the port.
Response Frames	Shows the number of valid EAP response data packets that the device received on the port (without EAP response/identity data packets).
Request/ID Frames	Shows the number of EAP request/identity data packets that the device received on the port.
Request Frames	Shows the number of valid EAP request data packets that the device received on the port (without EAP request/identity data packets).
Invalid Frames	Shows the number of EAPOL data packets with an unknown frame type that the device received on the port.
Error Frames	Shows the number of EAPOL data packets with an invalid packet body length field that the device received on the port.
Frame Version	Shows the protocol version number of the EAPOL data packet that the device last received on the port.
Frame Source	Shows the sender MAC address of the EAPOL data packet that the device last received on the port. The value `00:00:00:00:00:00` means that the port has not received any EAPOL data packets yet.

Table 90: Table in the `Security:802.1X Port Authentication:Statistics` dialog.

■ Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 91: Buttons

2.5.5 Port Authentication History

The device logs the authentication process of the terminal devices that are connected to its ports. This dialog shows the information recorded during the authentication.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Authentification Time Stamp	Shows the time at which the authenticator authenticated the terminal device.
Result Age	Shows since when this entry has been entered in the table.
MAC Address	Shows the MAC address of the terminal device.
VLAN ID	Shows the ID of the VLAN that was assigned to the terminal device before the login.
Authentication Status	Shows the status of the authentication on the device port. Possible values: ▶ `success` The authentication was successful. ▶ `failure` The authentication failed.

Table 92: Table in the `Security:802.1X Port Authentication:Port Authentication History` dialog.

Parameters	Meaning
Access Status	Shows whether the device grants the terminal device access to the network. Possible values: ▶ `granted` The device grants the terminal device access to the network. ▶ `denied` The device denies the terminal device access to the network.
Assigned VLAN ID	Shows the ID of the VLAN that the authenticator assigned to the port.
Assignment Type	Shows the type of the VLAN that the authenticator assigned to the port. Possible values: ▶ `default` ▶ `radius` ▶ `unauthenticatedVLAN` ▶ `guestVlan` ▶ `monitorVlan` ▶ `notAssigned`
Assignment Reason	Shows the reason for the assignment of the VLAN ID and the VLAN type.

Table 92: Table in the `Security:802.1X Port Authentication:Port Authentication History` dialog. (cont.)

■ Port

Parameters	Meaning
Port	Simplifies the display and in the table shows only the entries relating to the port selected here. This makes it easier for you to record the table and sort it as you desire. Possible values: ▶ `all` The table shows the entries for every device port. ▶ <Port number> The table only shows the entries that apply to the port selected here.

Table 93: "802.1X Port Authentication History" dialog, "Port" field

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Clear History	Deletes the information recorded during the authentication from the table.
Help	Opens the online help.

Table 94: Buttons

2.5.6 Integrated Authentication Server

The Integrated Authentication Server (IAS) allows you to authenticate terminal devices using IEEE 802.1X. Compared to RADIUS, the IAS has a very limited range of functions. The authentication is only based on the user name and the password.

In this dialog you manage the login data of the terminal devices. The device allows you to set up up to 100 sets of login data.

To authenticate the terminal devices via the Integrated Authentication Server you assign the ias policy to the 8021x list in the `Security:Authentication List` dialog.

Table

Parameters	Meaning
User Name	Shows the user name of the terminal device. To create a new user, you click "Create".

Table 95: Table in the `Security:802.1X Port Authentication:Integrated Authentication Server` dialog.

Parameters	Meaning
Password	Specifies the password with which the user authenticates himself. Possible values: ▶ 6..64 alphanumeric characters ▶ including the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~ The device differentiates between upper and lower case.
Active	Activates/deactivates the login data. Possible values: ▶ `Selected` The login data is active. A terminal device has the option to login via 802.1x using this login data. ▶ `Not selected` (default setting) The login data is inactive.

Table 95: Table in the `Security:802.1X Port Authentication:Integrated Authentication Server` dialog. (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 96: Buttons

2.6 RADIUS

With its factory settings, the device authenticates users based on the local user management. However, as the size of a network increases, it becomes more difficult to keep the login data of the users consistent across the devices.

RADIUS (Remote Authentication Dial-In User Service) allows you to manage the users at a central location in the network. A RADIUS server performs the following tasks here:

- Authentication
  The authentication server authenticates the users when the RADIUS client at the access point forwards the users' login data to the server.
- Authorization
  The authentication server authorizes logged in users for selected services by assigning various parameters for the relevant terminal device to the RADIUS client at the access point.
- Accounting
  The accounting server records the traffic data that has occurred during the port authentication according to IEEE 802.1X. This enables you to subsequently determine which services the users have used, and to what extent.

The device works in the role of the RADIUS client if you have assigned the `radius` policy to an application in the `Security:Authentication List` dialog. The device forwards the users' login data to the primary authentication server. The authentication server decides whether the login data is valid and transfers the user's authorizations to the device.

The device also allows you to authenticate terminal devices with IEEE 802.1X via an authentication server. To do this, you assign the `radius` policy to the `8021x` list in the `Security:Authentication List` dialog.

The menu contains the following dialogs:

- Global
- Authentication Server
- Accounting Server
- Authentication Statistics
- Accounting Statistics

2.6.1 Global

This dialog allows you to define basic settings for RADIUS.

■ RADIUS Configuration

Parameters	Meaning
Max. Number of Retransmits	Defines how often the device retransmits an unanswered request to the authentication server before the device sends the request to an alternative authentication server. Possible values: ▶ 1..15 (default setting: 4)
Timeout [s]	Defines how many seconds the device waits for a response after a request to an authentication server before it retransmits the request. Possible values: ▶ 1..30 (default setting: 5)
Enable Accounting Mode	Switches the accounting function on/off. Possible values: ▶ Not selected (default setting) The accounting function is switched off. ▶ Selected The accounting function is switched on. The active server specified in the Security:RADIUS:Accounting Server records the traffic data that occurs during the authentication and the authorization.
NAS IP Address (Attribute 4)	Defines the IP address that the device transfers to the authentication server as attribute 4. Enter the IP address of the device or another freely selectable address. Possible values: ▶ Valid IPv4 address (default setting: 0.0.0.0) In many cases, there is a firewall between the device and the authentication server. In the Network Address Translation (NAT) in the firewall the original IP address changes, and the authentication server receives the translated IP address of the device. The IP address in this field is transferred unchanged by the device across the Network Address Translation (NAT).

Table 97: "RADIUS Configuration" frame in the Security:RADIUS:Global dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Clear Radius Statistics ...	Deletes the statistics in the Security:RADIUS:Authentication Statistics dialog and in the Security:RADIUS:Accounting Statistics dialog.
Help	Opens the online help.

Table 98: Buttons

2.6.2 Authentication Server

This dialog allows you to define up to 8 authentication servers. An authentication server authenticates and authorizes the users when the device forwards the login data to the server.

The device sends the login data to the specified primary authentication server. If the server does not respond, the device contacts the specified secondary authentication server that is highest in the table. If no response comes from this server either, the device contacts the next server in the table.

Table

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. The device automatically defines this number. Possible values: ▶ 1..8

Table 99: Table in the Security:RADIUS:Authentication Server dialog

Parameters	Meaning
Name	Shows the name of the server. To change the value, click the relevant field. Possible values: ▶ 1..32 alphanumeric characters (Default setting: `Default RADIUS Server`)
Address	Specifies the IP address of the server. Possible values: ▶ Valid IPv4 address
UDP Port	Specifies the number of the UDP port on which the server receives requests. Possible values: ▶ `0..65535` (default setting: `1812`) Exception: Port `2222` is reserved for internal functions.
Secret	Shows ****** (asteriks) when a password is specified with which the device logs in to the server. To change the password, click the relevant field. Possible values: ▶ 1..16 alphanumeric characters You get the password from the administrator of the authentication server.
Primary Server	Specifies the authentication server as primary or secondary. Possible values: ▶ `Selected` The server is specified as the primary authentication server. The device sends the login data for authenticating the users to this authentication server. If you select multiple servers, the device specifies the last server selected as the primary authentication server. ▶ `Not selected` (default setting) The server is specified as the secondary authentication server. The device sends the login data to the secondary authentication server if it does not receive a response from the primary authentication server.
Active	Activates/deactivates the connection to the server. Possible values: ▶ `Selected` The connection is active. The device sends the login data for authenticating the users to this server if the preconditions named above are fulfilled. ▶ `Not selected` The connection is inactive. The device does not send any login data to this server.

Table 99: Table in the `Security:RADIUS:Authentication Server` dialog (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 100: Buttons

2.6.3 Accounting Server

This dialog allows you to define up to 8 accounting servers. An accounting server records the traffic data that has occurred during the port authentication according to IEEE 802.1X. The prerequisite for this is that the "Activate accounting mode" function must be activated in the Security:RADIUS:Global menu.

The device sends the traffic data to the first accounting server that can be reached. If it does not respond, the device contacts the next server in the table.

Table

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. The device automatically defines this number. Possible values: ▶ 1..8

Table 101: Table in the Security:RADIUS:Accounting Server dialog

Parameters	Meaning
Name	Shows the name of the server. To change the value, click the relevant field. Possible values: ▶ 1..32 alphanumeric characters (Default setting: `Default RADIUS Server`)
Address	Specifies the IP address of the server. Possible values: ▶ Valid IPv4 address
UDP Port	Specifies the number of the UDP port from which the server receives requests. Possible values: ▶ `0..65535` (default setting: `1813`) Exception: Port `2222` is reserved for internal functions.
Secret	Shows ****** (asteriks) when a password is specified with which the device logs in to the server. To change the password, click the relevant field. Possible values: ▶ 1..16 alphanumeric characters You get the password from the administrator of the authentication server.
Active	Activates/deactivates the connection to the server. Possible values: ▶ `Selected` The connection is active. The device sends traffic data to this server if the preconditions named above are fulfilled. ▶ `Not selected` The connection is inactive. The device does not send any traffic data to this server.

Table 101:Table in the `Security:RADIUS:Accounting Server` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Create	Adds a new table entry.
Delete	Removes the selected table entry.
Help	Opens the online help.

Table 102:Buttons

2.6.4 Authentication Statistics

This dialog shows information about the communication between the device and the authentication server. The table shows the information for each server in a separate row.

To delete the statistics, click `Clear RADIUS Statistics ...` in the "Security:RADIUS:Global" dialog.

■ Table

Parameters	Meaning
Name	Shows the name of the server.
Address	Shows the IP address of the server.
Round Trip Time	Shows the time interval in hundredths of a second between the last response received from the server (Access Reply/Access Challenge) and the corresponding data packet sent (Access Request).
Access Requests	Shows the number of access data packets that the device sent to the server. This value does not take repetitions into account.
Retransmitted Access Request Packets	Shows the number of access data packets that the device retransmitted to the server.
Access Accepts	Shows the number of access accept data packets that the device received from the server.
Access Rejects	Shows the number of access reject data packets that the device received from the server.
Access Challenges	Shows the number of access challenge data packets that the device received from the server.
Malformed Access Responses	Shows the number of malformed access response data packets that the device received from the server (including data packets with an invalid length).
Bad Authenticators	Shows the number of access response data packets with an invalid authenticator that the device received from the server.
Pending Requests	Shows the number of access request data packets that the device sent to the server to which it has not yet received a response from the server.
Timeouts	Shows how often no response to the server was received before the specified waiting time elapsed.
Unknown Types	Shows the number data packets with an unknown data type that the device received from the server on the authentication port.
Packets Dropped	Shows the number of data packets that the device received from the server on the authentication port and then discarded them.

Table 103: "RADIUS Authentication Statistics" dialog, table

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 104: Buttons

2.6.5 Accounting Statistics

This dialog shows information about the communication between the device and the accounting server. The table shows the information for each server in a separate row.

To delete the statistics, click `Clear RADIUS Statistics ...` in the "Security:RADIUS:Global" dialog.

Table

Parameters	Meaning
Name	Shows the name of the server.
Address	Shows the IP address of the server.
Round Trip Time	Shows the time interval in hundredths of a second between the last response received from the server (Accounting Response) and the corresponding data packet sent (Accounting Request).
Accounting Request Packets	Shows the number of accounting request data packets that the device sent to the server. This value does not take repetitions into account.
Retransmitted Accounting Request Packets	Shows the number of accounting request data packets that the device retransmitted to the server.
Received Packets	Shows the number of accounting response data packets that the device received from the server.

Table 105: "RADIUS Accounting Statistics" dialog, table

Parameters	Meaning
Malformed Packets	Shows the number of malformed accounting response data packets that the device received from the server (including data packets with an invalid length).
Bad Authenticators	Shows the number of accounting response data packets with an invalid authenticator that the device received from the server.
Pending Requests	Shows the number of accounting request data packets that the device sent to the server to which it has not yet received a response from the server.
Timeouts	Shows how often no response to the server was received before the specified waiting time elapsed.
Unknown Types	Shows the number data packets with an unknown data type that the device received from the server on the accounting port.
Packets Dropped	Shows the number of data packets that the device received from the server on the accounting port and then discarded them.

Table 105:"RADIUS Accounting Statistics" dialog, table (cont.)

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 106:Buttons

2.7 Pre-login Banner

This dialog allows you to display a greeting or information text to users before they login to the device.

The users see this text in the login dialog of the graphical user interface (GUI) and of the Command Line Interface (CLI). Users logging in with SSH see the text - regardless of the client used - before or during the login.

To display the text only in the Command Line Interface (CLI), you use the settings in the `Security:Management Access:CLI` dialog.

■ Operation

Parameters	Meaning
Operation	When this function is switched on, the device shows a greeting or information text in the login dialog of the graphical user interface (GUI) and of the Command Line Interface (CLI). Possible values: ▶ `Off` (default setting) The device does not show a text in the login dialog. If you entered a text in the "Banner Text" field, this text is kept. ▶ `On` The device shows the text specified in the "Banner Text" field in the login dialog.

Table 107: "Operation" frame in the `Security:Pre-login Banner` dialog

Banner Text

Parameters	Meaning
Banner Text	Specifies the greeting or information text that the device displays in the login dialog of the graphical user interface (GUI) and of the Command Line Interface (CLI). Possible values: ▶ Maximum 512 alphanumeric characters ▶ including spaces, tabs, line breaks and the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~
Remaining Characters	Shows how many characters are still available in the "Banner Text" field. Possible values: ▶ `512..0`

Table 108:"Banner Text" frame in the `Security:Pre-login Banner` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 109:Buttons

3 Time

The device allows you to synchronize the system time in the device and in the network with SNTP (Simple Network Time Protocol).

The device is equipped with a buffered hardware clock. This clock maintains the correct time if the power supply fails or you disconnect the device from the power supply. After the device is started, the current time is available to you, e.g. for log entries.

The hardware clock bridges a power supply downtime of 3 hours. The prerequisite is that the power supply of the device has been connected continually for at least 5 minutes beforehand.

The menu contains the following dialogs:

- Basic Settings
- SNTP

3.1 Basic Settings

With this dialog you can define time-related settings independently of the time synchronization protocol selected.

The dialog contains the following tabs:
- Global
- Daylight Saving Time

3.1.1 Global

On this tab you define the time zone to which the system time in the device refers.

Configuration

Parameters	Meaning
System Time (UTC)	Displays the current date and time with reference to Universal Time Coordinated (UTC).
System Time	Displays the current date and time with reference to the local time: "System Time" = "System Time (UTC)" + "Local Offset [min]" + "Daylight Saving Time"
Set Time from PC	The device uses the time on the PC as the system time.

Table 110: "Configuration" frame in the "Global" tab of the `Time:Basic Settings` *dialog*

Parameters	Meaning
Time Source	Shows the time source from which the device gets the time information. The device automatically selects the available time source with the greatest accuracy. Possible values: ▶ `local` System clock of the device. ▶ `sntp` The SNTP client is activated and the device is synchronized by an SNTP server.
Local Offset [min]	Defines the difference between the local time and the "System Time (UTC)" in minutes: "Local Offset [min]" = "System Time" − "System Time (UTC)" Possible values: ▶ `-780..840` (default value: `60`)
Set Offset from PC	The device determines the time zone on your PC and uses it to calculate the difference between the local time and the "System Time (UTC)".

Table 110: "Configuration" frame in the "Global" tab of the `Time:Basic Settings` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 111: Buttons

3.1.2 Daylight Saving Time

On this tab you activate the automatic daylight saving time switching. You select the beginning and the end of summertime using a predefined profile, or you define these settings individually. During summertime, the device puts the local time forward by 1 hour.

Operation

Parameters	Meaning
Operation	When the function is switched on, the device automatically switches between summertime and wintertime. Possible values: ▶ `On` ▶ `Off` (default setting) The device switches at the times specified in the "Summertime Begin" and "Summertime End" frames.
Profile…	Opens the "Profile" dialog. There you select a predefined configuration for the beginning and the end of summertime. The profile selected overwrites the settings in the "Summertime Begin" and "Summertime End" frames.

Table 112: "Operation" frame in the `Time:Basic Settings` dialog, "Daylight Saving Time" tab page

Summertime Begin

In the first 3 fields you define the day for the beginning of summertime, and in the last field the time.

The devices switches to summertime when the time in the "System Time" field reaches the value entered here.

Parameters	Meaning
Week	Defines the week in the current month. Possible values: ▶ `none` (state on delivery) ▶ `first` ▶ `second` ▶ `third` ▶ `forth` ▶ `last`
Day	Defines the day of the week. Possible values: ▶ `none` (state on delivery) ▶ `sun` ▶ `mon` ▶ `tue` ▶ `wed` ▶ `thu` ▶ `fri` ▶ `sat`
Month	Defines the month. Possible values: ▶ `none` (state on delivery) ▶ `jan` ▶ `feb` ▶ `mar` ▶ `apr` ▶ `mai` ▶ `jun` ▶ `jul` ▶ `aug` ▶ `sep` ▶ `oct` ▶ `nov` ▶ `dec`

Table 113: "Summertime Begin" frame in the `Time:Basic Settings` dialog, "Daylight Saving Time" tab page

Parameters	Meaning
Systemtime	Defines the time. Possible values: ▶ 00:00 (state on delivery) ▶ <HH:MM>

Table 113: "Summertime Begin" frame in the Time:Basic Settings dialog, "Daylight Saving Time" tab page (cont.)

Summertime End

In the first 3 fields you define the day for the end of summertime, and in the last field the time.

The devices switches to normal time when the time in the "System Time" field reaches the value entered here.

Parameters	Meaning
Week	Defines the week in the current month. Possible values: ▶ none (state on delivery) ▶ first ▶ second ▶ third ▶ forth ▶ last
Day	Defines the day of the week. Possible values: ▶ none (state on delivery) ▶ sun ▶ mon ▶ tue ▶ wed ▶ thu ▶ fri ▶ sat

Table 114: "Summertime End" frame in the Time:Basic Settings dialog, "Daylight Saving Time" tab page

Parameters	Meaning
Month	Defines the month. Possible values: ▶ `none` (state on delivery) ▶ `jan` ▶ `feb` ▶ `mar` ▶ `apr` ▶ `mai` ▶ `jun` ▶ `jul` ▶ `aug` ▶ `sep` ▶ `oct` ▶ `nov` ▶ `dec`
Systemtime	Defines the time. Possible values: ▶ `00:00` (state on delivery) ▶ `<HH:MM>`

Table 114: "Summertime End" frame in the `Time:Basic Settings` dialog, "Daylight Saving Time" tab page (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 115: Buttons

3.2 SNTP

SNTP (Simple Network Time Protocol) is a procedure described in the RFC 4330 for time synchronization in the network.

The device allows you to synchronize the system time in the device as an SNTP client. As the SNTP server, the device makes the time information available to other devices.

The menu contains the following dialogs:

- Client
- Server

3.2.1 Client

With this dialog you can define the settings with which the device operates as an SNTP client.

An an SNTP client the device obtains the time information from both SNTP servers and NTP servers and synchronizes the local clock with the time of the time server.

Operation

Parameters	Meaning
Operation	When the function is switched on, the device operates as an SNTP client. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 116: "Operation" frame in the `Time:SNTP:Client` dialog

Configuration

Parameters	Meaning
Mode	Defines whether the device actively requests the time information from an SNTP server known and configured in the network (Unicast mode) or passively waits for the time information from a random SNTP server (Broadcast mode). Possible values: ▶ `unicast` (default setting) The device only takes the time information from the configured SNTP server. The device sends Unicast requests to the SNTP server and evaluates its responses. ▶ `broadcast` The device obtains the time information from one or more SNTP or NTP servers. The device only evaluates the Broadcasts or Multicasts from these servers.
Request Interval [s]	Defines the interval in seconds at which the device requests time information from the SNTP server. Possible values: ▶ `5..3600` (default setting: `30`)
Disable Client after successful Synchronization	Defines whether the device disables the SNTP client when it has successfully synchronized the time. Possible values: ▶ `Selected` The device deactivates the SNTP client after successful synchronization. ▶ `Not selected` (default setting) The SNTP client remains activated after successful synchronization.

Table 117: "Configuration" frame in the `Time:SNTP:Client` dialog

State

Parameters	Meaning
Status	Shows the status of the SNTP client. Possible values: ▶ `disabled` The SNTP client is disabled. ▶ `notSynchronized` The SNTP client is not synchronized with any SNTP or NTP server. ▶ `syncToRemoteServer` The SNTP client is synchronized with an SNTP or NTP server.

Table 118: "State" frame in the `Time:SNTP:Client` dialog

■ Table

In the table you define the settings for up to 4 SNTP servers.

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. Possible values: ▶ `1..4` The device automatically defines this number. When you delete a table entry, this leaves a gap in the numbering. When you create a new table entry, the device fills the first gap. After starting, the device sends requests to the SNTP server configured in the first table entry. If the server does not reply, the device sends its requests to the SNTP server configured in the next table entry. If none of the configured SNTP servers responds in the meantime, the SNTP client loses its synchronization. The device cyclically sends requests to each SNTP server until a server delivers a valid time. The device synchronizes itself with this SNTP server, even if the other servers can be reached again later.
Description	Specifies the name of the SNTP server. Possible values: ▶ 1..32 alphanumeric characters
Address	Specifies the IP address of the SNTP server. Possible values: ▶ Valid IPv4 address (default setting: `0.0.0.0`)
Target UDP Port	Defines the UDP Port on which the SNTP server expects the time information. Possible values: ▶ `1..65535` (default setting: `123`) Exception: Port `2222` is reserved for internal functions.

Table 119: Table in the `Time:SNTP:Client` dialog

Parameters	Meaning
Status	Shows the connection status between the SNTP client and the SNTP server. Possible values: ▶ success The device has successfully synchronized the time with the SNTP server. ▶ badDateEncoded The time information received contains protocol errors - synchronization failed. ▶ other – The value 0.0.0.0 is entered for the IP address of the SNTP server - synchronization failed. or – The SNTP client is using a different SNTP server. ▶ requestTimedOut The device has not received a reply from the SNTP server - synchronization failed. ▶ serverKissOfDeath The SNTP server is overloaded. The device is requested to synchronize itself with another SNTP server. If no other SNTP server is available, the device asks at intervals longer than the setting in the "Request Interval [s]" field, whether the server is still overloaded. ▶ serverUnsynchronized The SNTP server is not synchronized with either a local or an external reference clock - synchronization failed. ▶ versionNotSupported The SNTP versions on the client and the server are incompatible with each other - synchronization failed.
Active	Activates/deactivates the connection to the SNTP server. Possible values: ▶ Selected (default value) The connection to the SNTP server is activated. The SNTP client has access to the SNTP server. ▶ Not selected The connection to the SNTP server is deactivated. The SNTP client has no access to the SNTP server.

Table 119: Table in the `Time:SNTP:Client` dialog (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 120: Buttons

3.2.2 Server

With this dialog you can define the settings with which the device operates as an SNTP server.

The SNTP server provides the Universal Time Coordinated (UTC) without considering local time differences.

If the configuration is such, the SNTP server operates in Broadcast mode: In Broadcast mode, the SNTP server automatically sends Broadcast messages or Multicast messages according to the Broadcast send interval.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device operates as an SNTP server. Possible values: ▶ `On` ▶ `Off` (default setting) Note the setting in the "Disable Server at local Time Source" checkbox in the "Configuration" frame.

Table 121: "Operation" frame in the `Time:SNTP:Server` dialog

■ Configuration

Parameters	Meaning
Listen UDP Port	Defines the number of the UDP port on which the SNTP server of the device receives requests from other clients. Possible values: ▶ `1..65535` (default setting: `123`) Exception: Port `2222` is reserved for internal functions.

Table 122: "Configuration" frame in the `Time:SNTP:Server` dialog

Parameters	Meaning
Broadcast Admin Mode	Activates/deactivates the Broadcast mode: ▶ `Selected` The SNTP server replies to requests from SNTP clients in Unicast mode and also sends SNTP packets in Broadcast mode as Broadcasts or Multicasts. ▶ `Not selected` (default setting) The SNTP server replies to requests from SNTP clients in the Unicast mode.
Broadcast Destination Address	Defines the IP address to which the SNTP server of the device sends the SNTP packets in Broadcast mode. Possible values: ▶ Valid IPv4 address (default setting: `0.0.0.0`) Broadcast and Multicast addresses are permitted.
Broadcast Port	Defines the number of the UDP port at which the SNTP server sends the SNTP packets in Broadcast mode. Possible values: ▶ `1..65535` (default setting: `123`) Exception: Port `2222` is reserved for internal functions.
Broadcast VLAN ID	Defines the ID of the VLAN in which the SNTP server of the device sends the SNTP packets in Broadcast mode. Possible values: ▶ `0..4042` (default setting: `1`) If you set the value to `0`, the SNTP server of the device sends the SNTP packets in the same VLAN in which the management functions of the device can be accessed. See the `Basic Settings:Network` dialog.
Broadcast Send Interval [s]	Defines the time interval at which the SNTP server of the device sends SNTP broadcast packets. Possible values: ▶ `64..1024` (default setting: `128`)
Disable Server at local Time Source	Defines whether the device disables the SNTP Broadcast server when it is synchronized to the local clock. Possible values: ▶ `Selected` The device disables the SNTP Broadcast server when it is synchronized to the local clock. The SNTP server continues to reply to requests from SNTP clients. In the SNTP packet, the SNTP server informs the clients that it is synchronized locally. ▶ `Not selected` (default setting) The SNTP Broadcast server remains active when the device is synchronized to the local clock.

Table 122: "Configuration" frame in the `Time:SNTP:Server` dialog (cont.)

State

Parameters	Meaning
State	Shows the state of the SNTP server. Possible values: ▶ `disabled` The SNTP server is deactivated. ▶ `notSynchronized` The SNTP server is not synchronized with either a local or an external reference clock. ▶ `syncToLocal` The SNTP server is synchronized with the hardware clock of the device. ▶ `syncToRefclock` The SNTP server is synchronized with an external reference clock, e.g. PTP. ▶ `syncToRemoteServer` The SNTP server is synchronized with an SNTP server that is higher than the device in a cascade.

Table 123: "State" frame in the `Time:SNTP:Client` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 124: Buttons

4 Network Security

The device has comprehensive configuration options to help protect individual devices and complex networks against undesired or even dangerous network traffic.

The device can perform the following with data packets

- Accept: The device forwards the data packet to its destination.
- Reject: The device discards the data packet and informs the sender.
- Drop: The device discards the data packet without informing the sender.

The network security area also provides protection against invalid or fake data traffic that aims to bring down specific services or devices (Denial of Service, DoS).

The menu contains the following dialogs:

- DoS

4.1 DoS

The device supports you in protecting against invalid or fake data traffic that aims to bring down specific services or devices (Denial of Service, DoS). With this menu you can use various filters to restrict the data traffic for Denial of Service attacks.

The menu contains the following dialog:
- Global

4.1.1 Global

With this dialog you can configure the DoS settings for the TCP/UDP, IP and ICMP protocols.

TCP/UDP

The attaching stations uses port scans to prepare network attacks. Here the station attempts to use the network to detect the devices present and the services they provide.

This frame allows you to activate or deactivate the detection of port scans.

The device detects the following scan types:
- Null scan
- Xmas scan
- SYN/FIN scan

- TCP offset protection
- TCP SYN protection
- L4 port protection
- Minimal header scan

Parameter	Meaning
Activate Null Scan Filter	Activates or deactivates the null scan. Possible values: ▶ `Selected` The device detects ingress data packets with no TCP flags set and TCP sequence number reset to 0 and discards these. ▶ `Not selected` (default setting) The null scan is deactivated.
Activate Xmas Filter	Activates or deactivates the Xman scan. Possible values: ▶ `Selected` The device detects ingress data packets with the TCP flags FIN, URG and PUSH set simultaneously and TCP sequence number reset to 0 and discards these. ▶ `Not selected` (default setting) The Xmas scan is deactivated.
Activate SYN/FIN Filter	Activates or deactivates the SYN/FIN scan. Possible values: ▶ `Selected` The device detects ingress data packets with the TCP flags SYN and FIN set simultaneously and discards these. ▶ `Not selected` (default setting) The SYN/FIN scan is deactivated.
Activate TCP Offset Protection	Activates or deactivates the TCP offset scan. Possible values: ▶ `Selected` The device detects ingress TCP packets having Fragment Offset field of IP header equal 1 and discards these. The device accepts UDP and ICMP packets having Fragment Offset field of IP header equal 1. ▶ `Not selected` (default setting) The TCP offset scan is deactivated.
Activate TCP SYN Protection	Activates or deactivates the TCP SYN scan. Possible values: ▶ `Selected` The device detects ingress data packets with the TCP SYN flag set and L4 source port <1024 and discards these. ▶ `Not selected` (default setting) The TCP SYN scan is deactivated.

Table 125: "TCP/UDP" frame in the `Network Security:DoS:Global` dialog

Parameter	Meaning
Activate L4 Port Protection	Activates or deactivates the L4 port scan. Possible values: ▶ `Selected` The device detects and discards ingress TCP or UDP data packets for which source port number is identical to the destination port number. ▶ `Not selected` (default setting) The L4 port scan is deactivated.
Activate Minimal Header Filter	Activates or deactivates the minimal header scan. Possible values: ▶ `Selected` The device detects and discards ingress data packets for which the data offset value multiplied by 4 is smaller than the minimum TCP header size. ▶ `Not selected` (default setting) The minimal header scan is deactivated.

Table 125:"TCP/UDP" frame in the `Network Security:DoS:Global` *dialog (cont.)*

■ IP

This frame allows you to activate or deactivate the land attack filter. With the land attack method, the attacking station sends data packets whose source and destination addresses are identical to those of the receiver. When you activate this filter, the device detects data packets with identical source and destination addresses and discards these.

Parameter	Meaning
Activate Land Attack Filter	Activates or deactivates the land attack scan. Possible values: ▶ `Selected` The device detects and discards ingress IP data packets having source IP address identical to destination IP address. ▶ `Not selected` (default setting) The land attack scan is deactivated.

Table 126:"IP" frame in the `Network Security:DoS:Global` *dialog*

■ ICMP

This dialog provides you with filter options for the following ICMP parameters:

- Fragmented data packets
- ICMP packets from a specific size upwards
- Broadcast pings

Parameter	Meaning
Filter Fragmented Packets	Activates or deactivates the filter for fragmented ICMP packets. Possible values: ▶ `Selected` The device detects fragmented ICMP packets and discards these. ▶ `Not selected` (default setting) The filter for fragmented ICMP packets is deactivated.
Allowed Packet Size	Defines the maximum allowed size of ICMP packets in bytes. Possible values: ▶ `0..1472` The maximum allowed size of ICMP packets in bytes ▶ `512` (default setting) The default allowed size of ICMP packets is 512 bytes. **Note:** Select the "Filter by Packet Size" checkbox if you want the device to discard incoming data packets whose size exceeds the maximum allowed size for ICMP packets.
Filter by Packet Size	Activates or deactivates the filter for incoming ICMP data packets whose size exceeds the maximum allowed packet size. Possible values: ▶ `Selected` The device detects and discards ingress ICMP data packets whose size exceeds the allowed packet size (see the input field "Allowed Packet Size"). ▶ `Not selected` (default setting) The device forwards ingress ICMP data packets whose size is less than the allowed packet size.

Table 127:"ICMP" frame in the `Network Security:DoS:Global` *dialog*

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 128: Buttons

5 Switching

With this menu you can configure the settings for the switching.

The menu contains the following dialogs:

- Global
- Rate Limiter
- Filter for MAC addresses
- IGMP
- VLAN

5.1 Global

This dialog allows you to define the following settings:

- Change the aging time of the address table (forwarding database)
- Switch on the flow control in the device
- Switch on the VLAN Unaware Mode

If many large data packets are received in the sending queue of a port, this can cause the port memory to overflow. This happens, for example, when the device receives data at a Gigabit port and forwards it to a port with a lower bandwidth. The device discards surplus data packets.

The flow control mechanism described in standard IEEE 802.3 ensures that no data packets are lost due to a port memory overflowing. Shortly before a port memory is completely full, the device signals to the connected devices that it is not accepting any more data packets from them.

- In full-duplex mode, the device sends a pause data packet.
- In half-duplex mode, the device simulates a collision.

Then the connected devices do not send any more data packets for as long as the signaling takes. On uplink ports, this can possibly cause undesired sending breaks in the higher-level network segment (“wandering backpressure”).

According to standard IEEE 802.1Q, the device forwards data packets with a VLAN tag in a VLAN `≥1`. However, a small number of applications on connected terminal devices send or receive data packets with a VLAN ID=`0`. When the device receives one of these data packets, before forwarding it the device overwrites the original value in the data packet with the VLAN ID of the receiving port. When you switch on the VLAN Unaware Mode, this deactivates the VLAN settings in the device. The device then transparently forwards the data packets on all ports and only evaluates the priority information contained in the data packet.

■ Configuration

Parameters	Meaning
MAC Address	Displays the MAC address of the device.
Aging Time (s)	Defines the aging time in seconds. Possible values: ▶ 10..500000 (default setting: 30) The device monitors the age of the learned Unicast MAC addresses. Address entries that exceed a particular age (aging time) are deleted by the device from its address table (FBD, Forwarding Database). You will find the address table in the Switching:Filter for MAC addresses dialog. In connection with the router redundancy, select a time ≥ 30 s.
Activate Flow Control	Activates/deactivates the flow control globally in the device. Possible values: ▶ Not selected (default setting) ▶ Selected For this, you also activate the "Flow Control" function for the device ports in the Basic Settings:Port Configuration dialog. When you are using a redundancy function, you deactivate the flow control on the participating ports. If the flow control and the redundancy function are active at the same time, there is a risk that the redundancy function will not operate as intended.

Table 129: "Configuration" frame in the Switching:Global dialog

Parameters	Meaning
VLAN Unaware Mode	Defines the bridging mode of the device. Possible values: ▶ `Not selected` (default setting) The device works in the VLAN Aware bridging mode (802.1Q): – The device evaluates the VLAN tags in the data packets. – The device transmits the data packets based on their destination MAC address or destination IP address in the corresponding VLAN. – The device evaluates the priority information contained in the data packet. ▶ `Selected` The device works in the VLAN Unaware bridging mode (802.1D): – The device ignores the VLAN settings in the device and the VLAN tags in the data packets. The device transmits the data packets based on their destination MAC address or destination IP address in VLAN 1. – The device ignores the VLAN settings defined in the `Switching:VLAN:Static` and `Switching:VLAN:Port` dialogs. All the device ports are assigned to VLAN 1. – The device evaluates the priority information contained in the data packet. **Note:** You specify the VLAN ID `1` for all the functions in the device that use VLAN settings. Among other things, this applies to static filters, MRP and IGMP Snooping.

Table 129:"Configuration" frame in the `Switching:Global` dialog (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 130:Buttons

5.2 Rate Limiter

The device allows you to limit the traffic on the ports in order to ensure reliable operation even with a large traffic volume. If the traffic on a port exceeds the traffic value entered, the device discards the excess traffic on this port.

The rate limiter function operates exclusively on layer 2, and is used to limit the effects of storms of data packets that flood the device (typically Broadcasts).

The rate limiter function ignores protocol information on higher levels, such as IP or TCP. With the following measures you reduce the effects on, for example, the TCP traffic:

- Restricting the rate limiter function to specific data packets, e.g. to Broadcasts, Multicasts and Unicasts with an unknown destination address. Excluding Unicasts with a known destination address from this restriction.
- Using the egress limiter function instead of the ingress limiter function. The egress limiter function works somewhat better with the TCP flow control due to the device-internal buffering of the data packets.
- Increasing the aging time for learned Unicast addresses.

The dialog contains the following tabs:

- Ingress
- Egress

Ingress

On this tab you activate the rate limiter function for received data packets. By entering a threshold value you define the maximum amount of traffic the port transmits on the ingress side. If the traffic on this port exceeds the threshold value, the device discards the excess traffic on this port.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.

Table 131: Table in the "Ingress" tab of the `Switching:Rate Limiter` *dialog*

Parameters	Meaning
Threshold	Defines the threshold value for Broadcast, Multicast and Unicast traffic on this port. Possible values: ▶ `0..24414` at 100 MBit/s `0..244140` at 1000 MBit/s (default setting: `0`) The value `0` deactivates the rate limiter function on this port. □ Enter a percentage between 0 and 100 if the value `percent` is selected in the "Threshold Unit" column. □ Enter an absolute value for the data rate if the value `pps` is selected in the "Threshold Unit" column. The rate limiter function calculates the threshold based on data packets sized 512 bytes.
Threshold Unit	Defines the unit for the threshold value: Possible values: ▶ `percent` (default setting) The threshold value is entered as a percentage of the data rate of the port. ▶ `pps` The threshold value is entered in data packets per second.
Broadcast Mode	Activates/deactivates the rate limiter function for received Broadcast data packets. Possible values: ▶ `Not selected` (default setting) ▶ `Selected` If the threshold value is exceeded, the device discards the excess Broadcast data packets on this port.
Multicast Mode	Activates/deactivates the rate limiter function for received Multicast data packets. Possible values: ▶ `Not selected` (default setting) ▶ `Selected` If the threshold value is exceeded, the device discards the excess Multicast data packets on this port.
Unknown Unicast Mode	Activates/deactivates the rate limiter function for received Unicast data packets with an unknown destination address. Possible values: ▶ `Not selected` (default setting) ▶ `Selected` If the threshold value is exceeded, the device discards the excess Unicast data packets on this port.

Table 131: Table in the "Ingress" tab of the `Switching:Rate Limiter` dialog (cont.)

■ Egress

On this tab you activate the rate limiter function for data packets to be sent. By entering a threshold value you define the maximum amount of traffic the port transmits on the egress side. If the traffic on this port exceeds the threshold value, the device discards the excess traffic on this port.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Bandwidth [%]	Defines the threshold value for data packets to be sent on this port. Possible values: ▶ `0..100` (default setting: `0`) The threshold value is entered as a percentage of the data rate of the port: ▶ Enter the percentage of the data rate of the port between `0` and `100`. ▶ The value `0` deactivates the rate limiter function on this port.

Table 132: Table in the "Egress" tab of the `Switching:Rate Limiter` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 133: Buttons

5.3 Filter for MAC addresses

This dialog allows you to display and edit address filters for the address table (forwarding database). Address filters define the way the data packets are forwarded in the device based on the destination MAC address.

Each row in the table represents one filter. The device automatically sets up the filters. The device allows you to set up additional filters manually.

The device transmits the data packets as follows:

- If the table contains an entry for the destination address of a data packet, the device transmits the data packet from the receiving port to the port specified in the table entry.
- If there is no table entry for the destination address, the device transmits the data packet from the receiving port to all the other ports.

Table

Parameters	Meaning
Address	Shows the destination MAC address to which the table entry applies.
Status	Shows how the device has set up the address filter. Possible values: ▶ `learned` Address filter set up automatically by the device based on received data packets. ▶ `permanent` Address filter set up manually. The address filter stays set up permanently. ▶ `igmp` Address filter automatically set up by IGMP Snooping. ▶ `mgmt` MAC address of the device. The address filter is protected against changes. ▶ `invalid` Deletes a manually set up address filter.

Table 134: Table in the `Switching:Filters for MAC Addresses` dialog

Parameters	Meaning
VLAN ID	Shows the ID of the VLAN to which the table entry applies. Possible values: ▶ `1..4042` The device learns the MAC addresses for every VLAN separately (independent VLAN learning).
Ports	Shows how the corresponding device port transmits data packets for the adjacent destination address. Possible values: ▶ `-` The port does not transmit any data packets to the destination address. ▶ `learned` The port transmits data packets to the destination address. The device sets up the filter automatically based on received data packets. ▶ `IGMP learned` The port transmits data packets to the destination address. The device sets up the filter automatically based on IGMP. ▶ `unicast static` The port transmits data packets to the destination address. A user created the filter. ▶ `multicast static` The port transmits data packets to the destination address. A user created the filter.

Table 134: Table in the `Switching:Filters for MAC Addresses` dialog (cont.)

To remove the learned MAC addresses from the address table (forwarding database), click "Reset MAC Address Table" in the `Basic Settings:Restart` dialog.

■ Create

To set up a filter manually, click the "Create" button.

Parameters	Meaning
VLAN ID	Defines the ID of the VLAN to which the table entry applies. Possible values: ▶ All VLAN IDs that are set up

Table 135: "Create" window

Parameters	Meaning
Address	Defines the destination MAC address to which the table entry applies. Possible values: ▶ Valid MAC address Enter the value in one of the following formats: – without a separator, e.g. `001122334455` – separated by spaces, e.g. `00 11 22 33 44 55` – separated by colons, e.g. `00:11:22:33:44:55` – separated by hyphens, e.g. `00-11-22-33-44-55` – separated by points, e.g. `00.11.22.33.44.55` – separated by points after every 4th character, e.g. `0011.2233.4455`
Possible Ports	Defines the device ports to which the device transmits data packets with the destination MAC address: ☐ Select one port if the destination MAC address is a Unicast address. ☐ Select one or more ports if the destination MAC address is a Multicast address. ☐ Select no port to set up a discard filter. The device discards data packets with the destination MAC address specified in the table entry.

Table 135: "Create" window (cont.)

Edit Entry

To manually adapt the settings for a table entry, click the "Edit Entry" button.

Parameters	Meaning
Possible Ports	This column contains the ports available in the device.
Dedicated Ports	This column contains the device ports that are assigned to the table entry. ☐ Select one port if the destination MAC address is a Unicast address. ☐ Select one or more ports if the destination MAC address is a Multicast address. ☐ Select no port to set up a discard filter. The device discards data packets with the destination MAC address specified in the table entry.

Table 136: "Edit Entry" window in the `Switching:Filters for MAC Addresses` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Create	Adds a new table entry.
Edit Entry	Opens the "Edit Entry" window.
Help	Opens the online help.
>	Moves the selected entry to the right column.
>>	Moves all entries to the right column.
<	Moves the selected entry to the left column.
<<	Moves all entries to the left column.

Table 137: Buttons

5.4 IGMP

The IGMP protocol (Internet Group Management protocol) is a protocol for dynamically managing Multicast groups. The protocol describes the distribution of Multicast data packets between routers and terminal devices on Layer 3.

The device allows you to use the IGMP Snooping function to also use the IGMP mechanisms on Layer 2:

- Without IGMP Snooping, the device transmits the Multicast data packets to all the ports.
- With the activated IGMP Snooping function, the device transmits the Multicast data packets exclusively on ports to which Multicast receivers are connected. This reduces the network load. The device evaluates the IGMP data packets transmitted on Layer 3 and uses the information on Layer 2.

□ Activate the IGMP Snooping function not until the following conditions are fulfilled:
  – There is a Multicast router in the network that creates IGMP queries (periodic queries).
  – The devices participating in IGMP Snooping forward the IGMP queries.

The device links the IGMP reports with the entries in its address table (forwarding database). If a Multicast receiver joins a Multicast group (report), the device creates a table entry in the `Switching:Filters for MAC Addresses` dialog for this port. If the Multicast receiver leaves the Multicast group, the device removes the table entry again.

The menu contains the following dialogs:

- Snooping
- IGMP Snooping Enhancements
- IGMP Querier
- Multicasts

5.4.1 Snooping

This dialog allows you to activate the IGMP Snooping protocol in the device and also configure it for each port and each VLAN.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the IGMP Snooping function according to RFC 4541 (Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches) is activated in the device. Possible values: ▶ `On` When the function is switched on, the IGMP Snooping protocol is activated globally in the device. ▶ `Off` (default setting) When the function is switched off, the device transmits received query, report and leave data packets without evaluating them. Received data packets with a Multicast destination address are transmitted to all ports by the device.

Table 138: "Operation" frame in the `Switching:IGMP:IGMP Snooping` dialog

■ Information

Parameters	Meaning
Multicast Control Frames Processed	Shows the number of Multicast control data packets processed. This statistic encompasses the following packet types: – IGMP Reports – IGMP Queries version V1 – IGMP Queries version V2 – IGMP Queries version V3 – IGMP Queries with an incorrect version – PIM or DVMRP packets The device uses the Multicast control data packets to create the address table for transmitting the Multicast data packets. Possible values: ▶ `0..2`^{31}`-1` You use the "Reset IGMP Snooping Counter" button in the `Basic Settings:Restart` dialog or the `clear igmp-snooping` CLI command to reset the IGMP Snooping entries, including the counter for the processed Multicast control data packets.

Table 139: "Information" frame in the `Switching:IGMP:IGMP Snooping` dialog

■ Interface

This tab page allows you to configure the IGMP Snooping protocol for every port.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Active	Activates/deactivates the IGMP Snooping protocol for this port. Prerequisite: The IGMP Snooping protocol is activated globally in the device. Possible values: ▶ `off` (default setting) IGMP Snooping is deactivated for this port. The port has left the Multicast data stream. ▶ `Active` IGMP Snooping is activated for this port. The port is included in the Multicast data stream.

Table 140: "Interface" tab in the `Switching:IGMP:IGMP Snooping` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Group Membership Interval	Defines the time in seconds for which a port from a dynamic Multicast group remains entered in the address table when the device does not receive any more report data packets from the port. In the "Group Membership Interval" field, select a value larger than the value in the "Max Response Time" field. Possible values: ▶ `2..3600` (default setting: `260`)
Max Response Time	Defines the time in seconds in which the members of a Multicast group should respond to a query data packet. For their response, the members select a random time within the response time. You thus help prevent the Multicast group members from responding to the query at the same time. In the "Max Response Time" field, select a value smaller than the value in the "Group Membership Interval" field. Possible values: ▶ `1..25` (default setting: `10`)
MRP Expiration Time	Specifies the MRP (Multicast Router Present) expiration time. The MRP expiration time is the time in seconds for which the device waits for a query on this port. If the port does not receive a query data packet, the device removes the port from the list of ports with connected Multicast routers. Possible values: ▶ `2..3600` (default setting: `260`) The value `0` means an unlimited timeout - no expiration time.
Fast Leave Admin Mode	Activates/deactivates the Fast Leave function for this port. Possible values: ▶ `off` (default setting) When the Fast Leave function is switched off, the device first sends MAC-based queries to the members of the Multicast group, and only removes an entry when a port does not send any more report messages. ▶ `Active` If the device receives an IGMP Leave message from a Multicast group, when the Fast Leave function is switched on it removes the entry immediately from its address table.
Static Query Port	Configures the port as a static query port in all VLANs. Possible values: ▶ `off` (default setting) The port is is not configured as a static query port. The device only transmits IGMP report messages to the port when it receives IGMP queries. ▶ `Active` The port is configured as a static query port.

Table 140: "Interface" tab in the `Switching:IGMP:IGMP Snooping` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
VLAN IDs	Shows the ID of the VLAN to which the table entry applies. Possible values: `1..4042` (VLAN IDs that are set up)

Table 140:"Interface" tab in the `Switching:IGMP:IGMP Snooping` dialog (section #x3c;$tblsheetnum> of 3)

VLAN

This tab page allows you to configure the IGMP Snooping protocol for every VLAN.

Parameters	Meaning
VLAN ID	Shows the ID of the VLAN to which the table entry applies. Possible values: ▶ `1..4042` (VLAN IDs that are set up)
Active	Activates/deactivates the IGMP Snooping protocol for this VLAN. Prerequisite: The IGMP Snooping protocol is activated globally in the device. Possible values: ▶ `off` (default setting) IGMP Snooping is deactivated for this VLAN. The VLAN has left the Multicast data stream. ▶ `Active` IGMP Snooping is activated for this VLAN. The VLAN has joined the Multicast data stream.
Group Membership Interval	Defines the time in seconds for which a VLAN from a dynamic Multicast group remains entered in the address table when the device does not receive any more report data packets from the VLAN. In the "Group Membership Interval" field, select a value larger than the value in the "Max Response Time" field. Possible values: ▶ `2..3600` (default setting: `260`)
Max Response Time	Defines the time in seconds in which the members of a Multicast group should respond to a query data packet. For their response, the members select a random time within the response time. You thus help prevent the Multicast group members from responding to the query at the same time. In the "Max Response Time" field, select a value smaller than the value in the "Group Membership Interval" field. Possible values: ▶ `1..25` (default setting: `10`)

Table 141:"VLAN" tab in the `Switching:IGMP:IGMP Snooping` dialog

Parameters	Meaning
Fast Leave Admin Mode	Activates/deactivates the Fast Leave function for this VLAN. Possible values: ▶ `off` (default setting) When the Fast Leave function is switched off, the device first sends MAC-based queries to the members of the Multicast group, and only removes an entry when a VLAN does not send any more report messages. ▶ `Active` If the device receives an IGMP Leave message from a Multicast group, when the Fast Leave function is switched on it removes the entry immediately from its address table.
MRP Expiration Time	Multicast Router Present Expiration Time. Defines the time in seconds for which the device waits for a query on this port, which belongs to a VLAN. If the port does not receive a query data packet, the device removes the port from the list of ports with connected Multicast routers. You can only configure this parameter if the port belongs to an existing VLAN. Possible values: ▶ `2..3600` (default setting: `260`) The value `0` means an unlimited timeout - no expiration time.

Table 141:"VLAN" tab in the `Switching:IGMP:IGMP Snooping` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 142:Buttons

5.4.2 IGMP Snooping Enhancements

With this dialog you can select a port for a VLAN ID and configure this port.

■ Table

Parameters	Meaning
VLAN ID	Shows the ID of the VLAN to which the table entry applies. Possible values: ▶ 1..4042 (VLAN IDs that are set up)
Port	Shows for every VLAN set up in the device whether the relevant device port is a query port. Additionally, the field shows whether the device transmits all the Multicast streams in the VLAN to this port. Possible values: ▶ - The port is not a query port in this VLAN. ▶ A = Automatic The device has detected the port as a query port. A prerequisite is that the port is configured as Learn by LLDP. ▶ L = Learned The device has detected the port as a query port because the port has received IGMP queries in this VLAN. The port is not a statically configured query port. ▶ ALA = Learn by LLDP (can be set) A user has configured the port as Learn by LLDP. With LLDP (Link Layer Discovery Protocol), the device detects Hirschmann devices connected directly to the port. The device denotes the detected query ports with A. You configure a port as Learn by LLDP by selecting the "Learn by LLDP" checkbox on the "Configuration" page in the "Wizard". ▶ FA = Forward All (can be set) A user has configured the port so that the device transmits all the received Multicast streams in the VLAN to this port. This setting is suited to diagnostic purposes, for example. You configure the port as Forward All by selecting the "Forward All" checkbox on the "Configuration" page in the "Wizard". ▶ S = Static (can be set) A user has configured the port as a static query port. The device only transmits IGMP reports to ports at which it previously received IGMP queries – and to statically configured query ports. You configure the port as a static query port by selecting the "Static" checkbox in the "Configuration" step in the "Wizard".

Table 143: Table in the Switching:IGMP:Snooping Enhancements dialog

Parameters	Meaning
Display Categories	Simplifies the display. The chosen value appears in the table instead of filling the cells with the values assigned by the device. This makes it easier to analyze and sort the table according to your wishes. ▶ `All` Displays every assigned value in the table. ▶ `Learned (L)` Displays in the table the cells which contain, among other possible values, the value `L`. When this value is selected cells containing values other than `L` are displayed as “`-`“. ▶ `Static (S)` Displays in the table the cells which contain, among other possible values, the value `S`. When this value is selected cells containing values other than `S` are displayed as “`-`“. ▶ `Automatic (A)` Displays in the table the cells which contain, among other possible values, the value `A`. When this value is selected cells containing values other than `A` are displayed as “`-`“. ▶ `Learn by LLDP (ALA)` Displays in the table the cells which contain, among other possible values, the value `ALA`. When this value is selected cells containing values other than `ALA` are displayed as “`-`“ ▶ `Forward all (FA)` Displays in the table the cells which contain, among other possible values, the value `FA`. When this value is selected cells containing values other than `FA` are displayed as “`-`“.

Table 144:"Display Categories" pulldown menu in the `Switching:IGMP:Snooping Enhancements` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Wizard	Opens a Wizard that supports you in selecting and configuring a VLAN port.
Help	Opens the online help.

Table 145:Buttons

■ Wizard – Select VLAN Port

This page of the Wizard allows you to assign a VLAN ID to a port.

Parameters	Meaning
VLAN ID	Select the ID of the VLAN. Possible values: ▶ `1..4042`
Port	Select the device port. Possible values: ▶ `1.1, 1.2, 1.3` etc.

Table 146: "Select VLAN Port" dialog in the `Switching:IGMP:Snooping Enhancements` Wizard

■ Wizard – Configuration

This page of the Wizard allows you to configure the selected port.

Parameters	Meaning
VLAN ID	Shows the ID of the VLAN to which the table entry applies. Possible values: ▶ `1..4042` (VLAN IDs that are set up)
Port	Shows the number of the device port to which the table entry relates. Possible values: ▶ `1.1, 1.2, 1.3` etc.
Static	Defines the port as a “static query port”. The device only transmits IGMP report messages to the ports at which it receives IGMP queries. Allows you to also transmit IGMP report messages to other selected ports (`enable`) or connected Hirschmann devices (`Automatic`). Possible values: ▶ `off` (default setting) ▶ `Active`
Learn by LLDP	Defines the port as `Learned by LLDP`. Allows directly connected Hirschmann devices to be detected via LLDP and learned as query ports. Possible values: ▶ `off` (default setting) ▶ `Active`

Table 147: "Configuration" dialog in the `Switching:IGMP:Snooping Enhancements` wizard

Parameters	Meaning
Forward All	Defines the port as `Forward All`. With the `Forward All` setting, the device transmits at this port all data packets with a Multicast address in the destination address field. Possible values: ▶ `off` (default setting) ▶ `Active`

Table 147: "Configuration" dialog in the `Switching:IGMP:Snooping Enhancements` wizard (cont.)

Button	Meaning
Back	Displays the previous page again. Changes are lost.
Next	Saves the changes and opens the next page.
Finish	Saves the changes and completes the configuration.
Cancel	Closes the Wizard. Changes are lost.

Table 148: Buttons

After closing the Wizard, click "Set" to save your settings.

5.4.3 IGMP Querier

The device allows you to send a Multicast stream only to those ports to which a Multicast receiver is connected.

To determine which ports Multicast receivers are connected to, the device sends query data packets to the ports at a definable interval. If a Multicast receiver is connected, it joins the Multicast stream by responding to the device with a report data packet.

This dialog allows you to configure the Snooping Querier settings globally and for the VLANs that are set up.

■ Operation

Parameters	Meaning
Operation	Activates/deactivates the IGMP Querier function globally in the device. Possible values: ▶ `On` ▶ `off` (default setting)

Table 149: "Operation" frame in the `Switching:IGMP:Querier` dialog

■ Configuration

In this frame you define the IGMP Snooping Querier settings for the general query data packets.

Parameters	Meaning
Protocol Version	Defines the IGMP version of the general query data packets. Possible values: ▶ `1` (IGMP v1) ▶ `2` (IGMP v2, default setting) ▶ `3` (IGMP v3)
Query Interval	Defines the time in seconds after which the device generates general query data packets itself when it has received query data packets from the Multicast router. Possible values: ▶ `1..1800` (default setting: `60`)

Table 150: "Configuration" frame in the `Switching:IGMP:Querier` dialog

Parameters	Meaning
Expiry Interval	Defines the time in seconds after which an active querier switches from the passive state back to the active state if it has not received any query packets for longer than the expiry interval. Possible values: ▶ 60..300 (default setting: 125)

Table 150: "Configuration" frame in the Switching:IGMP:Querier dialog (cont.)

■ Table

In the table you define the Snooping Querier settings for the VLANs that are set up.

Parameters	Meaning
VLAN ID	Shows the ID of the VLAN to which the table entry applies.
Active	Activates/deactivates the IGMP Snooping Querier function for this VLAN. Possible values: ▶ off (default setting) The IGMP Snooping Querier function is deactivated for this VLAN. ▶ Active The IGMP Snooping Querier function is activated for this VLAN.
Current State	Shows whether the Snooping Querier is actually active for this VLAN. Possible values: ▶ inactive (default setting) ▶ Active The Snooping Querier is active for this VLAN. ▶ Off The Snooping Querier function is inactive for this VLAN.
Election Participate Mode	Activates/deactivates the Snooping Querier in the selection process if the device detects other queriers in the VLAN. Possible values: ▶ off (default setting) ▶ Active If the Snooping Querier detects a querier source address that is better (i.e. smaller) than the existing one, the device stops sending out queries. The Snooping Querier that wins the selection process continues sending out the queries.

Table 151: Table in the Switching:IGMP:Querier dialog

Parameters	Meaning
Address	Defines the IP address that the device adds as the sender address in generated general query data packets. You use the address of the Multicast router. Possible values: ▶ Valid IP Multicast address (default setting: `0.0.0.0`)
Protocol Version	Shows the IGMP protocol version of the general query data packets. Possible values: ▶ `1` (IGMP v1) ▶ `2` (IGMP v2, default setting) ▶ `3` (IGMP v3)
Max Response Time	Shows the time in seconds in which the members of a Multicast group should respond to a query data packet. For their response, the members select a random time within the response time. This helps to prevent all the Multicast group members from responding to the query at the same time. In the "Max Response Time" field, select a value smaller than the value in the "Group Membership Interval" field. Possible values: ▶ `1..25` (default setting: `10`)
Last Querier Address	Shows the IP address of the Multicast router from which the last received IGMP query was sent out.
Last Querier Version	Shows the IGMP protocol version that the Multicast router used when sending out the last IGMP query received in this VLAN.

Table 151: Table in the `Switching:IGMP:Querier` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 152: Buttons

5.4.4 Multicasts

The device allows you to specify how it transmits data packets with unknown Multicast addresses: Either the device discards these data packets, floods them to all ports, or transmits them only to the ports that previously received query packets.

The device also allows you to transmit the data packets with known Multicast addresses to the query ports.

■ Configuration

Parameters	Meaning
Unknown Multicasts	Defines how the device transmits the data packets with unknown Multicast addresses. Possible values: ▶ `Send to Query Ports` The device sends data packets with an unknown MAC/IP Multicast address to the query ports. ▶ `Send To All Ports` (default setting) The device sends data packets with an unknown MAC/IP Multicast address to the ports. ▶ `Discard` The device discards data packets with an unknown MAC/IP Multicast address.

Table 153: "Configuration" frame in the `Switching:IGMP:Multicasts` *dialog*

■ Table

In the table you define the settings for known Multicasts for the VLANs that are set up.

Parameters	Meaning
VLAN ID	Shows the ID of the VLAN to which the table entry applies.

Table 154: Table in the `Switching:IGMP:Multicasts` *dialog*

Parameters	Meaning
Known Multicasts	Defines how the device transmits the data packets with known Multicast addresses. Possible values: ▶ `Send to query and registered ports` The device sends data packets with an unknown MAC/IP Multicast address to query ports and to registered ports. ▶ `Send to registered Ports` (default setting) The device sends data packets with an unknown MAC/IP Multicast address to registered ports.

Table 154: Table in the `Switching:IGMP:Multicasts` dialog (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 155: Buttons

5.5 VLAN

With VLAN (Virtual Local Area Network) you distribute the data traffic in the physical network to logical subnetworks. This provides you with the following advantages:

- High flexibility
  - With VLAN you distribute the data traffic to logical networks in the existing infrastructure. Without VLAN, it would be necessary to have additional devices and complicated cabling.
  - With VLAN you define network segments independently of the location of the individual terminal devices.
- Improved throughput
  - In VLANs data packets can be transferred by priority.
    If the priority is high, the device transfers the data traffic of a VLAN preferentially, e.g. for time-critical applications such as VoIP phone calls.
  - The network load is considerably reduced if data packets and Broadcasts are distributed in small network segments instead of in the entire network.
- Increased security
  The distribution of the data traffic among individual logical networks makes unwanted accessing more difficult and strengthens the system against attacks such as MAC Flooding or MAC Spoofing.

The device supports packet-based “tagged” VLANs according to the IEEE 802.1Q standard. The VLAN tagging in the data packet indicates the VLAN to which the data packet belongs.

The device transmits the tagged data packets of a VLAN exclusively via ports that are assigned to the same VLAN. This reduces the network load.

Depending on the settings, we differentiate between the following VLANs:

- Static VLANs
  VLANs set up manually by the user.
- Dynamic VLANs
  VLANs set up automatically by the following mechanisms:
  - Redundancy mechanisms

The device learns the MAC addresses for every VLAN separately (independent VLAN learning).

The menu contains the following dialogs:

- Global
- Current
- Static
- Port
- Voice

5.5.1 Global

This dialog allows you to view general VLAN parameters for the device.

Configuration

Parameters	Meaning
Max. VLAN ID	Biggest ID that you can assign to a VLAN. See the `Switching:VLAN:Static` dialog.
Max. Number of VLANs	Maximum number of VLANs that you can set up in the device. See the `Switching:VLAN:Static` dialog.
Number of VLANs	Number of VLANs currently set up in the device. See the `Switching:VLAN:Static` dialog. The VLAN with ID 1 is always set up in the device.

Table 156:"Configuration" frame in the `Switching:VLAN:Global` dialog

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.

Table 157:Buttons

Button	Meaning
Clear…	Resets the VLAN settings of the device to the state on delivery. Caution: You block your access to the device if you have changed the VLAN ID for the management functions of the device in the `Basic Settings:Network` dialog.
Help	Opens the online help.

Table 157: Buttons (cont.)

5.5.2 Current

This dialog allows you to view the static and dynamic VLANs that are set up. The table shows the ports to which the device distributes the data packets for the corresponding VLAN, and how the port handles the tagging of the data packets. You can make changes to the entries in the `Switching:VLAN:Static` dialog.

The device transmits the data packets in the corresponding VLAN if the `VLAN Unaware Mode` function is deactivated in the "Switching:Global" dialog.

■ Table

Parameters	Meaning
VLAN ID	ID of the VLAN.
Status	Shows how the VLAN is set up. Possible values: ▶ `other` Only for VLAN 1. ▶ `permanent` Manually set up VLAN. If the device is reset, the configuration of this VLAN remains in the device.

Table 158: Table in the `Switching:VLAN:Current` dialog

Parameters	Meaning
Creation Time	Shows the time stamp for the operating time (system uptime). The VLAN has been set up in the device since this time. Possible values: ▶ day(s), hh:mm:ss
Port	Shows on which ports the device transmits the data packets for the corresponding VLANs, and how it handles the VLAN tagging. Possible values: ▶ `-` The port does not transmit any data packets for the VLAN. The port is not a member of the VLAN. ▶ `T` The port transmits data packets with a VLAN tag (tagged). ▶ `U` The port transmits data packets without a VLAN tag (untagged).

Table 158: Table in the `Switching:VLAN:Current` dialog (cont.)

■ Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 159: Buttons

5.5.3 Static

This dialog allows you to set up and manage VLANs. For each VLAN you specify to which ports the sending of a data packet is allowed, and whether the port sends the data packet with or without a VLAN tag.
This dialog allows you to create and manage VLANs. In the table you assign the VLANs that are set up to the device ports. In the process you define whether a port transmits data packets in the corresponding VLAN, and how the port handles the VLAN tagging.

The device transmits the data packets in the corresponding VLAN if the `VLAN Unaware Mode` function is deactivated in the "Switching:Global" dialog.

Note: The VLAN settings are only effective if the VLAN Unaware Mode is switched off - see the `Switching:Global` dialog.

■ Table

Parameters	Meaning
VLAN ID	ID of the VLAN. The device supports up to 128 VLANs set up simultaneously. Possible values: ▶ `1..4042`
Name	Name of the VLAN. The device automatically specifies the name. You can change the name at any time. Possible values: ▶ 1..32 alphanumeric characters (state on delivery: `default` for VLAN 1, otherwise `VLANxxxx`)

Table 160: Table in the `Switching:VLAN:Static` dialog

Parameters	Meaning
Port	Defines on which ports the device transmits the data packets for the corresponding VLANs, and how it handles the VLAN tagging. Possible values: ▶ `-` (state on delivery) The port does not transmit any data packets for the VLAN. The port is not a member of the VLAN. ▶ `T` The port transmits data packets with a VLAN tag (tagged). You use this setting for an uplink connection, for example. ▶ `U` (state on delivery for VLAN 1) The port transmits data packets without a VLAN tag (untagged). Use this setting if the connected terminal device does not evaluate any VLAN tags. ▶ `F` The port does not transmit any data packets, neither from static nor dynamic VLANs (forbidden). Use this setting if the connected terminal device does not evaluate any VLAN tags.

Table 160:Table in the `Switching:VLAN:Static` dialog (cont.)

Note: When configuring the VLAN, ensure that the management station still has access to the device after the VLAN configuration is saved. Connect the management station to a port that is a member of the VLAN that is selected as the management VLAN. In the state on delivery, the device transmits the management data in VLAN 1.

The device automatically creates VLANs for MRP rings. The MRP ring function prevents the deletion of these VLANs.
Note the tagging settings for ports that are part of a redundant ring.

Note: In a redundant ring with VLANs, you should only operate devices whose software version supports VLANs:

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".

Table 161:Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 161: Buttons (cont.)

5.5.4 Port

In this dialog you specify how the device handles received data packets that have no VLAN tag, or whose VLAN tag differs from the VLAN ID of the port.

This dialog allows you to assign a VLAN to the device ports and thus define the port VLAN ID.
Additionally, you also define for each device port how the device transmits data packets when the VLAN Unaware mode is switched off if one of the following situations occurs:

- The port receives data packets without a VLAN tagging.
- The port receives data packets with VLAN priority information (VLAN ID 0, priority tagged).
- The VLAN tagging of the data packet differs from the VLAN ID of the port.

Note: The VLAN settings are only effective if the VLAN Unaware Mode is switched off - see the Switching:Global dialog.

Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.

Table 162: Switching:VLAN:Port dialog

Parameters	Meaning
Port VLAN ID	The port assigns to this VLAN data packets that have no VLAN tag. This setting is effective if you have selected the value "admitAll" in the `Acceptable Frame Types` column. Possible values: ▶ All VLAN IDs that are set up (default setting: `1`)
Acceptable Frame Types	Defines whether the port transmits or discards received data packets without a VLAN tag. Possible values: ▶ `admitAll` (default setting) The port accepts data packets both with and without a VLAN tag. ▶ `admitOnlyVlanTagged` The port only accepts data packets tagged with a VLAN ID ≥ `1`.
Ingress Filtering	Defines whether the port transmits or discards received data packets with a VLAN tagging. Possible values: ▶ `selected` The device compares the VLAN tagging in the data packet with the VLANs to which the device sends on this port according to the `Switching:VLAN:Static` dialog. If the VLAN tagging in the data packet matches one of these VLANs, the port forwards the data packet to ports in this VLAN. Otherwise the port discards the data packet. ▶ `not selected` (default setting) The port forwards data packets received with a VLAN tagging to other ports without comparing the VLAN IDs. Thus the port also transmits data packets with a VLAN tagging even though it is not a member of this VLAN.

Table 162:`Switching:VLAN:Port` dialog (cont.)

Note: If the MRP-Ring configuration is assigned to a VLAN, the device automatically performs the VLAN configuration for this port.
If the MRP-Ring configuration is not assigned to a VLAN, select the port VLAN ID 1.

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.

Table 163:Buttons

Button	Meaning
Help	Opens the online help.

Table 163: Buttons (cont.)

5.5.5 Voice

Use the Voice VLAN feature to separate voice and data traffic on a port, by VLAN and/or priority. A primary benefit of Voice VLAN is safeguarding the quality of voice traffic when data traffic on the port is high.

The device detects VoIP devices via Link Layer Discovery Protocol - Media Endpoint Discovery (LLDP-MED). The device then adds the appropriate switch port to the member set of the configured Voice VLAN. The member set is either a tagged or an untagged member. Tagging depends on the Voice VLAN interface mode (VLAN ID, Dot1p, None, Untagged).

Another benefit of the Voice VLAN feature is that the VOIP device obtains VLAN ID or priority information via LLDP-MED from the switch. As a result, the phone sends voice data tagged as priority, or untagged depending on the configured Voice VLAN Interface mode. You configure the switch to support Voice VLAN on a port that is connecting to the VOIP phone.

■ Operation

Parameters	Meaning
Operation	Activates/deactivates the Voice VLAN function globally on the device. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 164: "Operation" frame in the `Switching:VLAN:Voice` dialog

Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Voice VLAN Mode	Defines whether the port transmits or discards received data packets without Voice VLAN tagging or data packets with Voice VLAN priority information: Possible values: ▶ `disable` (default setting) Disables the Voice VLAN function for this table entry. ▶ `none` Allows the IP phone to use its own configuration to send untagged voice traffic. ▶ `vlan/dot1p-priority` The port filters Voice VLAN data packets based on vlan and dot1p priority tagging. ▶ `untagged` The port filters data packets without a Voice VLAN tag. ▶ `vlan` The port filters Voice VLAN data packets based on vlan tagging. ▶ `dot1p` The port filters Voice VLAN data packets based on dot1p tagging. Configure the "Priority" value when using this option.
Data Priority Mode	Defines the trust mode for data traffic on the port. The device uses this mode for data traffic on the Voice VLAN, when co-locating a VoIP phone and PC and both use the same cable to transmit data. Possible values: ▶ `trust` (default setting) This setting allows the data traffic to run at a normal priority with voice traffic present on the interface. ▶ `untrust` With voice traffic present and the "Voice VLAN Mode" set to `dot1p-priority`, data traffic uses priority 0. When the interface forwards data traffic exclusively, the data traffic uses the normal priority.
Status	Shows the status of the Voice VLAN on the port. Possible values: ▶ `enabled` ▶ `disabled`
VLAN ID	Defines the ID of the VLAN to which the table entry applies. To forward traffic to this VLAN ID using this filter, set the "Voice VLAN Mode" to `vlan`. Possible values: ▶ `1..4042` (VLAN IDs that are set up)

Table 165: Table in the `Switching:VLAN:Voice` dialog

Parameters	Meaning
Priority	Defines the port Voice VLAN Priority if the Voice Vlan Mode is `dot1p`. Possible values: ▶ `0..7` ▶ `none` Deactivates the Voice VLAN Priority of the port.
Bypass authentification	Sets the port Voice VLAN Authentication mode. Voice devices require authentication when you disable this feature, and set the Voice VLAN Mode to `dot1p`. Possible values: ▶ `enable` If you enabled the global dot1x functionality on the device, then before enabling this feature, set the "Port Control" mode to `macBased` for this port. The "Port Control " feature is in the `Security:802.1x Port Authentication:Port Configuration` dialog. ▶ `disable` (default setting)

Table 165: Table in the `Switching:VLAN:Voice` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 166: Buttons

6 QoS/Priority

Communication networks transmit a number of applications at the same time that have different requirements as regards availability, bandwidth and latency periods.

QoS (Quality of Service) is a procedure defined in IEEE 802.1D. It is used to distribute resources in the network. You therefore have the possibility of providing minimum bandwidth for important applications. Prerequisite for this is that the end devices and the devices in the network support prioritized data transmission. Data packets with high priority are given preference when transmitted by devices in the network. You transfer data packets with lower priority when there are no data packets with a higher priority to be transmitted.

The device provides the following setting options:

- You specify how the device evaluates QoS/prioritization information for inbound data packets.
- For outbound packets, you specify which QoS/prioritization information the device writes in the data packet (e.g. priority for management packets, port priority).

Note: Switch off flow control if you use the functions in this menu. The flow control is switched off if "Activate Flow Control" is unselected in the `Switching:Global` dialog, "Configuration" frame .

The menu contains the following dialogs:

- Global
- Port Configuration
- 802.1D/p Mapping
- IP DSCP Mapping
- Queue Management

6.1 Global

The device allows you to maintain access to the management functions, even in situations with heavy utilization. In this dialog you define the required QoS/priority settings.

■ Configuration

Parameters	Meaning
VLAN Priority for Management packets	Defines the VLAN priority for management data packets to be sent. The device sends the management data packets with the priority specified here. Possible values: ▶ `0..7` (default setting: `0`) In the `QoS/Priority:802.1D/p Mapping` dialog you assign the VLAN priority to the traffic classes and thus the data packets to a priority queue of the port.
IP-DSCP Value for Management packets	Defines the DSCP value for data packets that the management of the device sends. Possible values: ▶ `0..63` (default setting: `0(be/cs0)`) Some values in the list also have a DSCP keyword, e.g. `be/cs0`, `af11` and `ef`. These values are compatible with the IP precedence model. In the `QoS/Priority:IP DSCP Mapping` dialog you assign the IP DSCP value to the traffic classes and thus the data packets to a priority queue of the port.
Number of Queues per Port	Shows the number of priority queues per device port. Every priority queue is assigned to traffic classes (traffic class based on IEEE 802.1D). The device supports 8 priority queues.

Table 167:"Configuration" frame in the `QoS/Priority:Global` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 168: Buttons

6.2 Port Configuration

In this dialog you define the QoS/priority settings for each device port for received data packets.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Port Priority	Defines the port priority. The device exchanges the data packets received on the port according to the assigned traffic class. Possible values: ▶ `0..7` (default setting: `0`) Prerequisite: In the "Trust Mode" column you have selected the value as follows: ▶ `untrusted` or ▶ `trustDot1p` The data packets do not contain a VLAN tag or priority tag. or ▶ `trustIpDscp` The data packets are not IP packets. The `QoS/Priority:802.1D/p Mapping` dialog shows which traffic class has been assigned to the respective VLAN priority. The device assigns the data packets to a traffic class depending on their VLAN priority and thereby sorts them in the priority queue.

Table 169: Table in the `QoS/Priority:Port Configuration` dialog

Parameters	Meaning
Trust Mode	Defines how the device handles received data packets that contain QoS/priority information. Possible values: ▶ `untrusted` The device ignores the QoS/priority information contained in the data packets and prioritizes them according to the value entered in the "Port Priority" column. ▶ `trustDot1p` (default setting) – Data packets with a VLAN tag are prioritized by the device according to the QoS/priority information contained in the data packet. The `QoS/Priority:802.1D/p Mapping` dialog shows the traffic class to which the respective VLAN priority is assigned. The device assigns the data packets to a traffic class depending on their VLAN priority and thereby sorts them in the priority queue. – Data packets without a VLAN tag are prioritized by the device according to the value defined in the "Port Priority" column. ▶ `trustIpDscp` – The device prioritizes IP data packets according to their DSCP value. The `QoS/Priority:IP DSCP Mapping` dialog displays the traffic class to which the respective IP-DSCP value is assigned. The device assigns the data packets to a traffic class depending on their IP-DSCP value and thereby sorts them in the priority queue. – The device assigns the changed VLAN priority to the data packet in accordance with its DSCP value. – Data packets that are not IP data packets are prioritized by the device according to the value defined in the "Port Priority" column.
Untrusted Traffic Class	Shows the traffic class. If you have defined the value `untrusted` in the "Trust Mode" column, the device assigns the data packets to this traffic class. Possible values: ▶ `0..7` In the `QoS/Priority:802.1D/p Mapping` dialog you assign the VLAN priority to the traffic classes and thus the data packets to a priority queue of the port.

Table 169: Table in the `QoS/Priority:Port Configuration` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".

Table 170: Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 170: Buttons (cont.)

6.3 802.1D/p Mapping

The device allows you send data packets with a VLAN tagging according to the QoS/priority information contained in the data packet with a higher or lower priority.

In this dialog you assign the VLAN priority to the traffic classes. The traffic classes are assigned to the priority queues of the device ports.

■ Table

To change the settings click the desired row of the "Traffic Class" column and modify the value.

Parameters	Meaning
VLAN Priority	VLAN priority of received data packets.
Traffic Class	Defines the traffic class. Possible values: ▶ `0..7` The traffic classes are assigned to the priority queues of the device ports: ▶ Traffic class `7` ... queue with the highest priority ▶ Traffic class `0` ... queue with the lowest priority

Table 171: Table in the `QoS/Priority:802.1D/p Mapping` dialog

VLAN Priority	Traffic class	Content description according to IEEE 802.1D
0	2	Best Effort Normal data without prioritizing.
1	0	Background Non-time critical data and background services.
2	1	Standard Normal data.
3	3	Excellent Effort Important data.
4	4	Controlled load Time-critical data with a high priority.
5	5	Video Video transmission with delays and jitter < 100 ms.

Table 172: Default assignment of the VLAN priority to the traffic classes

VLAN Priority	Traffic class	Content description according to IEEE 802.1D
6	6	Voice Voice transmission with delays and jitter < 10 ms.
7	7	Network Control Data for network management and redundancy mechanisms.

Table 172: Default assignment of the VLAN priority to the traffic classes (cont.)

Note: Network management protocols and redundancy mechanisms use the highest traffic class. Therefore, select another traffic class for application data.

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 173: Buttons

6.4 IP DSCP Mapping

The device allows you send IP data packets according to the DSCP value contained in the data packet with a higher or lower priority.

In this dialog you assign the DSCP values to the traffic classes. The traffic classes are assigned to the priority queues of the device ports.

■ Table

To change the settings click the desired row of the "Traffic class" column and modify the value.

Parameters	Meaning
DSCP Value	Shows the DSCP value of received IP data packets.
Traffic Class	Defines the traffic class. Possible values: ▶ `0..7` The traffic classes are assigned to the priority queues of the device ports: ▶ Traffic class `7` … queue with the highest priority ▶ Traffic class `0` … queue with the lowest priority

Table 174: Table in the `QoS/Priority:802.1D/p Mapping` dialog

DSCP Value	DSCP Name	Traffic class
0	Best Effort /CS0	2
1-7		2
8	CS1	0
9,11,13,15		0
10,12,14	AF11,AF12,AF13	0
16	CS2	1
17,19,21,23		1
18,20,22	AF21,AF22,AF23	1
24	CS3	3
25,27,29,31		3
26,28,30	AF31,AF32,AF33	3
32	CS4	4
33,35,37,39		4

Table 175: Default assignment of the DSCP values to the traffic classes

DSCP Value	DSCP Name	Traffic class
34,36,38	AF41,AF42,AF43	4
40	CS5	5
41,42,43,44,45,47		5
46	EF	5
48	CS6	6
49-55		6
56	CS7	7
57-63		7

Table 175: Default assignment of the DSCP values to the traffic classes (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 176: Buttons

6.5 Queue Management

With this dialog you can activate/deactivate the "Strict Priority" function for the traffic classes. When the "Strict Priority" function is switched off, the device controls the processing of the priority queue with Weighted Fair Queuing.

You have the option of assigning minimum bandwidths for Weighted Fair Queuing to traffic classes.

■ Table

Parameters	Meaning
Traffic Class	Shows the traffic class assigned to a priority queue of the ports.
Strict Priority	Defines whether the device processes the priority queues of the ports with "Strict Priority" or with Weighted Fair Queuing. Possible values: ▶ `Selected` (default setting) Strict Priority: – You use this setting for time- and latency-critical applications such as VoIP or video. – The device port only sends data packets that are in the priority queue with the highest priority. If this priority queue is empty, the device port sends data packets that are in the priority queue with the next lower priority. – The device port only sends data packets with a lower traffic class when the priority queues with a higher priority are empty. In unfavorable situations, the device port never sends these data packets. – In this setting, the device switches the function on automatically, even for all traffic classes with a higher priority. ▶ `Not selected` Weighted Fair Queuing/Weighted Round Robin (WRR): – The user assigns a minimum bandwidth to each traffic class. – The device port transmits data packets with a low traffic class even if there is high utilization. – In this setting, the device switches the function off automatically, even for all traffic classes with a lower priority.

Table 177: Table in the `QoS/Priority:Queue Management` dialog

Parameters	Meaning
Min Bandwidth [%]	Defines the minimum bandwidth for this traffic class when the device is processing the priority queues of the ports with Weighted Fair Queuing. Possible values: ▶ `0..100` (default setting: `0`) The value entered in percent refers to the available bandwidth on the port. When you switch off the "Strict Priority" function for all traffic classes, the maximum bandwidth is available on the ports for the Weighted Fair Queuing. The total of the bandwidths assigned to the individual traffic classes is a maximum of 100%. The value `0` means that the device does not reserve any bandwidth for this traffic class.

Table 177: Table in the `QoS/Priority:Queue Management` dialog (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 178: Buttons

7 Redundancy

This menu allows you to configure and monitor the settings for redundancy mechanisms.
The “Redundancy Configuration User Manual” document contains detailed information that you require to select the suitable redundancy procedure and configure it.

The menu contains the following dialogs:

- MRP
- Spanning Tree

7.1 MRP

The MRP (Media Redundancy Protocol) is a protocol that enables you to set up high-availability, ring-shaped network structures. An MRP-Ring is made up of up to 50 devices that support the MRP protocol according to IEC 62439.

The ring structure of an MRP-Ring changes back into a line structure if a section fails. The maximum switching time can be configured.

The Ring Manager function of the device enables the ends of a backbone in a line structure to be closed to a redundant ring.

Note: For all devices in an MRP-Ring, activate the MRP compatibility in the `Redundancy:Spanning Tree:Global` dialog if you want to use RSTP in the MRP-Ring. If this is not possible, perhaps because individual devices do not support the MRP compatibility, you deactivate the Spanning Tree protocol on the ports connected to the MRP-Ring. Spanning Tree and Ring Redundancy affect each other.

Note: If you combine RSTP with an MRP-Ring, you must give the devices in the MRP-Ring a better (i.e. numerically lower) RSTP bridge priority than the devices in the connected RSTP network. You thus help avoid a connection interruption for devices outside the Ring.

⚠ **WARNING**

RING LOOP HAZARD

To avoid loops during the configuration phase, configure all the devices individually. Before you connect the redundant line, be sure to complete the configuration of all the devices.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

■ Operation

Parameters	Meaning
Operation	When you have configured all the parameters for the MRP-Ring, you switch the function on here. Possible values: ▶ `Off` (default setting) ▶ `On` When you have configured all the devices in the MRP-Ring, the redundancy is activated.

Table 179:"Operation" frame in the `Redundancy:MRP` dialog

■ Ring Port 1/Ring Port 2

Parameters	Meaning
Port	Number of the device port that is operating as a ring port.
Operation	Shows the operating status of the ring port. Possible values: ▶ `forwarding` Port is switched on, connection exists. ▶ `blocked` Port is blocked, connection exists. ▶ `disabled` Port is disabled. ▶ `not connected` No connection exists.

Table 180:"Ring Port 1" frame/"Ring Port 2" frame in the `Redundancy:MRP` dialog

Configuration

Parameters	Meaning
Ring Manager	Defines whether the device is operating as a ring manager. Possible values: ▶ `Off` (default setting) Device is operating as a ring client. ▶ `On` Device is operating as a ring manager. If there is exactly one device at the ends of the line, you activate this function.
Advanced Mode	Activate/deactivate the advanced mode for fast switching times. Possible values: ▶ `Selected` (default setting) Advanced mode switched on. MRP-capable Hirschmann devices support this mode. ▶ `Not selected` Advanced mode switched off. Select this setting if another device in the ring does not support this mode.
Ring Recovery	Defines the max. delay time in milliseconds for the reconfiguration of the ring. This setting is only effective if the device is working as a ring manager. Possible values: ▶ `500ms` ▶ `200ms` (default setting) Shorter delay times make greater demands on the response time of every individual device in the ring. Only use values lower than `500ms` if the other devices in the ring also support this shorter delay time.
VLAN ID	Defines the ID of the VLAN to which the MRP-Ring configuration is assigned. Possible values: ▶ `0` (default setting) The MRP-Ring configuration is not assigned to any VLAN. Define the following settings for the ring ports: – VLAN-ID `1` – For this VLAN ID you assign the port the value `U` in the `Switching:VLAN:Static` dialog. ▶ `1..4042` The MRP-Ring configuration is assigned to a VLAN. Define the same VLAN ID for all the devices in the ring. Define the following settings for the ring ports: – VLAN ID as defined here. – For this VLAN ID you assign the port the value `T` in the `Switching:VLAN:Static` dialog.

Table 181: "Configuration" frame in the `Redundancy:MRP` dialog

Information

Parameters	Meaning
Information	Shows messages for the redundancy configuration and the possible causes of errors. The following messages are possible if the device is operating as a ring client or a ring manager: ▶ `Redundancy Available` The redundancy is set up. When a component of the ring is down, the redundant line takes over its function. ▶ `Configuration error: Ring port link error` Error in the cabling of the ring ports. The following messages are possible if the device is operating as a ring manager: ▶ `Configuration error: Packet of other ring manager received` Another device exists in the ring that is operating as the ring manager. Activate the "Ring Manager" function if there is exactly one device in the ring. ▶ `Configuration error: Connection in ring is connected to incorrect port` A line in the ring is connected with a different port instead of with a ring port. The device only receives test data packets on 1 ring port.

Table 182:"Information" frame in the `Redundancy:MRP` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Delete ring configuration	Switches off the redundancy function and resets all the settings in the dialog to the state on delivery.
Help	Opens the online help.

Table 183:Buttons

7.2 Spanning Tree

The Spanning Tree Protocol (STP) is a protocol that deactivates redundant paths of a network in order to avoid loops. If a network component fails on the path, the device calculates the new topology and reactivates these paths.

The device supports the Rapid Spanning Tree Protocol (RSTP) defined in standard IEEE 802.1D-2004. This protocol is a further development of the Spanning Tree Protocol (STP) and is compatible with it.

The Rapid Spanning Tree Protocol enables fast switching to a newly calculated topology without interrupting existing connections. RSTP achieves average reconfiguration times of less than a second. When you use RSTP in a ring with 10 to 20 devices, you can achieve reconfiguration times in the order of milliseconds.

In this menu you configure and monitor the Spanning Tree functions.

The menu contains the following dialogs:

- Global
- Port

7.2.1 Global

With this dialog you can switch the Spanning Tree function on/off, view current values relating to the root bridge, and define the bridge settings.

■ Operation

Parameters	Meaning
Operation	Switches the Spanning Tree function in the device on/off. Possible values: ▶ `On` (default setting) ▶ `Off` The device behaves transparently. The device floods received Spanning Tree data packets like Multicast data packets to the device ports.

Table 184: "Operation" frame in the `Redundancy:Spanning Tree:Global` *dialog*

■ Protocol Version

Parameters	Meaning
Protocol Version	Shows the protocol used for the Spanning Tree function: With `RSTP` (IEEE 802.1Q-2005) the Spanning Tree function is effective in all the configured VLANs.

Table 185: "Protocol Version" frame in the `Redundancy:Spanning Tree:Global` *dialog*

Protocol Configuration / Information

Parameters	Meaning
Bridge ID	Shows the bridge ID of the device. The device with the numerically lowest bridge ID takes over the role of the root bridge in the network. Possible values: ▶ `<Bridge priority> / <MAC address>`
Priority	Defines the bridge priority of the device. Possible values: ▶ `0..61440` in steps of 4096 (default setting: `32,768`) Assign the numerically lowest priority in the network to the device to make it the root bridge.
Hello Time [s]	Defines the time in seconds between the sending of two configuration messages (Hello data packets). Possible values: ▶ `1..2` (default setting: `2`) If the device takes over the role of the root bridge, the other devices in the network use the value defined here. Otherwise the device uses the value specified by the root bridge - see the "Root" column. Due to the interaction with the "Tx Hold Count" parameter, we recommend not changing the default setting.
Forward Delay [s]	Defines the delay time for the status change in seconds. Possible values: ▶ `4..30` (default setting: `15`) If the device takes over the role of the root bridge, the other devices in the network use the value defined here. Otherwise the device uses the value specified by the root bridge - see the "Root" column. In the RSTP protocol, the bridges negotiate a status change without a specified delay. The STP protocol uses the parameter to delay the status change between the statuses `disabled`, `discarding`, `learning`, `forwarding`.
The parameters "Forward Delay" and "Max Age" have the following relationship: `Forward Delay` ≥ (`Max Age`/2) + 1 If you enter a value in the field that contradict this relationship, the device replaces these values with the last valid values or with the default value.	

Table 186: "Protocol Configuration / Information" frame, "Bridge" column, in the `Redundancy:Spanning Tree:Global` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Max Age	Specifies the maximum permissible branch length, i.e. the number of devices to the root bridge. Possible values: ▶ `6..40` (default setting: `20`) If the device takes over the role of the root bridge, the other devices in the network use the value defined here. Otherwise the device uses the value specified by the root bridge - see the "Root" column. The STP protocol uses the parameter to specify the validity of STP-BPDUs in seconds.
Tx Hold Count	Limits the maximum transmission rate for sending BPDUs. Possible values: ▶ `1..10` (default setting: `10`) When the device sends a BPDU, it increments a counter at this device port. When the counter reaches the value specified here, the device port stops sending any more BPDUs. On the one hand, this reduces the load generated by RSTP, and on the other a loop may be caused when BPDUs are not received. The device decrements the counter by 1 every second. In the following second, the device sends a maximum of 1 new BPDU.

Table 186: "Protocol Configuration / Information" frame, "Bridge" column, in the `Redundancy:Spanning Tree:Global` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
BPDU Guard	Switches the BPDU Guard function in the device on/off. With this function, the device helps protect your network from incorrect configurations, attacks with STP-BPDUs, and undesired topology changes. Possible values: ▶ `Not selected` (default setting) The BPDU Guard function is switched off. ▶ `selected` The BPDU Guard function is switched on. – The device activates the function for manually defined edge ports (terminal device ports). On the "CIST" tab page, the checkbox in the "Admin Edge Port" column is `Selected` for these device ports. – If an edge port receives an STP-BPDU, the device deactivates the device port. In the `Basic Configuration:Port Configuration` dialog, the checkbox in the "Port on" column is `Not selected` for this device port. To reset the status of the device port to the value `forwarding`, you proceed as follows: ☐ If the device port is still receiving BPDUs: – On the "CIST" tab page, remove the selection from the checkbox in the "Admin Edge Port" column. or – In the `Redundancy:Spanning Tree:Global` dialog, remove the selection in the "BPDU Guard" checkbox. ☐ To activate the device port, in the `Basic Configuration:Port Configuration` dialog, select the checkbox in the "Port on" column for this device port.

Table 186: "Protocol Configuration / Information" frame, "Bridge" column, in the `Redundancy:Spanning Tree:Global` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Bridge ID	Shows the bridge ID of the current root bridge. Possible values: ▶ `<Bridge priority> / <MAC address>` The bridge ID is made up of the bridge priority and the MAC address.
Priority	Shows the bridge priority of the current root bridge. Possible values: ▶ `0..61440` in steps of 4096

Table 187: "Root" column in "Protocol Configuration / Information" frame in the `Redundancy:Spanning Tree:Global` dialog

Parameters	Meaning
Hello Time [s]	Shows the time in seconds defined by the root bridge between the sending of two configuration messages (Hello data packets). Possible values: ▶ `1..2` The device uses this specified value - see the "Bridge" column.
Forward Delay [s]	Shows the delay time in seconds defined by the root bridge for status changes. Possible values: ▶ `4..30` The device uses this specified value - see the "Bridge" column. In the RSTP protocol, the bridges negotiate a status change without a specified delay. The STP protocol uses the parameter to delay the status change between the statuses `disabled`, `discarding`, `learning`, `forwarding`.
Max Age	Shows the maximum permissible branch length specified by the root bridge, i.e. the number of devices to the root bridge. Possible values: ▶ `6..40` (default setting: `20`) The STP protocol uses the parameter to specify the validity of STP-BPDUs in seconds.

Table 187: "Root" column in "Protocol Configuration / Information" frame in the `Redundancy:Spanning Tree:Global` dialog (cont.)

Parameters	Meaning
Bridge is Root	Shows whether the device currently has the role of the root bridge. Possible values: ▶ `Not selected` Another device currently has the role of the root bridge. ▶ `Selected` The device currently has the role of the root bridge.
Root Port	Shows the number of the device port from which the current path leads to the root bridge. If the device takes over the role of the root bridge, the field shows the value `0`.

Table 188: "Topology" column in "Protocol Configuration / Information" frame in the `Redundancy:Spanning Tree:Global` dialog

Parameters	Meaning
Root Path Cost	Shows the path cost for the path that leads from the root port of the device to the root bridge of the layer 2 network. Possible values: ▶ `0..200000000` ▶ 0 The device takes over the role of the root bridge.
Topology Change Count	Shows how often the device has put a device port into the `forwarding` status via Spanning Tree since it was started.
Time Since Topology Change	Shows the time since the last topology change. Possible values: ▶ <days, hours:minutes:seconds>

Table 188:"Topology" column in "Protocol Configuration / Information" frame in the `Redundancy:Spanning Tree:Global` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 189:Buttons

7.2.2 Port

With this dialog you can switch the Spanning Tree function on/off on the device ports, specify edge ports, and define the settings for various protection functions.

■ CIST

On this tab page you can switch the Spanning Tree function on/off on the device ports individually, define the settings for edge ports, and view the current values. The abbreviation CIST stands for Common and Internal Spanning Tree.

Note: If you are using other layer 2 redundancy protocols parallel to Spanning Tree on the device: Switch off the Spanning Tree function on the device ports that are participating in other redundancy protocols. Otherwise the redundancy may operate differently to the way intended. This can cause loops.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Stp active	Switches the Spanning Tree function on/off on the device port. Possible values: ▶ `Selected` (default setting) ▶ `Not selected` If the Spanning Tree is activated in the device and switched off on the device port, the port does not send STP-BPDUs and drops any STP-BPDUs received.
Port State	Shows the transmission state of the device port. Possible values: ▶ `discarding` The device port is blocked and only forwards STP-BPDUs. ▶ `learning` The device port is blocked, but it learns the MAC addresses of received data packets. ▶ `forwarding` The device port forwards data packets. ▶ `disabled` The device port is switched off. See the `Basic Settings:Port Configuration` dialog. ▶ `manualFwd` The Spanning Tree function is switched off on the device port. The device port forwards STP-BPDUs. ▶ `notParticipate` The device port is not participating in STP.

Table 190: "CIST" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Port Role	Shows the current role of the device port in CIST. Possible values: ▶ `root` Device port with the cheapest path to the root bridge. ▶ `alternate` Device port with the alternative path to the root bridge (currently interrupted). ▶ `designated` Device port for the side of the tree averted from the root bridge. ▶ `backup` Device port receives STP-BPDUs from its own device. ▶ `disabled` The device port is switched off. See the `Basic Settings:Port Configuration` dialog.
Port Path Cost	Defines the path cost of the device port. Possible values: ▶ `0..200000000` (default setting: `0`) If the value is `0`, the device automatically calculates the path costs depending on the data rate of the device port.
Port Priority	Defines the priority of the device port. Possible values: ▶ `16..240` in steps of 16 (default setting: `128`) This value represents the first 4 bits of the port ID.
Received Bridge ID	Shows the bridge ID of the device from which this device port last received an STP-BPDU. Possible values: ▶ For device ports with the `designated` role, the device displays the information for the STP-BPDU last received by the port. This helps to diagnose the possible STP problems in the network. ▶ For the `alternate`, `backup`, `master` and `root` port roles, in the stationary condition (static topology) this information is identical to the information of the `designated` port role. ▶ If a device port has no connection, or if it has not received any STP-BDPUs yet, the device displays the values that the device port would send with the `designated` role.

Table 190: "CIST" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Received Port ID	Shows the port ID of the device from which this device port last received an STP-BPDU. Possible values: ▶ For device ports with the `designated` role, the device displays the information for the STP-BPDU last received by the port. This helps to diagnose the possible STP problems in the network. ▶ For the `alternate`, `backup`, `master` and `root` port roles, in the stationary condition (static topology) this information is identical to the information of the `designated` port role. ▶ If a device port has no connection, or if it has not received any STP-BDPUs yet, the device displays the values that the device port would send with the `designated` role.
Received Path Cost	Shows the path cost that the higher-level bridge has from its root port to the root bridge. Possible values: ▶ For device ports with the `designated` role, the device displays the information for the STP-BPDU last received by the port. This helps to diagnose the possible STP problems in the network. ▶ For the `alternate`, `backup`, `master` and `root` port roles, in the stationary condition (static topology) this information is identical to the information of the `designated` port role. ▶ If a device port has no connection, or if it has not received any STP-BDPUs yet, the device displays the values that the device port would send with the `designated` role.
Admin Edge Port	Specifies whether a terminal device is connected to the device port. Possible values: ▶ `Not selected` (default setting) An STP bridge is connected to the device port. After the connection is set up, the device port switches to the `learning` state before switching to the `forwarding` state, if applicable. ▶ `Selected` A terminal device is connected to the device port. – After the connection is set up, the device port switches to the `forwarding` state without switching to the `learning` state beforehand. – If the device port receives an STP-BPDU, the device deactivates the port if the BPDU Guard function is switched on in the `Redundancy:Spanning Tree:Global` dialog.

Table 190: "CIST" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Auto Edge Port	Activates/deactivates the automatic detection of whether a terminal device is connected to the device port. This setting is only effective if the device checkbox in the "Admin Edge Port" column is not selected. Possible values: ▶ `Selected` (default setting) After the connection is set up, after 1.5 × "Hello Time" the device sets the device port to the `forwarding` state (default setting 1.5 × 2 s) if the port has not received any STP-BPDUs during this time. ▶ `Not selected` After the connection is set up, after "Max Age" the device sets the device port to the `forwarding` state (default setting 20 s).
Oper Edge Port	Shows whether a terminal device or an STP bridge is connected to the device port. Possible values: ▶ `enable` A terminal device is connected to the device port. The device port does not receive any STP-BPDUs. ▶ `disable` An STP bridge is connected to the device port. The device port receives STP-BPDUs.
Oper PointToPoint	Shows whether the port is connected to an STP device via a direct full-duplex link. Possible values: ▶ `true` The device port is connected directly to an STP device via a full-duplex link. The direct, decentralized communication between 2 bridges enables short reconfiguration times. ▶ `false` The device port is connected in another way, e.g. via a half-duplex link or via a hub.

Table 190: "CIST" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 4)

■ Guards

On this tab page you can define the settings for various protection functions on the device ports.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Root Guard	Switches the monitoring of STP-BPDUs on/off on the device port. With this setting the device helps you protect your network from incorrect configurations or attacks with STP-BPDUs that try to change the topology. This setting is only relevant for device ports with the STP role `designated`. Possible values: ▶ `Not selected` (default setting) The monitoring of STP-BPDUs is switched off. ▶ `Selected` The monitoring of STP-BPDUs is switched on. – If the device port receives an STP-BPDU with better path information to the root bridge, the device discards the STP-BPDU and sets the state of the device port to the value `discarding` instead of to `root`. – If there are no STP-BPDUs with better path information to the root bridge, after 2 x "Hello Time" the device resets the state of the device port to a value according to the port role. If you switch on the "Root Guard" function while the "Loop Guard" function is switched on, the device switches off the "Loop Guard" function.
TCN Guard	Switches the monitoring of Topology Change Notifications on/off on the device port. With this setting the device helps you protect your network from attacks with STP-BPDUs that try to change the topology. Possible values: ▶ `Not selected` (default setting) The monitoring of Topology Change Notifications is switched off. If the device receives STP-BPDUs with a Topology Change flag, it deletes the address table (FDB) of the device port and forwards the Topology Change Notifications. ▶ `Selected` The monitoring of Topology Change Notifications is switched on. – The device port ignores the Topology Change flag in received STP-BPDUs. – If the received BPDU contains other information that causes a topology change, the device processes the BPDU even if the TCN guard is switched on. Example: The device receives better path information for the root bridge.

Table 191: "Guards" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
Loop Guard	Switches the monitoring of loops on/off on the device port. With this setting the device prevents loops if the device port does not receive any more STP-BPDUs. Only use this setting for device ports with the STP role `alternate`, `backup` or `root`. Possible values: ▶ `Not selected` (default setting) The monitoring of loops is switched off. If the device port does not receive any STP-BPDUs for a while, the device sets the state of the port to the value `forwarding`. ▶ `Selected` The monitoring of loops is switched on. This prevents loops e.g. if you switch off the Spanning Tree function on the remote device or if the connection is only interrupted in the receiving direction. – If the device port does not receive any STP-BPDUs for a while, the device sets the state of the port to the value `discarding` and the value in the "Loop State" field to `true`. – If the device port then receives STP-BPDUs again, the device sets the state of the port to a value according to the port role and the value in the "Loop State" field to `false`. If you switch on the "Loop Guard" function while the "Root Guard" function is switched on, the device switches off the "Root Guard" function.
Loop State	Shows whether the loop state of the device port is inconsistent. Possible values: ▶ `true` The loop state of the device port is inconsistent: – The device port is not receiving any STP-BPDUs and the “Root Guard” function is switched on. – The device sets the state of the device port to the value `discarding`. The device thus prevents any potential loops. ▶ `false` The loop state of the device port is consistent: The device port receives STP-BPDUs.
Trans. into Loop	Shows how often the device has set the value in the "Loop State" field from `false` to `true`.
Trans. out of Loop	Shows how often the device has set the value in the "Loop State" field from `true` to `false`.

Table 191: "Guards" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 3)

Parameters	Meaning
BPDU Guard Effect	Prerequisite: – The device port is a manually defined edge port (terminal device port). In the "Port" dialog, the checkbox in the "Admin Edge Port" column is `Selected` for this port. – In the `Redundancy:Spanning Tree:Global` dialog, the BPDU Guard function is switched on. Shows whether the device port has received an STP-BPDU as an edge port (terminal device port). Possible values: ▶ `disable` The device port is an edge port (terminal device port) and has not received any STP-BPDUs, or the device port is not an edge port. ▶ `enable` The device port is an edge port (terminal device port) and has received an STP-BPDU. The device deactivates the device port. In the `Basic Configuration:Port Configuration` dialog, the checkbox in the "Port on" column is `Not selected` for this port. To reset the status of the device port to the value `forwarding`, you proceed as follows: ☐ If the device port is still receiving BPDUs: – On the "CIST" tab page, remove the selection from the checkbox in the "Admin Edge Port" column. or – In the `Redundancy:Spanning Tree:Global` dialog, remove the selection in the "BPDU Guard" checkbox. ☐ To activate the device port, in the `Basic Configuration:Port Configuration` dialog, select the checkbox in the "Port on" column for this device port.

Table 191: "Guards" tab page in the `Redundancy:Spanning Tree:Port` dialog (section #x3c;$tblsheetnum> of 3)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 192: Buttons

8 Diagnostics

The dialogs in this menu show information on statuses and events that the device has logged. In service cases, this information helps our support to diagnose the situation.

The menu contains the following dialogs:

- System
- Report
- Ports
- Status Configuration
- LLDP

8.1 System

The dialogs in this menu allow you to display the current operating conditions, to verify that the device configuration conforms to the network environment and control the behavior of the device upon start-up.

The menu contains the following dialogs:
- System Information
- Configuration Check
- Selftest

8.1.1 System Information

This dialog displays the current operating condition of individual components in the device. The displayed values are a snapshot; they represent the operating condition at the time the dialog was loaded to the page.

The dialog allows you to search the page for search terms and save them in HTML format on your PC.

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Search	Opens the "Search" dialog. The dialog allows you to search the log file for search terms or regular expressions.
Save	Opens the "Save" dialog. The dialog allows you to save the log file in HTML format on your PC.
Help	Opens the online help.

Table 193: Buttons

8.1.2 Configuration Check

The device enables you to compare the device configuration with those of its neighboring devices. For this purpose, the device uses the information that it received from its neighboring devices via topology recognition (LLDP).

The dialog lists the deviations detected, which affect the performance of the communication between the device and the recognized neighboring devices.

You update the content of the table via the "Load" button. If the table remains empty, the configuration check was successful and the device configuration is compatible with the device configuration in the detected neighboring devices.

■ Summary

Parameters	Meaning
Number of Errors	Shows the number of errors that the device detected during the configuration check.
Number of Warnings	Shows the number of warnings that the device detected during the configuration check.
Amount of Information	Shows the amount of information that the device detected during the configuration check.

Table 194: "Summary" frame in the `Diagnostics:System:Configuration Check` dialog

You will also find this information in the status bar above the menu.

■ Table

When you select a row in the table, the device displays additional information in the area beneath it.

Parameters	Meaning
Rule ID	Rule ID of the deviations having occurred. The dialog combines several deviations with the same rule ID under one rule ID.

Table 195: Table in the `Diagnostics:System:Configuration Check` dialog

Parameters	Meaning
Level	Level of deviation between this device's configuration and the recognized neighboring devices. The rule level can have 3 statuses: ❗ Information: The performance of the communication between the two devices is not impaired. ⚠ Warning: The performance of the communication between the two devices may be impaired. ✖ Error: Communication between the two devices is impaired.
Message	The dialog specifies more precisely the information, warnings and errors having occurred.

Table 195: Table in the `Diagnostics:System:Configuration Check` *dialog (cont.)*

Note: A neighboring device without LLDP support, which forwards LLDP packets, may be the cause of equivocal messages in the dialog. This occurs if the neighboring device is a hub or a switch without management, which ignores the IEEE 802.1D-2004 standard.
In this case, the dialog displays the devices recognized and connected to the neighboring device as connected to the switch port, even though they are connected to the neighboring device.

Note: If you have more than 39 VLANs configured on the device, the dialog always shows a warning. The reason is the limited number of possible VLAN data sets in LLDP frames with a maximum length. The device compares the first 39 VLANs automatically.
If you have 40 or more VLANs configured on a device, check the congruence of the further VLANs manually, if necessary.

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 196: Buttons

8.1.3 Selftest

This dialog allows you to do the following:

- Activate/deactivate the RAM test when the device is being started.
- Enable/disable the switch to the system monitor when the device is being started.
- Defines how the device behaves in the case of an error.

■ Configuration

Parameters	Meaning
RAM Test	Defines whether the device tests the RAM memory during the restart. Possible values: ▶ `Selected` (default setting) The device tests the RAM memory during the restart. ▶ `Not selected` The device skips the memory test during the restart. This shortens the start time for the device.
Activate SysMon1	Activates/deactivates the access to the system monitor during the restart. Possible values: ▶ `Selected` (default setting) The device allows you to switch to the system monitor during the restart. ▶ `Not selected` The device starts without the option to switch to the system monitor. Among other things, the system monitor allows you to update the device software or delete saved device configurations.
Load default config on error	Activates/deactivates the loading of the standard device configuration (`default configuration`) if no readable device configuration is available for the device when it is restarting. Possible values: ▶ `Selected` (default setting) The device loads the standard device configuration. ▶ `Not selected` The device interrupts the restart and stops. To get access to the device again, use a V.24 link to switch to the system monitor and load the standard device configuration there.

Table 197: "Configuration" frame in the `Diagnostics:System:Selftest` dialog

Note: The following settings block your access to the device permanently if no readable device configuration is available for the device when it is restarting. This is the case, for example, if the password for the device configuration to be loaded differs from the password set in the device.
- "Activate SysMon1" checkbox is `not selected`.
- "Load default config on error" checkbox is `not selected`.

To have the device unlocked again, contact your sales partner.

Table

In this table you define how the device behaves in the case of an error.

Parameters	Meaning
Cause	Error causes to which the device reacts. Possible values: ▶ `task` The device detects errors in the applications executed, e.g. if a task terminates or is not available. ▶ `resource` The device detects errors in the resources available, e.g. if the memory is becoming scarce. ▶ `software` The device detects software errors, e.g. error in the consistency check. ▶ `hardware` The device detects hardware errors, e.g. in the chip set.
Action	Defines how the device behaves if the adjacent error occurs. Possible values: ▶ `reboot` (default setting) The device triggers a cold reset. ▶ `logOnly` The device logs the error in the log file (system log). ▶ `sendTrap` The device sends an SNMP message (trap). The prerequisite for sending SNMP messages (traps) is that the function is switched on in the `Diagnostics:Status Configuration:Alarms (Traps)` dialog and at least 1 SNMP manager is defined.

Table 198: Table in the `Diagnostics:System:Selftest` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 199: Buttons

8.2 Report

The device allows you to log user actions and device-specific events. In this menu you configure the logging settings for the device. You also have the option to view the reports.

The menu contains the following dialogs:

- Global
- Syslog
- Persistent Logging
- Hardware State
- System Log
- Audit Trail

8.2.1 Global

The device allows you to log specific events using the following outputs:

- on the console
- on one or more syslog servers
- on a CLI connection set up using SSH
- on a CLI connection set up using Telnet

You define the required settings in this dialog. By assigning the severity you define which events the device logs.

The buttons in the dialog allow you to save a ZIP archive with system information and the Java Applet of the graphical user interface (GUI) on your PC.

Console Logging

Parameters	Meaning
Operation	When the function is switched on, the device logs the events on the console. Possible values: ▶ `On` ▶ `Off` (default setting)
Severity	Defines the minimum severity for the events. The device logs all events with this severity and with more urgent severities. The device outputs the messages on the V.24 interface. Possible values: ▶ `emergency` ▶ `alert` ▶ `critical` ▶ `error` ▶ `warning` (default setting) ▶ `notice` ▶ `informational` ▶ `debug`

Table 200:"Console Logging" frame in the `Diagnostics:Report:Global` dialog

Buffered Logging

The device buffers logged events in 2 separate storage areas so that the log entries for urgent events are kept.

This dialog allows you to define the minimum severity for events that the device buffers in the storage area with a higher priority.

Parameters	Meaning
Severity	Defines the minimum severity for the events. The device buffers log entries for events with this severity and with more urgent severities in the storage area with a higher priority. Possible values: ▶ `emergency` ▶ `alert` ▶ `critical` ▶ `error` ▶ `warning` (default setting) ▶ `notice` ▶ `informational` ▶ `debug`

Table 201: "Buffered Logging" frame in the `Diagnostics:Report:Global` dialog

SNMP logging

Parameters	Meaning
Log SNMP Get Request	When the function is switched on, the device logs an event for the syslog for SNMP Get Requests. You define the severity for this event in the "Severity Get Request" field. Possible values: ▶ `On` ▶ `Off` (default setting)
Log SNMP Set Request	When the function is switched on, the device logs an event for the syslog for SNMP Set Requests. You define the severity for this event in the "Severity Set Request" field. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 202: "SNMP Logging" frame in the `Diagnostics:Report:Global` dialog

Parameters	Meaning
Severity Get Request	Defines the severity of the event that the device logs for SNMP Get Requests. Possible values: ▶ `emergency` ▶ `alert` ▶ `critical` ▶ `error` ▶ `warning` ▶ `notice` (default setting) ▶ `informational` ▶ `debug`
Severity Set Request	Defines the severity of the event that the device logs for SNMP Set Requests. Possible values: ▶ `emergency` ▶ `alert` ▶ `critical` ▶ `error` ▶ `warning` ▶ `notice` (default setting) ▶ `informational` ▶ `debug`

Table 202: "SNMP Logging" frame in the `Diagnostics:Report:Global` dialog (cont.)

When you activate the logging of SNMP requests, the device sends these as events with the preset severity `notice` to the list of syslog servers. The preset minimum severity for a syslog server entry is `critical`.

To send SNMP requests to a syslog server, you have a number of options to change the default settings. Select the ones that meet your requirements best.

□ Set the severity for which the device creates SNMP requests as events to `warning` or `error` and change the minimum severity for a syslog entry for one or more syslog servers to the same value.
You also have the option of creating a separate syslog server entry for this.

□ Only set the severity for SNMP requests to `critical` or higher. The device then sends SNMP requests as events with the severity `critical` or higher to the syslog servers.

□ Only set the minimum severity for one or more syslog server entries to `notice` or lower. Then it may happen that the device sends a large number of events to the syslog servers.

CLI Logging

Parameters	Meaning
Operation	When the function is switched on, the device logs all commands received through Command Line Interface (CLI). Possible values: ▶ `On` ▶ `Off` (default setting)

Table 203: "CLI Logging" frame in the `Diagnostics:Report:Global` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.

Table 204: Buttons

Button	Meaning
Download Support Information	Opens the "Save" dialog. This dialog allows you to save a ZIP archive on your PC that contains system information about the device. The device generates the file name of the ZIP archive automatically based on the format `<IP address>_<device name>.zip`. You will find an explanation of the files contained in the ZIP archive in the following section.
Download JAR File	Opens the "Save" dialog. The dialog allows you to save the Java Applet of the graphical user interface (GUI) on your PC as a JAR file. When you start the JAVA Applet, you have the option of administering the device, even if its HTTP server is switched off for security reasons. The device generates the file name of the Java Applet automatically based on the format `<product>-<software version)>-<build no.>.jar`.
Help	Opens the online help.

Table 204: Buttons (cont.)

■ Support Information: Files contained in ZIP archive

System information	File name	Format	Comments
Audit trail	audittrail.html	HTML	Chronological recording of system events and writing user actions.
Output of CLI commands: ▶ show port all ▶ show system info ▶ show mac-addr-table ▶ show mac-filter-table igmp-snooping	CLICommands.txt	Text	Prerequisite: The Telnet server of the device is switched on.
Default device configuration	defaultconfig.xml	XML	Device configuration with the plant settings.
Device configuration	runningconfig.xml	XML	Device configuration that the device uses in the current operation.
Support Information	supportinfo.html	Text	Device internal service information.
System information	systeminfo.html	HTML	—
Log file	systemlog.html	HTML	—

Table 205: Support Information: Files contained in the ZIP archive

Meaning of the severities for events

Severity	Meaning
`emergency`	Device not ready for operation
`alert`	Immediate user intervention required
`critical`	Critical status
`error`	Error status
`warning`	Warning
`notice`	Significant, normal status
`informational`	Informal message
`debug`	Debug message

Table 206:Meaning of the severities for events

8.2.2 Email Logging: Global

The device allows you to configure the following Email Alert features:

- You configure log messages for an urgent severity level at and above which the device sends the logs as urgent messages. The device sends urgent messages immediately to the mail server.
- You configure log messages for a non-urgent severity level at and above which the device sends the logs as non-urgent messages. Furthermore, configure the non-severity level to a level below the severity level. The device stores the non-urgent messages in a log buffer then sends the logs to the server at the configured time interval or when the buffer is full.
- You classify log messages as urgent and non-urgent to decide whether the device sends email immediately or periodically.

Operation

Parameters	Meaning
Operation	Activates/deactivates the Email Logging function globally on the device. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 207: "Operation" frame in the `Diagnostics:Report:Email Logging:Global` dialog

Information

Parameters	Meaning
Number of Failed Emails	Shows the number of dropped email alerts.
Number of Email Alerts	Shows the number of successfully sent email alerts.
Last Mail Sent	Shows the time, in seconds, since last sent email alert.

Table 208: "Information" frame in the `Diagnostics:Report:Email Logging:Global` dialog

Configuration

Parameters	Meaning
Sender	Shows the email address from which the device sends the email. Possible values: ▶ `switch@hirschmann.com` (default setting)
Sending Interval	Shows the count down timer, in minutes, until the next email alert. Possible values: ▶ `30..1440` (default setting: `30`)

Table 209: "Configuration" frame in the `Diagnostics:Report:Email Logging:Global` dialog

Urgent

Parameters	Meaning
Severity	Shows the urgent severity level at or above which the device immediately sends an email alert. Possible values: ▶ `emergency` ▶ `alert` (default setting) ▶ `critical` ▶ `error` ▶ `warning` ▶ `notice` ▶ `informational` ▶ `debug`
Subject	Defines the email subject for a given message type. Possible values: ▶ 0..255 alphanumeric characters

Table 210: "Urgent" frame in the `Diagnostics:Report:Email Logging:Global` *dialog*

Non Urgent

Parameters	Meaning
Severity	Shows the non-urgent severity level at or above which the device stores the log in a buffer. Configure the non-urgent severity level below the urgent severity level. The device sends the log as an email alert after a duration timeout or when the log buffer overflows. Possible values: ▶ `emergency` ▶ `alert` ▶ `critical` ▶ `error` ▶ `warning` (default setting) ▶ `notice` ▶ `informational` ▶ `debug`
Subject	Defines the email subject for a given message type. Possible values: ▶ 0..255 alphanumeric characters

Table 211: "Non-Urgent" frame in the `Diagnostics:Report:Email Logging:Global` *dialog*

■ Table

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. The device automatically defines this number. Possible values: ▶ `1..5`
Description	Defines the name of the configured email server. Possible values: ▶ 0..255 alphanumeric characters
IP Address	Defines the IP address or hostname of the email server. Possible values: ▶ Valid IP address (default setting: `0.0.0.0`) ▶ Hostname in the format `host.name` or `subdomain.host.name`
TCP Port	Defines the SMTP port number. Possible values: ▶ `1..65535` (default setting: `25`) Exception: Port `2222` is reserved for internal functions. ▶ A value of `0` returns the feature to the default setting.
Security	Defines the authentication mechanism. Possible values: ▶ `none` (default setting) ▶ `tlsv1` Use this value when authenticating with a "User ID" and "Password".
User ID	Defines the user id to use to authenticate the switch. Prerequisite for this function is that you configure the "Security" function as `tlsv1`. Possible values: ▶ 0..255 alphanumeric characters
Password	Defines the password to use to authenticate the device. Prerequisite for this function is that you configure the "Security" function as `tlsv1`. Possible values: ▶ 0..255 alphanumeric characters
Active	Activates/deactivates the email message handling for this row. Possible values: ▶ `Selected` The device sends an email message according to the user-defined configuration. ▶ `Not selected` (default setting)

Table 212: Table in the `Diagnostics:Report:Email Logging:Global` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Send	Sends an email to the configured address containing the log messages.
Test	Sends a test email to the configured address.
Help	Opens the online help.

Table 213: Buttons

■ Meaning of the severities for events

Severity	Meaning
emergency	Device not ready for operation
alert	Immediate user intervention required
critical	Critical status
error	Error status
warning	Warning
notice	Significant, normal status
informational	Informal message
debug	Debug message

Table 214: Meaning of the severities for events

8.2.3 Email Logging: Addresses

Use this table to define the destination email addresses for the respective message type.

■ Table

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. The device automatically defines this number. Possible values: ▶ `1..10`
Message Type	Defines the log message type to send to the destination email address. Possible values: ▶ `urgent` ▶ `non-urgent`
Address	Defines the destination email address for the email alert. Possible values: ▶ Valid e-mail address 0..255 alphanumeric characters
Active	Activates/deactivates the transmission of email alerts for the entry. Possible values: ▶ `Selected` The device sends an email alert to the user-defined email address. ▶ `Not selected` (default setting)

Table 215: Table in the `Diagnostics:Report:Email Logging:Addresses` dialog

8.2.4 Syslog

The device enables you to send specific logged events to one or more syslog servers. In this dialog you define the settings for this.

The dialog manages a list of up to 8 syslog server entries. Depending on the severity of the event, the device sends the log entry to different syslog servers.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device sends the events specified in the table to the specified syslog servers. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 216: "Operation" frame in the `Diagnostics:Report:Syslog` dialog

■ Table

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. The device automatically defines this number. When you delete a table entry, this leaves a gap in the numbering. When you create a new table entry, the device fills the first gap. Possible values: ▶ `1..8`
IP Address	Defines the IP address of the syslog server. Possible values: ▶ Valid IP address (default setting: `0.0.0.0`)
Port	Defines the UDP Port on which the syslog server expects the log entries. Possible values: ▶ `1..65535` (default setting: `514`)

Table 217: Table in the `Diagnostics:Report:Syslog` dialog

Parameters	Meaning
Minimum Severity	Defines the minimum severity of the events. The device sends a log entry for events with this severity and with more urgent severities to the syslog server. Possible values: ▶ emergency ▶ alert ▶ critical ▶ error ▶ warning (default setting) ▶ notice ▶ informational ▶ debug
Type	Defines the type of the log entry transmitted by the device. Possible values: ▶ systemlog (default setting) ▶ audittrail
Active	Activates/deactivates the transmission of events to the syslog server: ▶ Selected The device sends events to the syslog server. ▶ Not selected (default setting) The transmission of events to the syslog server is deactivated.

Table 217: Table in the Diagnostics:Report:Syslog dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Create	Adds a new table entry.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 218: Buttons

8.2.5 Persistent Logging

The device allows you to save all log entries permanently in a file on the external memory. Therefore, even after the device is restarted you have access to the log entries.

With this dialog you can limit the size of the log file and define the minimum severity for the events to be saved. If the log file attains the specified size, the device archives this file and saves the following log entries in a newly created file.

In the table the device shows you the log files held on the external memory. As soon as the specified maximum number of files has been attained, the device deletes the oldest file and renames the remaining files. This ensures that there is always enough memory space on the external memory.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device saves the log entries in a file on the external memory. Possible values: ▶ `On` (default setting) ▶ `Off` Only activate this function when the external memory is available on the device.

Table 219: "Operation" frame in the `Diagnostics:Report:Persistent Logging` dialog

■ Configuration

Parameters	Meaning
Max File Size	Defines the maximum size of the log file in KBytes. If the log file attains the specified size, the device archives this file and saves the following log entries in a newly created file. Possible values: ▶ `0..4096` (default setting: `1024`) The value `0` deactivates saving of log entries in the log file.
Max Files	Defines the number of log files that the device keeps on the external memory. As soon as the specified maximum number of files has been attained, the device deletes the oldest file and renames the remaining files. Possible values: ▶ `0..25` (default setting: `4`) The value `0` deactivates saving of log entries in the log file.
Severity	Defines the minimum severity of the events. The device saves the log entry for events with this severity and with more urgent severities in the log file on the external memory. Possible values: ▶ `emergency` ▶ `alert` ▶ `critical` ▶ `error` ▶ `warning` (default setting) ▶ `notice` ▶ `informational` ▶ `debug`
Target	Defines the external memory device for logging. Possible values: ▶ `sd`

Table 220: "Configuration" frame in the `Diagnostics:Report:Persistent Logging` dialog

Table

Parameters	Meaning
Index	Shows a sequential number to which the table entry relates. Possible values: ▶ `1..25` The device automatically defines this number.
File Name	Shows the file name of the log file on the external memory. Possible values: ▶ `messages` ▶ `messages.X`
File Size	Shows the size of the log file on the external memory in bytes.

Table 221: Table in the `Diagnostics:Report:Persistent Logging` dialog

To delete the log files, click "Delete Persistent Log File" in the `Basic Settings:Restart` dialog.

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 222: Buttons

8.2.6 Hardware State

This dialog provides information about the distribution and state of the flash memory of the device.

Information

Parameters	Meaning
Operating Time	Shows the total operating time of the device since it was delivered. Possible values: ▶ `day(s), hh:mm:ss`

Table 223: "Information" frame in the `Diagnostics:Report:Hardware State` dialog

Table

Parameters	Meaning
Flash Region	Shows the name of the respective memory area.
Description	Shows a description of what the memory uses the memory area for.
Flash Sectors	Shows how many sectors are assigned to the memory area.
Number of Sector Erase Operations	Shows how often the device has overwritten the sectors of the memory area.

Table 224: Table in the `Diagnostics:Report:Hardware State` dialog

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 225: Buttons

8.2.7 System Log

The device logs important device-internal events in a log file (system log).

This dialog displays the log file (system log). The dialog allows you to search the log file for search terms and save them in HTML format on your PC.

The log file is kept until a cold start is performed on the device. After the cold start the device creates the file again.
To delete the logged events from the log file, click `Delete Log File` in the "Basic Settings:Restart" dialog.

■ Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Search	Opens the "Search" dialog. The dialog allows you to search the log file for search terms or regular expressions.
Save	Opens the "Save" dialog. The dialog allows you to save the log file in HTML format on your PC.
Delete Log File	Removes the logged events from the log file.
Help	Opens the online help.

Table 226: Buttons

8.2.8 Audit Trail

The device logs system events and writing user actions on the device. This gives you the option of following WHO changes WHAT on the device WHEN.

The logged entries are write-protected and remain saved in the device after a cold reset.

This dialog displays the log file (audit trail). The dialog allows you to search the log file for search terms and save them in HTML format on your PC.

The device logs the following user actions, among others:

- A user logging on via CLI (local or remote)
- A user logging off manually
- Automatic logging off of a user in CLI after a specified period of inactivity
- Device restart
- Locking of a user account due to too many failed logon attempts
- Locking of the management access due to failed logon attempts
- Commands executed in CLI, apart from show commands
- Changes to configuration variables
- Changes to the system time
- File transfer operations, including firmware updates
- Configuration changes via HiDiscovery
- Firmware updates and automatic configuration of the device via the external memory
- Opening and closing of SNMP via an HTTPS tunnel

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Search	Opens the "Search" dialog. The dialog allows you to search the log file for search terms or regular expressions.
Save	Opens the "Save" dialog. The dialog allows you to save the log file in HTML format on your PC.
Help	Opens the online help.

Table 227: Buttons

8.3 Ports

This menu shows information on the port statistics, on the utilization on the individual ports, and on the connected SFP transceivers.

The menu contains the following dialogs:

- Statistics Table
- Utilization
- SFP
- TP cable diagnosis
- Port Monitor
- Auto Disable
- Port Mirroring

8.3.1 Statistics Table

This dialog shows you in table form for each device port how many data packets the device has sent and received.

To reset the values in the table to 0, click "Reset port counters" in the Basic Settings:Restart dialog.

Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Reset port counters	Resets the counter for the port statistics to 0.
Help	Opens the online help.

Table 228: Buttons

8.3.2 Utilization

This dialog displays the utilization (network load) for the individual device ports.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Utilization [%]	Shows the current utilization in percent in relation to the time interval specified in the "Control Interval [s]" column. The utilization is the relationship of the received data quantity to the maximum possible data quantity at the currently configured data rate.
Lower Threshold [%]	Defines a lower threshold for the utilization. If the utilization of the device port falls below this value, the "Alarm" field shows an alarm. Possible values: ▶ `0.00..100.00` (default setting: `0.00`) The value `0` deactivates the lower threshold.
Upper Threshold [%]	Defines an upper threshold for the utilization. If the utilization of the device port exceeds this value, the "Alarm" field shows an alarm. Possible values: ▶ `0.00..100.00` (default setting: `0.00`) The value `0` deactivates the upper threshold.
Control Interval [s]	Defines the interval in seconds. Possible values: ▶ `1..3600` (default setting: `30`) The value `0` deactivates the saving of the log entries in the log file.
Alarm	Indicates the alarm status for the utilization. Possible values: ▶ `Selected` The utilization of the device port is below the value defined in the "Lower Threshold [%]" field or above the value defined in the "Upper Threshold [%]" field. The device sends an SNMP message (trap). ▶ `Not selected` The utilization of the device port is above the value defined in the "Lower Threshold [%]" field or below the value defined in the "Upper Threshold [%]" field. The prerequisite for sending SNMP messages (traps) is that the function is switched on in the `Diagnostics:Alarms (Traps)` dialog and at least 1 SNMP manager is defined.

Table 229: Table in the `Diagnostics:Ports:Utilization` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 230: Buttons

8.3.3 SFP

This dialog allows you to look at the SFP transceivers currently connected to the device and their properties.

Table

The table only displays valid values if the device is equipped with SFP transceivers.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Module Type	Type of the SFP transceiver, e.g. M-SFP-SX/LC.
Serial Number	Serial number of the SFP module.
Supported	Shows whether the media module supports the SFP transceiver.
Temperature in °Celsius	Operating temperature of the SFP transceiver in °Celsius.
Tx Power in mW	Transmission power of the SFP transceiver in mW.
Rx Power in mW	Receiving power of the SFP transceiver in mW.
Tx Power in dBm	Transmission power of the SFP transceiver in dBm.
Rx Power in dBm	Receiving power of the SFP transceiver in dBm.

Table 231: Table in the Diagnostics:Ports:SFP dialog

Parameters	Meaning
Rx Power State	Power level of the signal received: The threshold values are specified by the SFP transceiver. ✓ Signal strength is OK. ⚠ Signal strength is lower than the SFP manufacturer recommendation. The signal can still be used. ✖ No signal or signal strength too low.

Table 231: Table in the `Diagnostics:Ports:SFP` dialog (cont.)

■ Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 232: Buttons

8.3.4 TP cable diagnosis

This feature tests the cable attached to an interface for short or open circuit. The table displays the cable status and estimated length. The device also displays the individual cable pairs connected to the port. When the device detects a short circuit or an open circuit in the cable, it also displays the estimated distance to the problem.

Note: This test interrupts traffic on the port.

Configuration

Parameters	Meaning
Port	Select the port to test from the pull-down menu. Use for copper-based ports exclusively.

Table 233: "Configuration" frame in the `Diagnostics:Ports:TP cable diagnosis` *dialog*

Information

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Status	Status of the Virtual Cable Tester. Possible values: ▶ `active` Cable testing is in progress. Select to this value to start the test. ▶ `success` The device displays this entry after performing a successful test. ▶ `failure` The device displays this entry after an interruption in the test. ▶ `uninitialized` The device displays this entry while in standby.

Table 234: "Information" frame in the `Diagnostics:Ports:TP cable diagnosis` *dialog*

Table

Parameters	Meaning
Cable Pair	Shows the cable pair to which this entry relates. The device uses the first PHY index supported to show the values.

Table 235: "Information" frame in the `Diagnostics:Ports:TP cable diagnosis` *dialog*

Parameters	Meaning
Result	Shows the results of the cable test. Possible values: ▶ `Normal` The cable is functioning properly. ▶ `Open` There is a break in the cable causing an interruption in the circuit. ▶ `Short` Wires in the cable are touching together causing a short circuit. ▶ `Unknown` The device displays this value for untested cable pairs.
Min. Length	The estimated length of the cable in meters. This value indicates the minimum estimated length. The device returns 0 if "Status" is `active`, `failure`, or `uninitialized` or the cable length is unknown.
Max Length	The estimated length of the cable in meters. This value indicates the maximum estimated length. The device returns 0 if "Status" is `active`, `failure`, or `uninitialized` or the cable length is unknown.
Distance [m]	The estimated distance in meters from the end of the cable to the failure location. The device returns 0 if "Status" is `active`, `failure`, or `uninitialized`.

Table 235: "Information" frame in the `Diagnostics:Ports:TP cable diagnosis` dialog (cont.)

■ Buttons

Button	Meaning
Start	Initiates a cable test on the selected port.
Help	Opens the online help.

Table 236: Buttons

8.3.5 Port Monitor

This feature monitors port states. The device offers you the ability to disable the port or send a trap when user-defined conditions occur. Definable port conditions are link flap, CRC/Fragments, and Duplex Mismatch Detection.

Proceed as follows to enable the action if a port state occurs:
- □ Enable the port monitor globally.
- □ Enable the port monitor on a port.
- □ Configure the conditions on a port.
- □ Configure an action to perform on that port when the condition occurs:

The dialog contains the following tabs:
- Port Monitor: Global
- Port Monitor: Link Flap
- Port Monitor: CRC/Fragments

8.3.6 Port Monitor: Global

In this dialog, you activate the configurations defined in the "Link Flap" and "CRC/Fragments" tabs. The device also offers a Duplex Mismatch Detection function. Duplex mismatch is a condition where 2 connected devices operate at different duplex modes, either half or full duplex. The device detects these conditions when you activate the functions and produces the user-defined action.

Operation

Parameters	Meaning
Operation	Activates/deactivates the Port Monitor function globally on the device. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 237: "Operation" frame in the "Global" tab of the `Diagnostics:Ports:Port Monitor` dialog

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Link Flap on	Activates/deactivates the conditions configured in the "Link Flap" tab to trigger an action. Possible values: ▶ `Selected` The device monitors the port for the conditions configured in the "Link Flap" table. When the configured condition occurs, the device performs the action selected in the "Action" column. ▶ `Not selected` (default setting)
CRC/Fragments on	Activates/deactivates the conditions configured in the "CRC/Fragments" tab to trigger an action. Possible values: ▶ `Selected` The device monitors the port for the conditions configured in the "CRC/Fragments" table. When the configured condition occurs, the device performs the action selected in the "Action" column. ▶ `Not selected` (default setting)
Duplex Mismatch Detection active	Activates/deactivates the duplex mismatch condition to trigger an action. Possible values: ▶ `Selected` The device monitors the port for a duplex mismatch. When a duplex mismatch occurs, the device performs the action selected in the "Action" column. ▶ `Not selected` (default setting)
Active Condition	Shows which configured condition caused an action to occur. Possible values: ▶ `-` ▶ `Link Flap` ▶ `CRC/Fragments` ▶ `Duplex Missmatch`
Action	Defines an action to perform when the user-defined port monitor conditions occur. Possible values: ▶ `Disable port` (default setting) When the port monitor conditions occur, the device disables the port. To enable the port again click "Reset". ▶ `Send trap` The device sends a trap to the management station. The prerequisite for sending SNMP messages (traps) is that you turn on the function in the `Diagnostics:Status Configuration:Alarms (Traps)` dialog and you define at least 1 SNMP manager.

Table 238: Table in the "Global" tab of the `Diagnostics:Ports:Port Monitor` dialog

Parameters	Meaning
Port Status	Shows the status of the port. Possible values: ▶ `up` ▶ `down` ▶ `notPresent`

Table 238: Table in the "Global" tab of the `Diagnostics:Ports:Port Monitor` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Reset	Resets the port monitor function for the selected interface and enables the port when disabled by the Port Monitor function.
Help	Opens the online help.

Table 239: Buttons

8.3.7 Port Monitor: Link Flap

Link Flapping occurs when a link alternately advertises its link state as up and down. You configure the device to detect this condition and then define whether to send a trap or shut the port off.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Sampling Interval [s]	Defines the interval, in seconds, for link flap detection for this entry. Possible values: ▶ `1..180` (default setting: `10`)
Link Flap Count	Defines the link flap detection counter for this entry. When the frequency of link flaps reaches this number, the device produces the action configured in the "Global" tab. Prerequisite for this function is that the "Link Flap on" checkbox in the "Global" tab is selected. Possible values: ▶ `1..100` (default setting: `5`)
Last Sampling Interval	Shows the link flap count that occurred during the last interval.
Total	Shows the total link flap count since the last reset.

Table 240: Table in the "Link Flap" tab of the `Diagnostics:Ports:Port Monitor` *dialog*

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Reset	Resets the port monitor function for the selected interface and enables the port when disabled by the Port Monitor function.
Help	Opens the online help.

Table 241: Buttons

8.3.8 Port Monitor: CRC/Fragments

In this dialog, you configure the device to monitor the Cyclical Redundancy Check (CRC) and Fragmentation. The CRC is a code added to the data to detect accidental changes in the raw data. Fragmentation occurs when the Maximum Transmission Unit (MTU) of a port is smaller than the packet size. The sending device divides the packet into several smaller sequential packets before transmitting. The receiving device reassembles the packet in the correct order. The device counts the packets which are less than 64 bytes as fragments. When configured and activated, the device monitors both conditions. If either the CRC or the Fragment count exceeds the configured condition, the device performs the user-defined action.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Sampling Interval[s]	Defines the interval, in seconds, for CRC Fragment detection for this entry. Possible values: ▶ `5..180` (default setting: `10`)
CRC/Fragments count [ppm]	Defines the CRC Fragment detection counter for this entry. When the frequency of CRC Fragments reaches this number, the device produces the action configured in the "Global" tab. Prerequisite for this function is that the "CRC Fragments on" function in the "Global" tab is active. Possible values: ▶ `1..1000000` (default setting: `1000`)
Last active Interval [ppm]	Shows the number of CRC Fragments that occurred during the last interval.
Total [ppm]	Shows the total number of CRC Fragments that occurred since the last reset.

Table 242: Table in the "CRC/Fragments" tab of the `Diagnostics:Ports:Port Monitor` *dialog*

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Reset	Resets the port monitor function for the selected interface and enables the port when disabled by the Port Monitor function.
Help	Opens the online help.

Table 243: Buttons

8.3.9 Auto Disable

If the configuration shows a port as enabled, but the device detects an error, the software shuts down that port. In other words, the device software disables the port because of a detected error condition.

When a port is auto-disabled, the device effectively shuts down the port and the port blocks traffic. The port LED blinks green 1 time per period and identifies the reason for the shutdown. In addition, the device generates a log entry listing the reason for the auto-disable. Furthermore, the device sends a trap with the interface number, the port status, and the reason to the administrator. When you enable the port after a timeout by auto-disable, the device sends a trap with the interface number and an empty "Reason" entry.

This feature provides a recovery function which automatically enables an auto-disabled port after a user-defined time. When this function enables a port, the device sends a trap with the interface number and an empty "Reason" entry.

The auto-disable function serves 2 purposes:
- It assists the administrator in port analysis.
- It eliminates the possibility that this port causes other ports on the module (or the entire module) to shut down.

Configuration

Parameters	Meaning
Link Flap	Defines whether the device enables a port after a Link Flap condition produces a disable port action. Possible values: ▶ `Selected` Enables the ports after the user-defined time elapses. ▶ `Not selected` (default setting) The ports remain disabled.
CRC Error	Defines whether the device enables a port after a CRC/Fragments condition produces a disable port action. Possible values: ▶ `Selected` Enables the ports after the user-defined time elapses. ▶ `Not selected` (default setting) The ports remain disabled.

Table 244: "Configuration" frame in the `Diagnostics:Ports:Auto Disable` dialog

Parameters	Meaning
Duplex Mismatch	Defines whether the device enables a port after a Duplex Mismatch condition produces a disable port action. Possible values: ▶ `Selected` Enables the ports after the user-defined time elapses. ▶ `Not selected` (default setting) The ports remain disabled.
DHCP Snooping	Defines whether the device enables a port after a DCHP Snooping condition produces a disable port action. Possible values: ▶ `Selected` Enables the ports after the user-defined time elapses. ▶ `Not selected` (default setting) The ports remain disabled.
ARP Rate	Defines whether the device enables a port after an ARP Rate condition produces a disable port action. Possible values: ▶ `Selected` Enables the ports after the user-defined time elapses. ▶ `Not selected` (default setting) The ports remain disabled.

Table 244: "Configuration" frame in the `Diagnostics:Ports:Auto Disable` dialog

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Reset Timer[s]	Timer value in seconds after which the device reactivates a deactivated port. Possible values: ▶ `30...4294967295` ▶ `0` (default setting) A value of 0 disables the timer.
Remaining Time [s]	Remaining time in seconds until the reactivation of the port.
Component	Shows the name of the component that caused the port to disable itself.
Reason	Shows the reason the port disabled itself.

Table 245: Table in the `Diagnostics:Ports:Auto Disable` dialog

Parameters	Meaning
Active	Shows the operational status of the function for the port. Possible values: ▶ `Selected` The Auto Disable function shuts down the port. ▶ `Not selected` (default setting) The port is active.

Table 245: Table in the `Diagnostics:Ports:Auto Disable` dialog (cont.)

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Reset	Enables the port when disabled by the Port Monitor function.
Help	Opens the online help.

Table 246: Buttons

8.3.10 Port Mirroring

The device ports to be reviewed are known as source ports. The device port to which the device copies the data packets to be reviewed is called the destination port. Only physical device ports are suitable to be source or destination ports.

In port mirroring, the device copies valid data packets transmitted and received by the source ports to the destination port. This does not affect the data traffic on the source ports during port mirroring. You can use a management tool connected at the destination port, e.g. an RMON probe, to monitor the data traffic of the source ports.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device copies the data packets for the select source ports to the destination port. Possible values: ▶ `On` ▶ `Off` (default setting)

Table 247: "Operation" frame in the `Diagnostics:Ports:Port Mirroring` dialog

■ Destination port

Parameters	Meaning
Destination Port	Specifies the destination port. The device copies the data packets from the source ports to this device port. Possible values: ▶ `<Port number>` (default setting: `no Port`) You cannot specify as the destination port any device port that you already defines as a source port in the table. The value `no Port` means: No destination port.

Table 248: "Destination Port" frame in the `Diagnostics:Ports:Port Mirroring` dialog

Table

Parameters	Meaning
Source Port	Number of the device port to which the table entry relates. Possible values: ▶ `<Port number>`
Enabled	Enables/disables the copying of the data packets from this device port to the destination port. Possible values: ▶ `Not selected` (default setting) The copying of the data packets is disabled. ▶ `Selected` The copying of the data packets is enabled. The port is specified as a source port. ▶ `Disabled` It is not possible to copy the data packets for this port. Possible causes: – The port is specified as a destination port. – The port is a logical port, not a physical port.
Type	Specifies which data packets the device copies to the destination port. Possible values: ▶ `none` (default setting) No data packets. ▶ `tx` Data packets that the source port transmits. ▶ `rx` Data packets that the source port receives. ▶ `txrx` Data packets that the source port transmits and receives.

Table 249: Table in the `Diagnostics:Ports:Port Mirroring` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Reset Config	Resets all the settings in the dialog to the default settings and transfers this change to the volatile memory of the device (`RAM`).
Help	Opens the online help.

Table 250: Buttons

8.4 Status Configuration

Use the dialogs in this menu to define the functions that the device monitors and the notification process.

The menu contains the following dialogs:

- ▶ Device Status
- ▶ Security Status
- ▶ Signal Contact
- ▶ MAC Notification
- ▶ Alarms (Traps)

8.4.1 Device Status

The device status provides an overview of the overall condition of the device. Many process visualization systems record the device status for a device in order to present its condition in graphic form.

The device displays its current status as "Error" or "OK" in the "Device Status" frame. The device determines this status from the individual monitoring results.

The device displays the detected faults in the "Device Status" frame of the `Basic Configuration:System` dialog for the monitored functions. The device displays the detected fault with the higher priority when 2 or more detected faults occur at the same time. The order of the functions listed in the "Monitoring" frame represents the monitor priority. Meaning that, the higher a function appears at the top of the list, the higher the priority. When you repair the displayed detected fault, the device displays the next higher detected fault.

■ Device Status

Parameters	Meaning
Device Status	Displays the current status of the device. The device determines the status from the individual monitored parameters. Possible values: ▶ `Error` ▶ `OK`

Table 251: "Device Status" frame in the `Diagnostics:Status Configuration:Device Status` *dialog*

■ Trap Configuration

Parameters	Meaning
Generate Trap	Activates/deactivates the sending of an SNMP message (trap) when the value in the "Device Status" field changes. Possible values: ▶ `Selected` The device sends a trap. ▶ `Not selected` (default setting) The device does not send a trap. The prerequisite for sending SNMP messages (traps) is that the function is switched on in the `Diagnostics:Alarms (Traps)` dialog and at least 1 SNMP manager is defined.

Table 252: "Trap Configuration" frame in the `Diagnostics:Status Configuration:Device Status` dialog

■ Monitoring

Parameters	Meaning
Temperature	Defines whether the device monitors the temperature in the device. Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the device status to `Error` if the temperature exceeds or falls below the temperature thresholds. You define the temperature thresholds in the `Basic Settings:System` dialog, in the "Temperature (°C)" field.
Ring Redundancy	Defines whether the device monitors the ring redundancy. Possible values: ▶ `Ignore` (default setting) The device ignores this parameter. ▶ `Monitor` The device changes the device status to `Error` in the following situations: – The redundancy function becomes active (loss of redundancy reserve) – The device is a normal ring participant and detects an error in the local configuration.

Table 253: "Monitoring" frame in the `Diagnostics:Status Configuration:Device Status` dialog

Parameters	Meaning
Connection error	Defines whether the device monitors the link status of the device ports. Possible values: ▶ `Ignore` (default setting) The device ignores this parameter. ▶ `Monitor` The device changes the device status to `Error` if the link at a device port is interrupted. You have the option of selecting the device ports to be monitored individually.
ENVM removal	Defines whether the device monitors the active external memory. Possible values: ▶ `Ignore` (default setting) The device ignores this parameter. ▶ `Monitor` The device changes the device status to `Error` if you remove the active external memory from the device.
ENVM not in Sync	Defines whether the device monitors the synchronization of the device configuration in the device and on the external memory. Possible values: ▶ `Ignore` (default setting) The device ignores this parameter. ▶ `Monitor` The device changes the device status to `Error` in the following situations: – The device configuration only exists in the device. – The device configuration in the device differs from the device configuration on the external memory.

Table 253: "Monitoring" frame in the `Diagnostics:Status Configuration:Device Status` dialog (cont.)

■ “Propagate Connection Error” table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.

Table 254: "Propagate Connection Error" table in the `Diagnostics:Status Configuration:Device Status` dialog

Parameters	Meaning
Propagate Connection Error	Defines whether the device monitors the link status of the port. Possible values: ▶ Selected The device changes the device status to Error if the link at this port is interrupted. ▶ Not selected (default setting) The device status remains unchanged if the link at this port is interrupted. This setting is only effective if you have selected the value Monitor in the "Connection error" field of the "Monitoring" frame.

Table 254:"Propagate Connection Error" table in the Diagnostics:Status Configuration:Device Status dialog (cont.)

■ "Propagate State" table

Parameters	Meaning
Power Supply	Number of the power supply that applies to this entry.
Propagate State	Defines whether the device monitors the power supply. Possible values: ▶ Selected (default setting) The device changes the device status to Error if one of the following conditions applies: – The voltage source is providing an incorrect voltage. – The voltage source fails. – The power supply within the device is defective. ▶ Not selected The device status remains unchanged under the conditions named above.

Table 255:"Propagate State" table in the Diagnostics:Status Configuration:Device Status dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".

Table 256:Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 256: Buttons (cont.)

8.4.2 Security Status

This dialog gives you an overview of the status of the safety-relevant settings in the device.

The device displays its current status as “Error” or “OK” in the “Security Status” frame. The device determines this status from the individual monitoring results.

The device displays the detected faults in the "Security Status" frame of the `Basic Configuration:System` dialog for the monitored functions. The device displays the detected fault with the higher priority when 2 or more detected faults occur at the same time. The order of the functions listed in the "Monitoring" frame represents the monitor priority. Meaning that, the higher a function appears at the top of the list, the higher the priority. When you repair the displayed detected fault, the device displays the next higher detected fault.

■ Security Status

Parameters	Meaning
Security Status	Shows the current status of the security-relevant settings in the device. The device determines the status from the individual monitored parameters. Possible values: ▶ `Error` ▶ `OK`

Table 257: "Security Status" frame in the `Diagnostics:Status Configuration:Security Status` dialog

Trap Configuration

Parameters	Meaning
Generate Trap	Activates/deactivates the sending of an SNMP message (trap) when the value in the "Security Status" field changes. Possible values: ▶ `Selected` The device sends a trap. ▶ `Not selected` (default setting) The device does not send a trap. The prerequisite for sending SNMP messages (traps) is that the function is switched on in the `Diagnostics:Alarms (Traps)` dialog and at least 1 SNMP manager is defined.

Table 258: "Trap Configuration" frame in the `Diagnostics:Status Configuration:Security Status` dialog

Monitoring

Parameters	Meaning
Default Passwords not changed	Defines whether the device monitors the password for the locally set up user accounts `user` and `admin`. Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the security status to the value `Error` if the password for the `user` or `admin` user account is unchanged from the default setting. You set the password in the `Security:User Management` dialog.
Configured min. password length <8	Defines whether the device monitors the password rule "Minimum Password Length". Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the security status to the value `Error` if the value for the password rule is less than `8`. You configure the password rules in the `Security:User Management` dialog, in the "Password Policy" frame.

Table 259: "Monitoring" frame in the `Diagnostics:Status Configuration:Security Status` dialog (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Password strength not configured	Defines whether the device monitors the password rules. Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the security status to the value `Error` if the value for at least one of the following password rules is `0`: – Minimum Upper Cases – Minimum Lower Cases – Minimum Numbers – Minimum Special Characters You configure the password rules in the `Security:User Management` dialog, in the "Password Policy" frame.
Password strength check inactive	Defines whether the device monitors the status of the function "Policy Check". Possible values: ▶ `Ignore` (default setting) The device ignores this parameter. ▶ `Monitor` The device changes the security status to the value `Error` if the function "Policy Check" is deactivated for at least 1 user account. You configure the "Policy Check" function in the table in the `Security:User Management` dialog.
Telnet Enabled	Defines whether the device monitors the status of the Telnet server. Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the security status to the value `Error` if the Telnet server is enabled. You enable/disable the Telnet server in the `Security:Management Access:Server` dialog, on the "Telnet" tab page.
HTTP Enabled	Defines whether the device monitors the status of the HTTP server. Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the security status to the value `Error` if the HTTP server is enabled. You enable/disable the HTTP server in the `Security:Management Access:Server` dialog, on the "HTTP" tab page.

Table 259: "Monitoring" frame in the `Diagnostics:Status Configuration:Security Status` dialog (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Unsecure SNMP Configuration	Defines whether the device monitors the status of the SNMP server. Possible values: ▶ Ignore The device ignores this parameter. ▶ Monitor (default setting) The device changes the security status to the value Error if at least one of the following conditions applies: – The "SNMPv1 on" function is enabled. – The "SNMPv2 on" function is enabled. – The encryption for SNMPv3 is disabled. You configure the encryption in the Security:User Management dialog, in the table in the "SNMP encryption" field. You define the settings for the SNMP server in the Security:Management Access:Server dialog, on the "SNMP" tab page.
SysMon active	Defines whether the device monitors the option to switch to the system monitor. Possible values: ▶ Ignore (default setting) The device ignores this parameter. ▶ Monitor The device changes the security status to the value Error if the access to the system monitor is possible. When the device is being started, every user can switch to the system monitor via a V.24 connection. You enable/disable the system monitor in the Diagnostics:Selftest dialog.
External NVM Update possible	Defines whether the device monitors the saving of the device configuration on the external memory. Possible values: ▶ Ignore (default setting) The device ignores this parameter. ▶ Monitor The device changes the safety status to the value Error if the device also saves the device configuration on the external memory. You enable/disable the saving of the device configuration on the external memory in the Basic Settings:External Memory dialog.

Table 259: "Monitoring" frame in the Diagnostics:Status Configuration:Security Status dialog (section #x3c;$tblsheetnum> of 4)

Parameters	Meaning
Active Port without link	Defines whether the device monitors the link status of the enabled device ports. Possible values: ▶ `Ignore` (default setting) The device ignores this parameter. ▶ `Monitor` The device changes the security status to the value `Error` if the link on an enabled device port is interrupted. You have the option of selecting the device ports to be monitored individually.
HiDiscovery Enabled	Defines whether the device monitors the status of HiDiscovery. Possible values: ▶ `Ignore` The device ignores this parameter. ▶ `Monitor` (default setting) The device changes the Security Status to the value `Error` if "Operation" for the HiDiscovery Protocol is `On` and "Access" is `readWrite`. You enable/disable the HiDiscovery Protocol in the `Basic Settings:Network` dialog in the "HiDiscovery Protocol" frame.

Table 259: "Monitoring" frame in the `Diagnostics:Status Configuration:Security Status` dialog (section #x3c;$tblsheetnum> of 4)

■ “Monitor active Port without link” table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Monitor active Port without link	Defines whether the device monitors the link status of an enabled port. Possible values: ▶ `Selected` The device changes the security status to `Error` if the port is switched on (dialog `Basic Settings:Port Configuration`, checkbox "Port on" is selected) and the link is down on the port. ▶ `Not selected` (default setting) The security status remains unchanged if someone sets up a connection via the port. This setting only takes effect if you have selected the value `Monitor` in the "Monitoring" frame in the "Active Port without link" field.

Table 260: "Monitor active Port without link" table in the `Diagnostics:Status Configuration:Security Status` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (RAM) of the device. To permanently save the changes afterwards, you open the Basic Settings:Load/Save dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (RAM) of the device.
Help	Opens the online help.

Table 261: Buttons

8.4.3 Signal Contact

The signal contact is a potential-free relay contact. The device thus allows you to perform remote diagnosis. The device uses the relay contact to signal the occurrence of events by opening the relay contact and interrupting the closed circuit.

In this dialog you define the trigger conditions for the signal contact.

The signal contact gives you the following options:

- ▶ Monitoring the correct operation of the device.
- ▶ Signaling the device status of the device.
- ▶ Signaling the security status of the device.
- ▶ Controlling external devices by manually setting the signal contacts.

■ Signal Contact Mode

Parameters	Meaning
Signal Contact Mode	Specifies which events the device signals via the signal contact. Possible values: ▶ Monitoring Correct Operation (default setting) In this mode the signal contact signals events that occur when monitoring individual device functions. The signal contact thus makes remote diagnosis possible. In the "Monitoring Correct Operation" frame, you define additional settings. ▶ Manual Setting With this mode you can control the signal contact remotely. In the "Manual Setting" frame, you define additional settings. ▶ Device Status In this mode the signal contact signals the overall status from the "Device Status" dialog. The "Status" frame shows the status. ▶ Security Status In this mode the signal contact signals the overall status from the "Security Status" dialog. The "Status" frame shows the status. ▶ Device Status/Security Status In this mode the signal contact signals the overall status from the "Device Status" dialog and from the "Security Status" dialog. The "Status" frame shows the status.

Table 262: "Signal Contact Mode" frame in the `Diagnostics:Status Configuration:Signal Contact` dialog

■ Trap Configuration

Parameters	Meaning
Generate Trap	Activates/deactivates the sending of an SNMP message (trap) when an event occurs that triggers the signal contact. Possible values: ▶ Selected The device sends a trap. ▶ Not selected (default setting) The device does not send a trap. The prerequisite for sending SNMP messages (traps) is that the function is switched on in the Diagnostics:Alarms (Traps) dialog and at least 1 SNMP manager is defined.

Table 263: "Trap Configuration" frame in the `Diagnostics:Status Configuration:Signal Contact` dialog

Monitoring correct Operation

In this frame you define the parameters that the device monitors. The device signals the occurrence of an event by opening the signal contact.

Parameters	Meaning
Contact	Shows the status of the signal contact. Possible values: ▶ `Opened (Error)` An event has occurred that triggers the signal contact. The signal contact is opened. ▶ `Closed (OK)` Normal status. The signal contact is closed.
Temperature	Defines whether the signal contact monitors the temperature in the device. Possible values: ▶ `Ignore` The signal contact ignores this parameter. ▶ `Monitor` (default setting) The signal contact opens if the temperature exceeds / falls below the threshold values. You define the temperature thresholds in the `Basic Settings:System` dialog, in the "Temperature (°C)" field.
Connection error	Defines whether the signal contact monitors the link status of the device ports. Possible values: ▶ `Ignore` (default setting) The signal contact ignores this parameter. ▶ `Monitor` The signal contact opens if the link on a device port is interrupted. You have the option of selecting the device ports to be monitored individually.
ENVM removal	Defines whether the signal contact monitors the external memory. Possible values: ▶ `Ignore` (default setting) The signal contact ignores this parameter. ▶ `Monitor` The signal contact opens if you remove the external memory from the device.

Table 264: "Monitoring Correct Operation" frame in the `Diagnostics:Status Configuration:Signal Contact` dialog

Parameters	Meaning
ENVM not in Sync	Defines whether the signal contact monitors the synchronization of the device configuration in the device and on the external memory. Possible values: ▶ `Ignore` (default setting) The signal contact ignores this parameter. ▶ `Monitor` The signal contact opens in the following situations: – The device configuration only exists in the device. – The device configuration in the device differs from the device configuration on the external memory.
Ring redundancy	Defines whether the signal contact monitors the ring redundancy. Possible values: ▶ `Ignore` (default setting) The signal contact ignores this parameter. ▶ `Monitor` The signal contact opens in the following situations: – The redundancy function becomes active (loss of redundancy) – The device is a normal ring participant and detects an error in the local configuration.

Table 264: "Monitoring Correct Operation" frame in the `Diagnostics:Status Configuration:Signal Contact` dialog (cont.)

■ Manual Setting

This frame allows you to control the signal contact remotely. This is useful in the following situations, for example:

- ▶ Simulating an error during SPS error monitoring.
- ▶ Remote control of a device via SNMP, such as switching on a camera.

Parameters	Meaning
Contact	Defines the status of the signal contact. Possible values: ▶ `Opened` (default setting) The signal contact is opened. ▶ `Closed` The signal contact is closed.

Table 265: "Manual Setting" frame in the `Diagnostics:Status Configuration:Signal Contact` dialog

Device Status

This frame shows the status of the signal contact:

- The signal contact indicates the device status if you have selected the "Device Status" option field in the "Signal Contact Mode" frame.
- The signal contact indicates the security status if you have selected the "Security Status" option field in the "Signal Contact Mode" frame.

Parameters	Meaning
Contact	Shows the status of the signal contact. The signal contact indicates the device status or the security status. Possible values: ▶ `Opened (Error)` The signal contact is opened. – The current status of the device has the value `Error`. or – The current status of the security-relevant settings in the device has the value `Error`. ▶ `Closed (OK)` Normal status. The signal contact is closed.

Table 266: "Status" frame in the `Diagnostics:Status Configuration:Signal Contact` *dialog*

"Propagate Connection Error" table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Propagate Connection Error	Defines whether the signal contact monitors the link status of the device port. Possible values: ▶ `Selected` The signal contact opens if the link on this device port is interrupted. ▶ `Not selected` (default setting) The signal contact remains closed if the link on this device port is interrupted. This setting is only effective if you have selected the value `Monitor` in the "Connection error" field of the "Monitoring correct Operation" frame.

Table 267: "Propagate Connection Error" table in the `Diagnostics:Status Configuration:Signal Contact` *dialog*

■ “Propagate State” table

Parameters	Meaning
Power Supply	Shows the number of the power supply to which the table entry relates.
Propagate State	Defines whether the signal contact monitors the power supply. Possible values: ▶ `Selected` (default setting) The signal contact opens if one of the following conditions applies: – The voltage source is providing an incorrect voltage. – The voltage source fails. – The power supply within the device is defective. ▶ `Not selected` The signal contact remains closed under the conditions named above.

Table 268: "Propagate State" table in the `Diagnostics:Status Configuration:Signal Contact` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 269: Buttons

8.4.4 MAC Notification

MAC notification, also known as MAC address change notification, tracks users on a network by storing the MAC address change activity. When the switch learns or removes a MAC address, the device sends an SNMP trap to a configured trap destination. The device generates MAC address change notifications for dynamic unicast MAC addresses.

The intended use of this function is for end device ports, where few MAC address changes occur.

■ Operation

Parameters	Meaning
Operation	Activates/deactivates the MAC Notification function globally on the device. Possible values: ▶ `On` The device sends traps for the active rows to the active management stations in `Diagnostics:Status Configuration:Alarms (Traps).` ▶ `Off` (default setting)

Table 270: "Operation" frame in the `Diagnostics:Status Configuration:MAC Notification` dialog

■ Configuration

Parameters	Meaning
Intervals [s]	Defines the interval, in seconds, between notifications. The device buffer contains up to 20 addresses. If the buffer is full before the interval expires, then the device sends a trap to the management station. Possible values: ▶ `0..2147483647`

Table 271: "Configuration" frame in the `Diagnostics:Status Configuration:MAC Notification` dialog

Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Active	Activates/deactivates the MAC Notification function on this port. Possible values: ▶ `Selected` When globally activated, the device sends traps for this row to the active management stations in `Diagnostics:Status Configuration:Alarms (Traps)`. ▶ `Not selected` (default setting)
MAC Address	Shows the last MAC addresses added or removed from the address table for this interface. When the field contains 20 addresses, the device sends a trap to the management station.
Last MAC Status	Shows the status of the last MAC address on this interface. Possible values: ▶ `other` ▶ `added` ▶ `removed`

Table 272: Table in the `Diagnostics:Status Configuration:MAC Notification` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 273: Buttons

8.4.5 Alarms (Traps)

The device enables you to send an SNMP message (trap) yourself for specific events to one or more SNMP managers.
You define the events, for example, in the Diagnostics:Status Configuration:Device Status dialog or the Diagnostics:Status Configuration:Security Status dialog.

With this dialog you can define the SNMP managers to which the device sends the traps.

■ Operation

Parameters	Meaning
Operation	When the function is switched on, the device sends SNMP messages (traps) to the SNMP managers defined in the table. When the function is switched off, the device does not send any traps. Possible values: ▶ On (default setting) ▶ Off

Table 274: "Operation" frame in the Diagnostics:Status Configuration:Alarms (Traps) dialog

■ Table

Parameters	Meaning
Name	Defines a name for the SNMP manager. Possible values: ▶ 1..32 alphanumeric characters ▶ including the following special characters: !#$%&'()*+,-./:;<=>?@[\\]^_`{}~
Address	Defines the IP address and the port number of the SNMP manager. Possible values: ▶ <Valid IPv4 address>:<port number>

Table 275: Table in the Diagnostics:Status Configuration:Alarms (Traps) dialog

Parameters	Meaning
Active	Defines whether the device sends SNMP messages (traps) to this SNMP manager. Possible values: ▶ `Selected` (default setting) The device sends traps to this SNMP manager. ▶ `Not selected` The device does not send traps to this SNMP manager.

Table 275: Table in the `Diagnostics:Status Configuration:Alarms (Traps)` dialog

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Create	Opens the "Create" dialog to add a new entry to the table. In the "Create" dialog you define the name and the IP address and port number of the SNMP manager. If you choose not to enter a port number, the device automatically adds the port number `162`.
Remove	Removes the selected table entry.
Help	Opens the online help.

Table 276: Buttons

8.5 LLDP

The device allows you to gather information about neighboring devices. For this, the device uses the Link Layer Discovery Protocol (LLDP). This information enables a network management station to map the structure of your network.

This menu allows you to configure the topology discovery and to display the information received in table form.

The menu contains the following dialogs:

- Configuration
- Topology Discovery

8.5.1 Configuration

This dialog allows you to configure the topology discovery for every device port.

■ Operation

Parameters	Meaning
Operation	If the function is switched on, the topology discovery with LLDP is activated on the device. Possible values: ▶ `On` (default setting) ▶ `Off`

Table 277: "Operation" frame in the `Diagnostics:LLDP:Configuration` dialog

■ Configuration

Parameters	Meaning
Transmit Interval [s]	Defines the interval in seconds at which the device transmits LLDP data packets. Possible values: ▶ `5..32768` (default setting: `30`)
Transmit Interval Multiplier	Defines the factor for determining the time-to-live value for the LLDP data packets. Possible values: ▶ `2..10` (default setting: `4`) The time-to-live value coded in the LLDP header results from multiplying this value with the value in the "Transmit Interval [s]" field.
Reinit Delay [s]	Defines the delay in seconds for the reinitialization of a device port. Possible values: ▶ `1..10` (default setting: `2`) If the value for a device port in the "Operation" field is `Off`, the device tries to initialize the port again after the time defined here has elapsed.
Transmit Delay [s]	Defines the delay in seconds for transmitting successive LLDP data packets. Possible values: ▶ `1..8192` (default setting: `2`) The recommended value is between a minimum of `1` and a maximum of a quarter of the value in the "Transmit Interval [s]" field.
Notification Interval [s]	Defines the interval in seconds for transmitting LLDP notifications. Possible values: ▶ `5..3600` (default setting: `5`) After transmitting a notification trap, the device waits for the time interval to expire before transmitting the next notification trap.

Table 278: "Configuration" frame in the `Diagnostics:LLDP:Configuration` dialog

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.

Table 279: Table in the `Diagnostics:LLDP:Configuration` dialog

Parameters	Meaning
Admin Status	Defines whether the device port transmits and receives LLDP data packets. Possible values: ▶ `Transmit` The device port transmits LLDP data packets but stores no information about neighboring devices. ▶ `Receive` The device port receives LLDP data packets but transmits no information to neighboring devices. ▶ `Receive and Transmit` (default setting) The device port transmits LLDP data packets and stores information about neighboring devices. ▶ `Disable` The device port transmits no LLDP data packets and stores no information about neighboring devices.
Notification Enabled	Specifies whether LLDP notifications are enabled on this device port. Possible values: ▶ `Selected` LLDP notifications are enabled on this device port. ▶ `Not selected` (default setting) LLDP notifications are disabled on this device port.
Transmit Port Description	Specifies whether the device transmits a TLV (Type Length Value) with the port description. Possible values: ▶ `Selected` (default setting) The device transmits a TLV with the port description. ▶ `Not selected` The device does not transmit a TLV with the port description.
Transmit System Name	Specifies whether the device transmits a TLV (Type Length Value) with the device name. Possible values: ▶ `Selected` (default setting) The device transmits a TLV with the device name. ▶ `Not selected` The device does not transmit a TLV with the device name.
Transmit System Description	Specifies whether the device transmits a TLV (Type Length Value) with the system description. Possible values: ▶ `Selected` (default setting) The device transmits a TLV with the system description. ▶ `Not selected` The device does not transmit a TLV with the system description.

Table 279: Table in the `Diagnostics:LLDP:Configuration` dialog (cont.)

Parameters	Meaning
Transmit System Capabilities	Specifies whether the device transmits a TLV (Type Length Value) with the system capabilities (performance data). Possible values: ▶ `Selected` (default setting) The device transmits a TLV with the system capabilities. ▶ `Not selected` The device does not transmit a TLV with the system capabilities.
Max Neighbors	Limits the number of neighboring devices to be recorded for this port. Possible values: ▶ `1..50` (default setting: `10`)
FDB Mode	Defines which function the device uses to record neighboring devices on this port. Possible values: ▶ `lldpOnly` The device uses only LLDP data packets to record neighboring devices on this port. ▶ `macOnly` The device uses learned MAC addresses to record neighboring devices on this port. The device only uses the MAC address if there is no other entry in the address table (FDB, Forwarding Database) for this port. ▶ `both` The device uses LLDP data packets and learned MAC addresses to record neighboring devices on this port. ▶ `autoDetect` (default setting) If the device receives LLDP data packets at this port, the device works the same as with the `lldpOnly` setting. Otherwise, the device works the same as with the `macOnly` setting.

Table 279: Table in the `Diagnostics:LLDP:Configuration` dialog (cont.)

■ Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 280: Buttons

8.5.2 Topology Discovery

Devices in a network send advertisements in packets called LLDP Data Units (LLDPDUs). The data sent and received via LLDPDUs is useful for many reasons. For example, the device discovers which devices on a network are neighbors, and through which ports they connect to each other.

This dialog with its tabs allows you to map the network as well as discover the devices connected with their capabilities.

■ LLDP

This tab shows you the collected LLDP information for the neighboring devices. This information enables the network management station to map the structure of your network.

When devices both with and without an active topology discovery function are connected to a device port, the topology table hides the devices without active topology discovery.

When only devices without active topology discovery are connected to a device port, the table will contain one line for this port to represent all devices. This line contains the number of connected devices.

The Forwarding Database (FDB) address table contains MAC addresses of devices that the topology table hides for the sake of clarity.

If you use 1 port to connect several devices, for example via a hub, the table contains 1 line for each connected device.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Neighbor Identifier	Shows the chassis ID of the neighboring device. This can be the basis MAC address of the neighboring device, for example.
Neighbor IP Address	Shows the IP address with which the management functions of the neighboring device can be reached.
Neighbor Port Description	Shows a description for the device port of the neighboring device.
Neighbor System Name	Shows the device name of the neighboring device.

Table 281: Table in the "LLDP" tab of the `Diagnostics:LLDP:Topology Discovery` *dialog*

Parameters	Meaning
Port ID	Shows the ID of the device port through which the neighboring device is connected to the device.
Autonegotiation Supported	Shows whether the device port of the neighboring device supports autonegotiation.
Autonegotiation Enabled	Shows whether autonegotiation is enabled on the device port of the neighboring device.
PoE Supported	Shows whether the device port of the neighboring device supports Power over Ethernet (PoE).
PoE Enabled	Shows whether Power over Ethernet (PoE) is enabled on the device port of the neighboring device.

Table 281: Table in the "LLDP" tab of the `Diagnostics:LLDP:Topology Discovery` dialog (cont.)

■ Display FDB Entries

Parameters	Meaning
Display FDB Entries	Adds entries to the table for devices without active LLDP support. Possible values: ▶ `Not selected` (default setting) The table only shows entries for devices with LLDP support. ▶ `Selected` The table shows entries for devices with and without LLDP support. The device uses information from its address table (FDB, Forwarding Database).

Table 282: "Display FDB Entries" checkbox in the "LLDP" tab of the `Diagnostics:LLDP:Topology Discovery` dialog

■ LLDP-MED

LLDP for Media Endpoint Devices (LLDP-MED) is an extension to LLDP that operates between endpoint devices and network devices. It specifically provides support for VoIP applications. In this support rule, it provides an additional set of common advertisement, Type Length Value (TLV), messages. The device uses the TLVs for capabilities discovery such as network policy, Power over Ethernet, inventory management and location information.

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Device Class	Shows the device class of the remotely connected device. ▶ A value of `notDefined` indicates that the device has capabilities not covered by any of the "LLDP-MED" classes. ▶ A value of `endpointClass1`..3 indicates that the device has endpoint class 1..3 capabilities. ▶ A value of `networkConnectivity` indicates that the device has network connectivity device capabilities.
VLAN ID	Shows the extension of the VLAN Identifier for the remote system connected to this port, as defined in IEEE 802.1P-1998. ▶ The device uses a value of `1` through `4094` to define a valid Port VLAN ID. ▶ The device shows a value of `0` for priority tagged frames. This means that only the 802.1 p priority level is significant and the device uses the default VLAN ID of the ingress port. ▶ The device reserves a value of `4095` for implementation.
Priority	Shows the value of the 802.1 p priority which is associated with the remote system connected to the port.
DSCP	Shows the value of the Differentiated Service Code Point (DSCP) which is associated with the remote system connected to the port.
Unknown Bit Status	Shows the unknown bit status of incoming traffic. ▶ A value of `true` indicates that the network policy for the specified application type is currently unknown. In this case, the VLAN ID ignores the Layer 2 priority and the "DSCP" value fields. ▶ A value of `false` indicates a defined network policy.
Tagged Bit Status	Shows the tagged bit status. ▶ A value of `true` indicates that the application uses a tagged VLAN. ▶ A value of `false` indicates that for the specific application the device uses untagged VLAN operation. In this case, the device ignores both the VLAN ID and the Layer 2 priority fields whereas the "DSCP" value is relevant.
Hardware Revision	Shows the vendor-specific hardware revision string as advertised by the remote endpoint.

Table 283: Table in the "LLDP-MED" tab of the `Diagnostics:LLDP:Topology Discovery` dialog

Parameters	Meaning
Firmware Revision	Shows the vendor-specific firmware revision string as advertised by the remote endpoint.
Software Revision	Shows the vendor-specific software revision string as advertised by the remote endpoint.
Serial Number	Shows the vendor-specific serial number as advertised by the remote endpoint.
Manufacturer Name	Shows the vendor-specific manufacturer name as advertised by the remote endpoint.
Model Name	Shows the vendor-specific model name as advertised by the remote endpoint.
Asset ID	Shows the vendor-specific asset tracking identifier as advertised by the remote endpoint.

Table 283: Table in the "LLDP-MED" tab of the `Diagnostics:LLDP:Topology Discovery` dialog (cont.)

■ Buttons

Button	Meaning
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 284: Buttons

9 Advanced

With this menu you can configure additional settings for the device.

The menu contains the following dialogs:

- DHCP L2 Relay
- Telnet Client

9.1 DHCP L2 Relay

A network administrator uses the DHCP L2 Relay Agent to add DHCP client information required by a L3 Relay Agent and DHCP server to assign addresses and configuration to a client.

When active, the relay adds Option 82 information configured in this dialog to the packets before it relays DHCP requests from the clients to the server. The Option 82 fields provide unique information about the client and relay. This unique identifier consists of a Circuit ID for the client and a Remote ID for the relay.

In addition to the type, length, and multicast fields, the circuit identifier includes the VLAN ID, unit number, slot number, and port number for the connected client.

The Remote ID consists of a type and length field and either a MAC address, IP address, client identifier, or a user-defined device description. A client identifier is the user-defined system name for the device.

The menu contains the following dialogs:

- Configuration
- Statistics

9.1.1 Configuration

This dialog allows you to activate the relay function on an interface and VLAN. When you activate this function on a port, the device either relays the Option 82 information or drops the information on untrusted ports. Furthermore, the device allows you to define the VLAN remote identifier.

■ Operation

Parameters	Meaning
Operation	Activates/deactivates the DHCP L2 Relay function globally on the device. Possible values: ▶ `On` Activates the DHCP L2 Relay function on the device. ▶ `Off` (default setting) Deactivates the DHCP L2 Relay function on the device.

Table 285: "Operation" frame in the `Advanced:DHCP L2 Relay:Configuration` dialog

■ Interface

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Active	Activates/deactivates the DHCP L2 Relay function on the port. Prerequisite is that you activate the function globally. Possible values: ▶ `Selected` Activates the DHCP L2 Relay function on the port. ▶ `Not selected` (default setting) Deactivates the DHCP L2 Relay function on the port.
Trusted Port	Activates/deactivates the DHCP Layer 2 Relay trust mode for the given interface. Possible values: ▶ `Selected` The device accepts DHCP packets with Option 82 information. ▶ `Not selected` (default setting) The device drops DHCP packets received on untrusted ports containing Option 82 information.

Table 286: "Interface" tab in the `Advanced:DHCP L2 Relay:Configuration` dialog

VLAN

Parameters	Meaning
VLAN ID	VLAN to which the table entry relates.
Active	Activates/deactivates the DHCP L2 Relay function on the VLAN. Prerequisite is that you first activate the function globally. Possible values: ▶ `Selected` ▶ `Not selected` (default setting)
Circuit ID	Activates/deactivates the addition of the circuit identifier to the Option 82 information. Possible values: ▶ `Selected` (default setting) Activates the sending of the Circuit ID with the Remote ID. ▶ `Not selected` The device sends the Remote ID exclusively.
Remote ID Type	Defines the Remote ID components for this VLAN. Possible values: ▶ `ip` Defines the IP address of the device as the Remote ID. ▶ `mac` (default setting) Defines the MAC address of the device as the Remote ID. ▶ `client-id` Defines the system name of the device as the Remote ID. ▶ `other` Enter the user-defined information in the "Remote ID" cell when using this value.
Remote ID	Shows the Remote ID for the VLAN. Enter the identifier in the cell when configuring the "Remote ID Type" as `other`.

Table 287:"VLAN" tab in the `Advanced:DHCP L2 Relay:Configuration` dialog

Buttons

Button	Meaning
Set	Transfers the changes to the volatile memory (`RAM`) of the device. To permanently save the changes afterwards, you open the `Basic Settings:Load/Save` dialog and click "Save".
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 288:Buttons

9.1.2 Statistics

The device monitors the traffic on the ports and displays the results in tabular form.

This table is divided into various categories to aid you in traffic analysis.

■ Table

Parameters	Meaning
Port	Shows the number of the device port to which the table entry relates.
Untrusted Server Messages With Option 82	Shows the number of DHCP server messages received with Option 82 information on the untrusted interface.
Untrusted Client Messages With Option 82	Shows the number of DHCP client messages received with Option 82 information on the untrusted interface.
Trusted Server Messages Without Option 82	Shows the number of DHCP server messages received without Option 82 information on the trusted interface.
Trusted Client Messages Without Option 82	Shows the number of DHCP client messages received without Option 82 information on the trusted interface.

Table 289: Table in the `Advanced:DHCP L2 Relay:Statistics` *dialog*

■ Buttons

Button	Meaning
Delete Statistics	Removes entries from the entire table.
Reload	Updates the fields with the values that are saved in the volatile memory (`RAM`) of the device.
Help	Opens the online help.

Table 290: Buttons

9.2 Telnet Client

This dialog opens a telnet session directly on the device. Using this dialog you configure the device using CLI commands.

For detailed information on CLI commands, review the “Command Line Interface” reference manual.

■ Buttons

Button	Meaning
Help	Opens the online help.

Table 291: Buttons

A Appendix

A.1 Technical Data

Switching	
Size of MAC address table (incl. static filters)	4096 (4k)
Max. number of statically configured MAC address filters	100
Max. number of MAC address filters learnable via IGMP Snooping	256
MTU (Max. length of over-long packets)	2000 Bytes
Latency (with 64 Byte data packets)	
1.000 Mbit/s	Layer 2: typ. 1,4 µs
100 Mbit/s	Layer 2: typ. 2,1 µs
10 Mbit/s	Layer 2: typ. 2,5 µs
Number of Switch queues	8 queues
Port priorities that can be set	0..7

VLAN	
VLAN-ID	1..4042
Number of VLANs	max. 128 simultaneously per device max. 128 simultaneously per port

A.2 List of RFCs

RFC 768	UDP
RFC 783	TFTP
RFC 791	IP
RFC 792	ICMP
RFC 793	TCP
RFC 826	ARP
RFC 854	Telnet
RFC 855	Telnet Option
RFC 951	BOOTP
RFC 1112	IGMPv1
RFC 1157	SNMPv1
RFC 1155	SMIv1
RFC 1212	Concise MIB Definitions
RFC 1213	MIB2
RFC 1493	Dot1d
RFC 1542	BOOTP-Extensions
RFC 1643	Ethernet-like -MIB
RFC 1757	RMON
RFC 1867	Form-Based File Upload in HTML
RFC 1901	Community based SNMP v2
RFC 1905	Protocol Operations for SNMP v2
RFC 1906	Transport Mappings for SNMP v2
RFC 1945	HTTP/1.0
RFC 2068	HTTP/1.1 protocol as updated by draft-ietf-http-v11-spec-rev-03
RFC 2131	DHCP
RFC 2132	DHCP-Options
RFC 2233	The Interfaces Group MIB using SMI v2
RFC 2236	IGMPv2
RFC 2246	The TLS Protocol, Version 1.0
RFC 2346	AES Ciphersuites for Transport Layer Security
RFC 2365	Administratively Scoped IP Multicast
RFC 2474	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers
RFC 2475	An Architecture for Differentiated Service
RFC 2578	SMIv2
RFC 2579	Textual Conventions for SMI v2
RFC 2580	Conformance statements for SMI v2
RFC 2613	SMON
RFC 2618	RADIUS Authentication Client MIB

RFC 2620	RADIUS Accounting MIB
RFC 2674	Dot1p/Q
RFC 2818	HTTP over TLS
RFC 2851	Internet Addresses MIB
RFC 2863	The Interfaces Group MIB
RFC 2865	RADIUS Client
RFC 2866	RADIUS Accounting
RFC 2868	RADIUS Attributes for Tunnel Protocol Support
RFC 2869	RADIUS Extensions
RFC 2869bis	RADIUS support for EAP
RFC 2933	IGMP MIB
RFC 3164	The BSD Syslog Protocol
RFC 3376	IGMPv3
RFC 3410	Introduction and Applicability Statements for Internet Standard Management Framework
RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks
RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 3413	Simple Network Management Protocol (SNMP) Applications
RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)
RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)
RFC 3580	802.1X RADIUS Usage Guidelines
RFC 3584	Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework
RFC 4022	Management Information Base for the Transmission Control Protocol (TCP)
RFC 4113	Management Information Base for the User Datagram Protocol (UDP)
RFC 4188	Definitions of Managed Objects for Bridges
RFC 4251	SSH protocol architecture
RFC 4252	SSH authentication protocol
RFC 4253	SSH transport layer protocol
RFC 4254	SSH connection protocol
RFC 4293	Management Information Base for the Internet Protocol (IP)
RFC 4318	Definitions of Managed Objects for Bridges with Rapid Spanning Tree Protocol
RFC 4330	Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
RFC 4363	Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual LAN Extensions
RFC 4541	Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches
RFC 4836	Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)

A.3 Underlying IEEE Standards

IEEE 802.1AB	Topology Discovery (LLDP)
IEEE 802.1D-2004	Media access control (MAC) bridges (includes IEEE 802.1p Priority and Dynamic Multicast Filtering)
IEEE 802.1Q-2005	Virtual Bridged Local Area Networks (VLAN Tagging, Port Based VLANs)
IEEE 802.1Q-2005	Spanning Tree (STP), Rapid Spanning Tree (RSTP)
IEEE 802.1X	Port Authentication
IEEE 802.3-2002	Ethernet
IEEE 802.3ac	VLAN Tagging
IEEE 802.3x	Flow Control

A.4 Underlying IEC Norms

IEC 62439	High availability automation networks MRP – Media Redundancy Protocol based on a ring topology

A.5 Underlying ANSI Norms

ANSI/TIA-1057	Link Layer Discovery Protocol for Media Endpoint Devices, April 2006

A.6 Maintenance

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A.7 Literature references

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  in industrieller Praxis“
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- “TCP/IP Illustrated”, Vol. 1
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- Hirschmann “Installation” user manual

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- Hirschmann “Redundancy Configuration” user manual

- Hirschmann “Routing Configuration” user manual

- Hirschmann “GUI Graphical User Interface” reference manual

- Hirschmann “Command Line Interface” reference manual

- Hirschmann User Guide “Industry Protocol”

- Hirschmann Manual „Network Management System Industrial HiVision“

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A.8.7 Parts of the FreeBSD IP stack

B Index

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