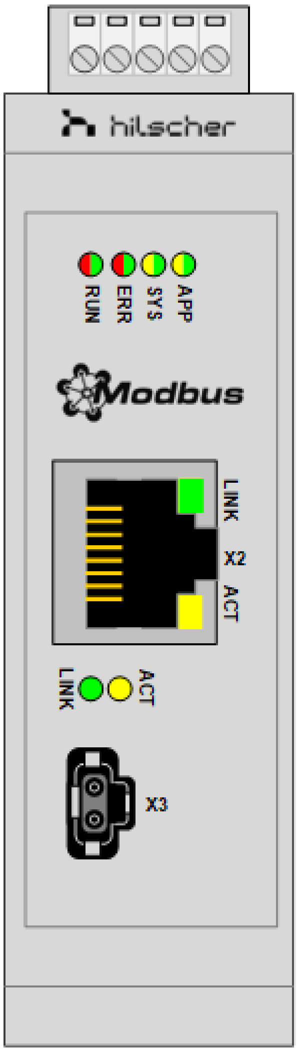
empowering communication

User manual

netSWITCH NS 90-RE-SPE\6I20/OMB

SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector

V1.2



Hilscher Gesellschaft für Systemautomation mbH
www.hilscher.com

DOC240804UM03EN | Revision 3 | English | 2025-06 | Released | Public

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1 Introduction

1.1 About the user manual

This user manual describes the hardware, installation, commissioning, and operation of the NS 90-RE-SPE\6I20/OMB SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector.

1.1.1 List of revisions

Revision	Date	Changes
1	2024-10-15	Document created.
2	2025-02-03	LED names: adapted APP
3	2025-06-10	Section *Notes on compatibility* [▸ page 6] added. Section *Web interface* [▸ page 25] added. Screenshots updated. Section *Firmware upgrade to 1.2* [▸ page 38] added.

Table 1: List of revisions

1.1.2 Obligation to read the manual

Important:

- To avoid personal injury and damage to your system and your device, you must read and understand **all** instructions in this manual before installing and using your device.
- First read the **Safety instructions** in chapter *Safety* [▸ page 7].
- Observe and follow all **warnings** in the manual.

1.1.3 Conventions in this manual

Notes, instructions, results of operating steps and positions in figures are marked as follows:

Notes

Important:
<important note you must follow to avoid malfunction>

Note:
<general note>

<note where to find further information>

Instructions

1. Operation purpose
2. Operation purpose
   - ➢ Instruction

Results

➮ Intermediate result

➩ Final result

Safety messages

The labeling of safety messages is explained in the chapter Safety.

The *positions* ①, ②, ③**...** or ⓐ, ⓑ, ⓒ**...** or Ⓐ, Ⓑ, Ⓒ**...** refer to the figure used in that section. If the numbers reference to a section outside the current section then a cross reference to that section and figure is indicated.

1.2 Reference to devices and firmware

This manual refers to device:
NS 90-RE-SPE\6I20/OMB
SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector
Part number: 1794.860

This information is valid from hardware revision 4.

Firmware	Firmware version
SPE_MS_OMB	1.2.x

Table 2: Reference to firmware

1.3 Notes on compatibility

Firmware version <=1.1.0.1

Some devices delivered very early in the lifecycle use firmware version 1.1.0.1 (or lower).

With version 1.1.0.2, the device-internal Flash memory was restructured. Loading this version conventionally is thus not possible. Affected devices must be returned to Hilscher or reloaded with firmware by a Hilscher partner.

Firmware version >=1.1.0.2

The delivered series devices had firmware version 1.1.0.2 or higher. This version, however, still includes an old version of the user interface with a limited functionality. An update to version 1.2.x is required. See *Firmware upgrade to 1.2* [page 38].

Current firmware version (>1.2.x)

All newer devices are delivered with firmware version 1.2.x or higher. The functions are described in this manual.

The firmware of this version can be updated entirely via the standard user interface. Siehe *Updating the firmware* [page 35].

2 Safety

2.1 General note about safety

The user manual, the accompanying texts and the documentation are written for the use of the products by educated personnel. When using the products, all safety instructions and all valid legal regulations have to be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended use

The NS 90-RE-SPE\6I20/OMB (SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector) described in this manual is a communication device and connects two communication networks. The NS 90-RE-SPE\6I20/OMB works as a switch and forwards frames from Ethernet (100BASE-TX, 10BASE-T) to Single Pair Ethernet (10BASE-T1L) and vice versa.

The SPE Media Switch is integrated in a compact housing and suitable for installation on top hat rails according to DIN EN 60715.

2.3 Personnel qualification

Only qualified expert personnel is allowed to install, configure, operate or dismantle the device. The expert personnel must have specific skills and qualifications for electrical professions in the following special fields:

- Health and safety at work
- Installing and connecting electrical equipment
- Measuring and analyzing electrical functions and systems
- Evaluating the safety of electrical systems and equipment
- Installing and configuring IT systems

2.4 Safety instructions to avoid personal injury

To avoid personal injury, you have to read, understand, and observe the following safety instructions and all warnings in this manual regarding hazards that may cause personal injury before you install and operate your device.

Risk of unsafe plant operation

To prevent personal injury, do not remove this device from a production plant without having ensured a safe operation of the plant during or after the removal of the device.

2.5 Safety instructions to avoid property damage

To avoid damage to your device, you have to read, understand, and observe the following safety instructions and all warnings in this manual regarding possible property damage before you install and operate your device.

2.5.1 Power disconnect during firmware or configuration download

If during the process of downloading a firmware or configuration

- the power supply to the device is interrupted, or
- the power supply to a PC with the software application is interrupted, or
- a reset to the device is done,

this may lead to the following consequences:

Loss of device parameters, firmware corruption

- The firmware download or the configuration download is interrupted and remains incomplete.
- The firmware or the configuration database will be corrupted and device parameters will be lost.
- Device damage may occur as the device cannot be rebooted.

Whether these consequences occur depends on when the power disconnect occurs during the download.

➢ During configuration download process, do not interrupt the power supply to the PC or to the device, and do not perform a reset!

Otherwise you might be forced to send in your device for repair.

Power drop during write and delete accesses in the file system

The FAT file system in the netX firmware is subject to certain limitations in its operation. Write and delete accesses in the file system (firmware update, configuration download etc.) can demage the FAT (File Allocation Table) if the accesses cannot be completed if the power drops. Without a proper FAT, a firmware may not be found and cannot be started.

Make sure that the power supply to the device is not interrupted during write and delete accesses in the file system (firmware update, configuration download, etc.).

2.5.2 Device destruction by exceeding allowed supply voltage

Observe the following note concerning your netSWITCH SPE Media Switch described in this manual:

The operation of the netSWITCH SPE Media Switch is allowed only with the stipulated supply voltage. Make sure not to exceed the upper limit or fall below the lower limit of the tolerance range of the supply voltage. A supply voltage above the upper limit, may cause damage to the netSWITCH SPE Media Switch! A supply voltage under the lower limit, may cause malfunctions of the netSWITCH SPE Media Switch. The permitted range of the supply voltage is defined by the tolerances specified in this manual.

For information on the supply voltage prescribed for the netSWITCH SPE Media Switch, see section *Requirements for operation* [▸ page 12]. This section specifies the required and permissible supply voltage for the netSWITCH SPE Media Switch and includes the permissible tolerance range.

2.5.3 Exceeding the maximum number of allowed write/delete accesses

This device uses a serial Flash chip for storing remanent data, such as firmware, configuration, etc. This chip allows a maximum of 100 000 write/delete accesses which is sufficient for a standard device operation. Writing/deleting the chip excessively (e.g. in order to change configuration or name of station) will exceed the maximum number of allowed write/delete accesses and, thus, result in damage to the device. If, e.g., the configuration is changed every hour, the maximum number will be reached after 11.5 years. If, e.g., it is changed every minute, the maximum number will already be reached after approx. 69 days.

Avoid exceeding the maximum number of allowed write/delete accesses by excessive writing.

2.5.4 Danger of unsafe system operation

To prevent property damage, do not remove this device under runtime conditions before you can not guarantee further a safe and secure operation of the plant.

2.6 Labeling of safety messages

Signal word	Description
DANGER	Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation, which if not avoided, may result in minor or moderate Injury.
NOTICE	Indicates a property damage message.

Table 3: Signal words

2.7 References safety

References safety:

[1] ANSI Z535.6-2006 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials

[2] IEC 60950-1, Information technology equipment - Safety - Part 1: General re-quirements, (IEC 60950-1:2005, modified); German Edition EN 60950-1:2006

[3] EN 61340-5-1 and EN 61340-5-2 as well as IEC 61340-5-1 and IEC 61340-5-2

3 Description and requirements

3.1 Brief description

Switch function

The NS 90-RE-SPE\6I20/OMB (SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector) is a switch between standard Ethernet (100BASE-TX) and Single Pair Ethernet (10BASE-T1L). The switch forwards Ethernet frames from standard Ethernet to Single Pair Ethernet and vice versa.

The Switch supports 100BASE-TX and 10BASE-T.

Connecting devices with “Single Pair Ethernet” connector

You can use the switch to connect devices with a “Single Pair Ethernet” connector to standard Ethernet. Data frames are forwarded with the help of the MAC address of the connected devices.

Cable length up to 1000 m

Single Pair Ethernet (10BASE-T1L) allows a cable length of up to 1000 m. Standard Ethernet allows a cable length of up to 100 m. The switch can be used to transport data up to a distance of 1000 m via an SPE cable.

3.2 Name of device

The device name is:

NS 90-RE-SPE\6I20/OMB

The device name consists of the following elements:

NS	Device type netSWITCH
90	Processor type netX 90
RE	Real-Time Ethernet at connector X2
SPE	Single Pair Ethernet at connector X3
\6I20	SPE connector according to IEC 63171-6, protection class: IP20
/OMB	Protocol at connector X2: Open Modbus/TCP

3.3 Requirements for operation

SPE Media Switch must be mounted on a top hat rail.

An external power supply is required. The voltage must be in the permissible range between 18.3 V and 30 V. The power supply must provide at least 33 mA (at 24 V).

Power is supplied via connector X1.

NOTICE

Device damage

The supply voltage must not exceed 30 V, otherwise damage to the device is possible.

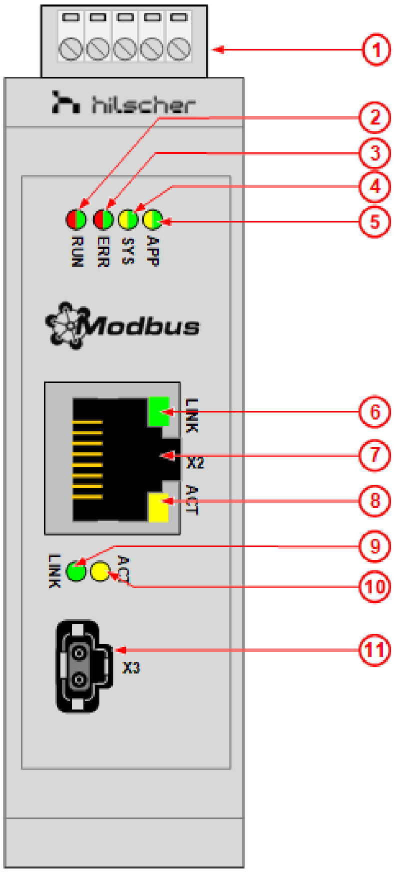
The permissible temperature range must be observed for operation.

The device must have a firmware loaded. The device is delivered with a loaded firmware.

4 Device drawings and connectors

4.1 Positions of the connectors and LEDs

Device drawing

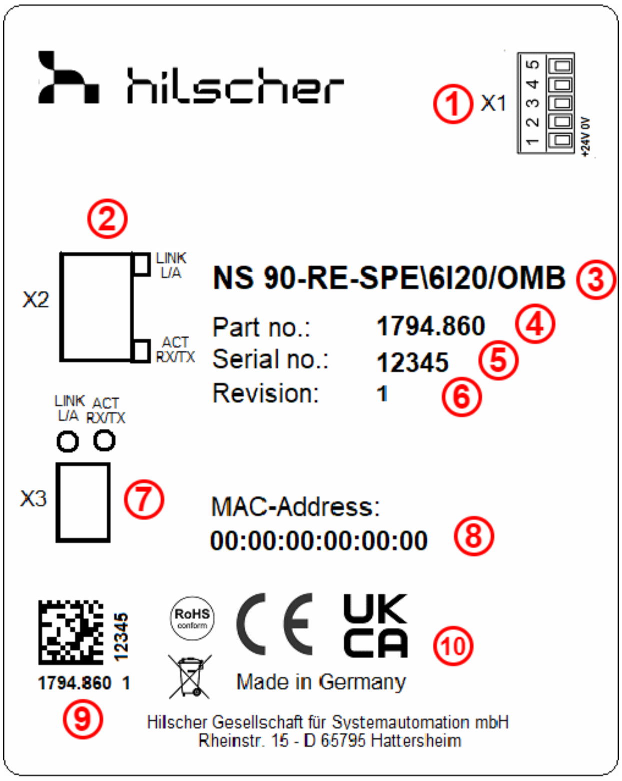


Position	Description
(1)	*Power supply (X1)* [▸ page 16]
(2)	RUN (Run) (COM0 LED)
(3)	ERR (Error) (COM1 LED)
(4)	*SYS LED* [▸ page 17]
(5)	*APP LED* [▸ page 18]
(6)	Real-Time Ethernet: Link
(7)	*Real-Time Ethernet RJ45 socket* [▸ page 16]
(8)	Real-Time Ethernet: Activity
(9)	Single Pair Ethernet: Link
(10)	Single Pair Ethernet: Activity
(11)	*Single Pair Ethernet interface* [▸ page 17] (IEC 63171-6 connector)

Table 4: Positions of the connectors and LEDs

4.2 Device label

The type label of NS 90-RE-SPE\6I20/OMB SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector shows the following information:



(1) Assignment of the power supply connectors (X1)
(2) Assignment of the Ethernet interface (X2)
(3) *Name of device* [▸ page 11]
(4) Part number
(5) Serial number
(6) Hardware revision
(7) Assignment of the "Single Pair Ethernet" interface (X3)
(8) MAC address for X2 and X3
(9) Matrix label
(10) Conformity designations and manufacturer information

4.3 Dimensional drawings

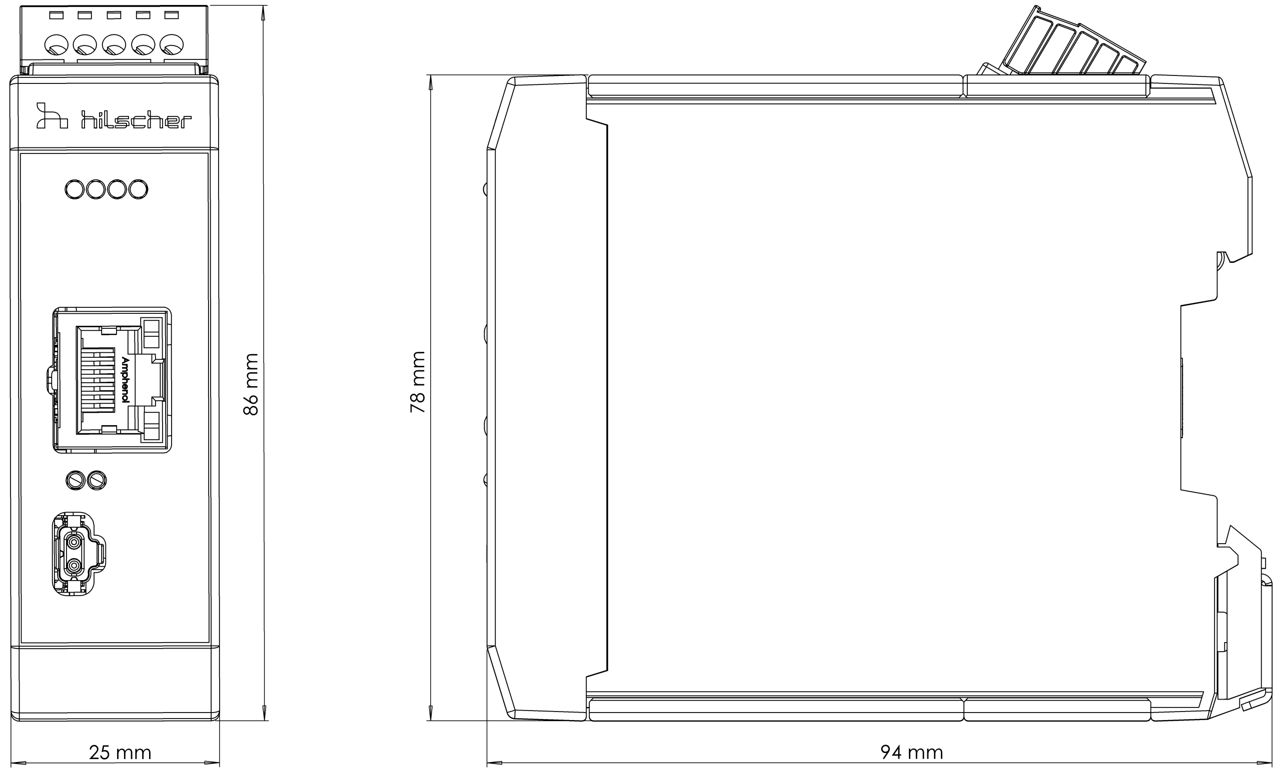


Figure 1: NS 90-RE-SPE dimensions

4.4 Connectors and interfaces

4.4.1 Power supply (X1)

The SPE Media Switch is supplied with voltage via connector X1. The connection is designed to accommodate stranded wires of a max. diameter of 1.5 mm². The supply voltage must be between 18.3 V and 30 V DC.

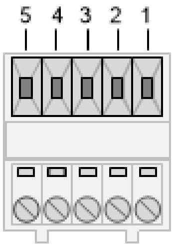
Power supply	Pin	Signal	Assignment
	1	+24 V DC	+ 24 V DC power supply
	2	0 V / GND	GND of the power supply
	3	FE	Grounding against top hat rail
	4	-	Not assigned
	5	-	Not assigned

Table 5: Power supply connector

Power over DataLine (PoDL) **not** supported at connector X2.

Power over Ethernet (PoE) **not** supported at connector X3.

4.4.2 Ethernet interface (X2)

For the Ethernet interface, use RJ45 plug and a twisted pair cable of category 5 (CAT5), or higher, which consists of 4 pairs of twisted wires with a max. baud rate of 100 MBit/s (CAT5).

Note:
The device supports the Auto Crossover function and can therefore switch RX and TX. The following figure shows the RJ45 standard pin assignment.

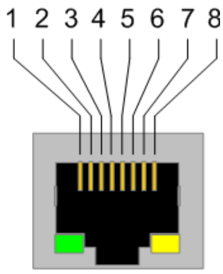
Ethernet	Pin	Signal	Description
 RJ-45 socket	1	TX+	Transmit data positive
	2	TX–	Transmit data negative
	3	RX+	Receive data positive
	4	-	Connected and terminated to PE via RC combination*
	5	-	Connected and terminated to PE via RC combination*
	6	RX–	Receive data negative
	7	-	Connected and terminated to PE via RC combination*
	8	-	Connected and terminated to PE via RC combination*
	-	PE	Metal shell on PE
	-	-	* Bob Smith Termination

Table 6: RJ45 Ethernet interface

4.4.3 Single Pair Ethernet interface (X3)

Connector X3 of the device is the Single Pair Ethernet interface.

Connector X3 for Single Pair Ethernet is a connector according to the IEC 63171-6. A suitable cable with a connector face based on the same standard is required to connect SPE devices.

The connector is protected against polarity reversal and has a notch to lock the connecting cable in place. The cable can only be detached from the device by pressing the corresponding lever at the end of the cable.

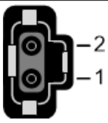
SPE (IEC 63171-6)	Pin	Signal	Description
	1	DA+	Data signal positive
	2	DA-	Data signal negative

Table 7: SPE (IEC 63171-6)

4.5 LEDs

4.5.1 System status (SYS)

This LED indicates important operating statuses even without configuring the device. To identify the SYS LED, see position (4) in section *Positions of the connectors and LEDs* [page 13].

LED	Color	State	Description
SYS	Duo-LED: yellow RDY / green RUN		
	(green)	On	The firmware is running.
	(green)	Blinking	During the formatting of the file system
	(yellow)	On	A system error has occurred.
	(yellow)/ (green)	Blinking, 3x yellow, 3x green	Firmware crash, unrecoverable (an internal exception occurred that cannot be handled)
	(yellow)/ (green)	Blinking, 1 Hz	Firmware update mode active: The firmware is idle and waiting for the update file.
	(yellow)/ (green)	Blinking, 4 Hz	Firmware update mode active: A firmware update is being installed.
	(gray)	Off	• No supply voltage: No supply voltage for the device or hardware defect. • During a firmware reset

Table 8: States of the SYS-LED

4.5.2 Application status (APP)

To identify the APP LED, see position (5) in section *Positions of the connectors and LEDs* [▸ page 13].

LED	Color	State	Description
APP (5)	**Duo LED red/green** (orange by red and green simultaneously)		
	● (green)	On	The initialization of communication between the two networks was successful. The device works normally.
	● (orange)	On	The initialization of communication between the two networks was not successful. An error has occurred.

Table 9: Status of the APP-LED

4.5.3 LEDs Open Modbus/TCP

For identification of the RUN LED, see position (2) and for identification of the ERR LED, see position (3) in section *Positions of the connectors and LEDs* [▸ page 13].

Switch has no connection to an Open Modbus/TCP client: The switch can also be used without being connected to an Open Modbus/TCP client. In this case, the RUN LED flashes green with 1 Hz. The switch function is executed. LINK LED and ACT LED indicate the Ethernet status.

Switch has a connection to an Open Modbus/TCP client: If the switch has a connection to an Open Modbus/TCP client, the following table describes the communication status for RUN LED and ERR LED.

Communication status OpenModbusTCP

LED	Color	State	Description
RUN Position in the device overview: (2)	**Duo LED red/green**		
	● (green)	On	**Connected:** OMB task has communication. At least one TCP connection is established.
	✺ (green)	Flashing (1 Hz)	**Ready, not configured yet:** OMB task is ready and not yet configured.
	✺ (green)	Flashing (5 Hz)	**Waiting for Communication:** OMB task is configured.
	● (off)	Off	**Not Ready:** OMB task is not ready.
ERR Position in the device overview: (3)	**Duo LED red/green**		
	● (off)	Off	No communication error
	✺ (red)	Flashing (2 Hz, 25% on)	System error
	● (red)	On	Communication error active

Table 10: Communication status OpenModbusTCP

LED state	Definition
Flashing (1 Hz)	The LED turns on and off with a frequency of 1 Hz: "On" for 500 ms, followed by "Off" for 500 ms.
Flashing (5 Hz)	The LED turns on and off with a frequency of 5 Hz: “On” for 100 ms, followed by “Off” for 100 ms.
Flashing (2 Hz, 25% on)	The LED turns on and off with a frequency of 2 Hz: “On” for 125 ms, followed by “Off” for 375 ms.

Table 11: Definition LED states communication status

Ethernet status OpenModbusTCP

LED	Color	State	Description
LINK	**LED green**		
X2 (6) X3 (9)	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
ACT	**LED yellow**		
X2 (8) X3 (10)	(yellow)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 12: Ethernet status OpenModbusTCP

LED status	Definition
Flickering (load dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 13: Definition of LED status of the Ethernet status

5 Mounting of device

5.1 Safety messages

Observe the following warnings:

NOTICE

Damage to the device caused by compensating currents

Observe the grounding and shielding concept of the plant to prevent compensating currents from flowing between connected devices via signal and supply voltage lines. Otherwise, the destruction of the device cannot be excluded.

5.2 Mounting device onto Top Hat Rail

- Mount the top hat rail for the SPE Media Switch horizontally at the provided mounting point according to DIN EN 60715.
- Connect the top hat rail to the equipotential bonding conductor (FE).

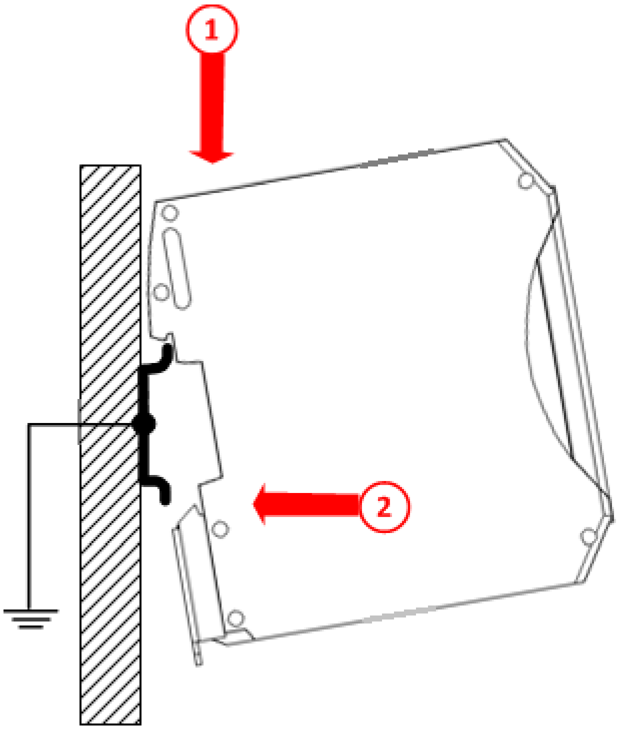


Figure 2: Mounting the SPE Media Switch on the top hat rail

- Place the device from above (1) onto the upper guiding of the top hat rail.
- Then, press the device against the top hat rail (2) until the latch of the lower holder engages.
- Thereafter, connect the 24 V supply voltage to the device.

NOTICE

Device destruction by exceeding allowed supply voltage!

The supply voltage must not exceed 30 V, otherwise damage to the device is possible.

Note:
For grounding use the grounding contact to the top hat rail on the rear of the device.

5.3 Removing device from Top Hat Rail

- To dismantle the SPE Media Switch, first remove the power supply and the data cables from the device.

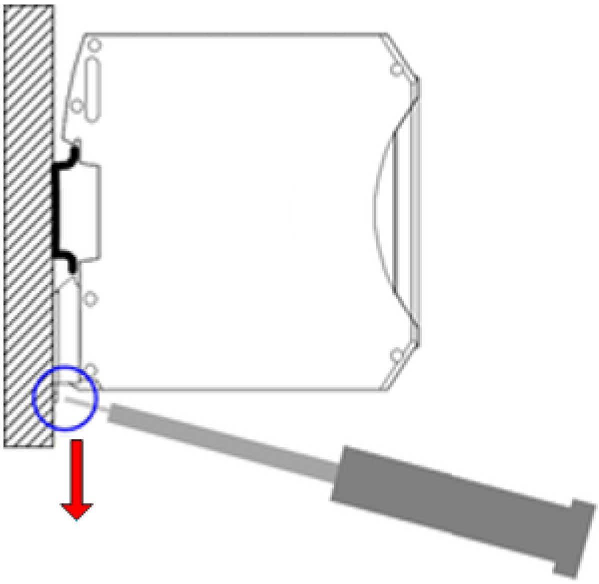


Figure 3: Removing the SPE Media Switch from the top hat rail

- At the bottom of the device, insert a screwdriver into the locking of the holder.
- Press the locking down to unlock the holder.
- Remove the device from the top hat rail thereafter.

6 Commissioning

6.1 Transparent mode and configured mode

The switch can be used in transparent mode and configured mode (optional).

Transparent mode: In the transparent mode, the switch forwards Ethernet frames from connector X2 to X3 and vice versa. This switch function is usable without any further configuration of the switch.

Configured mode: In the configured mode, the switch is included in the configuration of the Open Modbus/TCP Client and has a connection to this Open Modbus/TCP Client. In the transparent mode, the switch forwards Ethernet frames from connector X2 to X3 and vice versa.

6.2 Connecting power supply and Ethernet

Connect the +24 V DC power supply to connector X1.

Connect the Ethernet cable to connector X2. Connect the other end of the Ethernet cable to a switch or end device.

Connect the Single Pair Ethernet cable to connector X3. Connect the other end of the Single Pair Ethernet cable to a switch or end device.

As soon as all cables are connected and the switch is supplied with power, the switchs starts operation automatically. Ethernet frames are forwarded automatically and require no further configuration.

Shielded cables

Always use shielded cables whose shield has a large-scale connection to the potential equalization at both ends. Lay the communication lines as far away as possible from the power lines to avoid EMC influence caused by switching operations in the power lines.

6.3 IP address

The switch has no IP address when delivered.

Transparent mode

In transparent mode, the switch requires no IP address.

Configured mode

The switch requires an IP address so that it can be addressed via the Ethernet network. The switch has no IP address when delivered. After power on of the switch, the switch sends requests to a DHCP server in order to obtain an IP address.

If there is already a DHCP server in the network, ask your network administrator for the IP address assigned to the switch. For identification of the switch, use the MAC address printed on the type plate of the switch.

Firmware update

The switch has an integrated web server to update the firmware of the switch. To reach the web server, the switch requires an IP address.

6.4 Configured mode

In the configured mode (optional), the SPE Media Switch is an active Open Modbus/TCP participant and works as Open Modbus/TCP server. The SPE Media Switch is included in the configuration of the Open Modbus/TCP client. Adding the switch to the Open Modbus/TCP client configuration allows the client an active monitoring of the switch.

6.5 Web interface

Note:
The instructions described here refer to the firmware version >=1.2 of the device software. If the user interface differs from this manual, carry out the *Firmware upgrade to 1.2* [▸ page 38].

The device has a built-in Web server that provides various configuration and information pages.

Before you can log in to the web interface, you need the IP address of the device. Enter this IP address in a browser. The overview page "Dashboard" will be displayed.

Most overview pages can be accessed without login. To be able to adjust the settings, however, the user must be logged in.

As standard, the user *"root"* is preconfigured with the password *"password"*.

Note:
For safety reasons, the password of the user "root" should be changed.

Note:
User accounts can be created and edited via the integrated user administration. See section *User administration* [▸ page 31].

6.5.1 Device overview

The "Dashboard" shows basic information on device and manufacturer as well as a front view of the device.

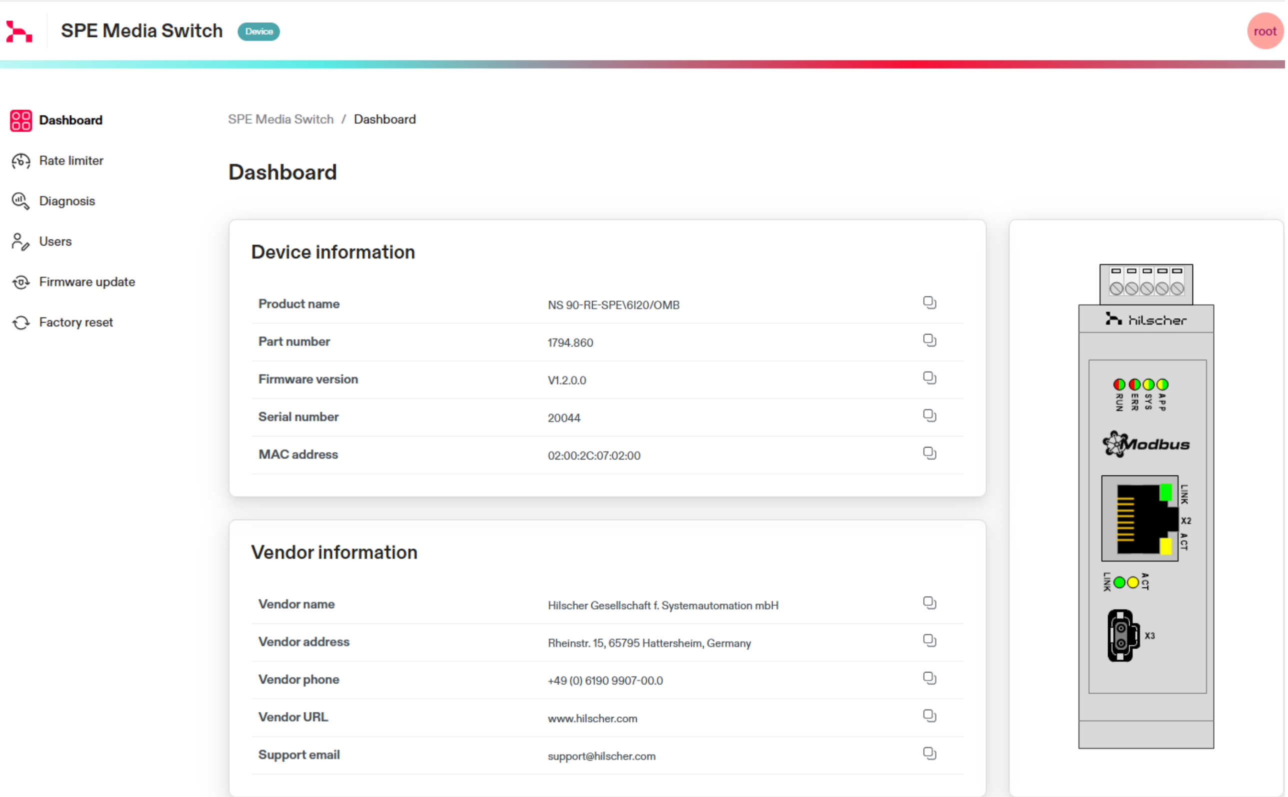


Figure 4: Dashboard

6.5.1.1 Information on the device

Entry	Description
Product Name	Full product name
Part Number	Part number of the vendor
Firmware Version	Installed firmware version
Serial Number	Serial number of the device
MAC address	MAC address of the Real-Time Ethernet port (X2)

Table 14: Information on the device

6.5.1.2 Information on the vendor

Information	Description
Vendor name	Manufacturer's name
Vendor address	Manufacturer's address
Vendor phone	Manufacturer's phone number
Vendor URL	Manufacturer's website
Support email	Manufacturer's customer service e-mail

Table 15: Information on the vendor

6.5.2 Rate limiter

The software of the device has a rate limiter to control data frames from the Real-Time Ethernet medium (100 Mbit/s) to Single Pair Ethernet (10 Mbit/s).

There are three types of incoming data:

- **Unicast**: 1-to-1 (e.g. specific request to a device)
- **Multicast**: 1-to-many (to a group, e.g. cyclic data to multiple devices)
- **Broadcast**: 1-to-all (in the local network segment, e.g. device identification)

Limiting mechanism

To limit the data rate, the software uses a so-called "token buckets" system. To put it simply: There are three "buckets" filled with imaginary "tokens". One "bucket" each for "Unicast", "Multicast" and "Broadcast" data frames.

If, e.g., a device receives a data frame of the type "Unicast", tokens from the "Bucket" "Unicast" will be assigned to the bytes of the data frame and the available number of tokens for this data type will be reduced until the data frame has been processed successfully.

125 tokens are assigned to 1 byte. A data frame of 100 bytes thus needs 12500 tokens.

This dynamically reduces the number of tokens available for this data type until the bucket is finally "empty". If no more tokens for this data type are available, additional data frames of this type will be discarded (except for enabling traffic sharing, see below).

If the data rate limiter is disabled, data frames from the Real-Time Ethernet medium will be processed without limitation until the bandwidth of the Single Pair Ethernet is fully occupied. Excess frames will be discarded, this data is lost.

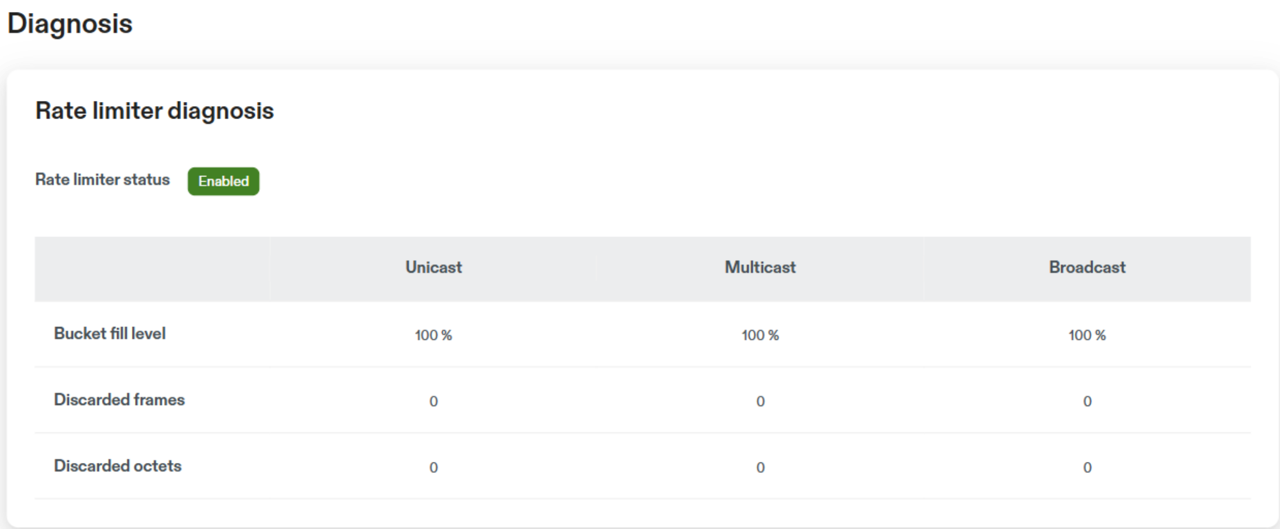
Note:
Only logged-in users can configure the data rate limiter.

6.5.2.1 Diagnosis

This section of the main page provides the diagnosis view for rate limiting.

The "Rate limiter status" shows whether the rate limiter is enabled.

The table shows the fill level (number of available tokens) of the respective "bucket". If all tokens of the respective data type are "used up", data frames will be discarded. The display will then list the number of data frames discarded and the total size (in octets) of the data discarded.

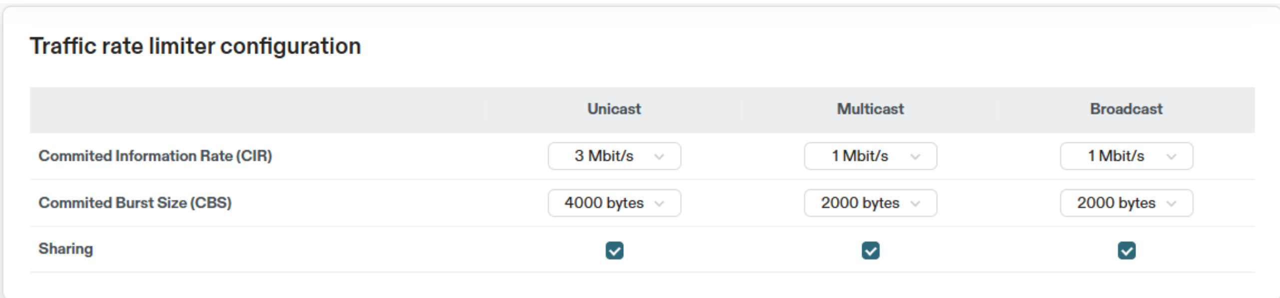


	Unicast	Multicast	Broadcast
Bucket fill level	100 %	100 %	100 %
Discarded frames	0	0	0
Discarded octets	0	0	0

Figure 5: Rate limiter diagnosis

6.5.2.2 Bandwidth and buffer

Rate limitation depends on the available bandwidth of the Single Pair Ethernet connection and the selected "Burst Size" buffer size. This specifies how many "tokens" can be assigned simultaneously per data type.



	Unicast	Multicast	Broadcast
Commited Information Rate (CIR)	3 Mbit/s	1 Mbit/s	1 Mbit/s
Commited Burst Size (CBS)	4000 bytes	2000 bytes	2000 bytes
Sharing	☑	☑	☑

Figure 6: Traffic rate limiter configuration

Limiting profiles

Limiting profiles help configure the rate limitation. Creating a "Custom" profile offers you the free choice of setting.

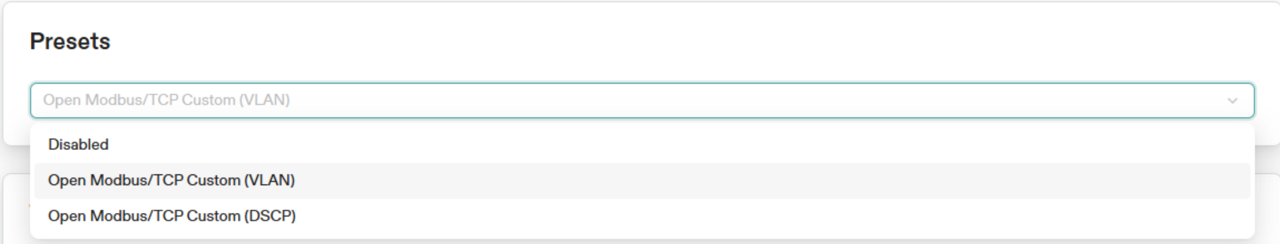


Figure 7: Preset Selection

For OpenModbus/TCP, the limit values for bandwidth and burst rate can be set freely (either for DSCP or VLAN).

Traffic Sharing

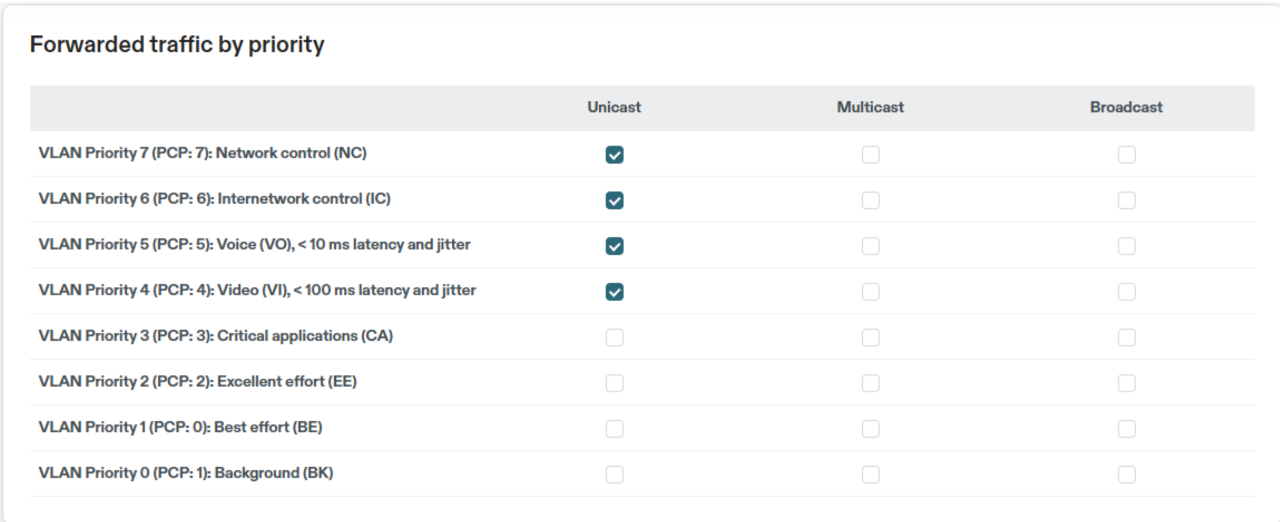
If the number of incoming frames exceeds the token renewal rate, tokens can be "shared" by other data types to prevent excess traffic from being discarded. However, this only applies in the order *unicast -> multicast -> broadcast*.

"Broadcast frames" will be discarded, e.g., when the tokens are used up even if tokens for Unicast or Multicast are available.

6.5.2.3 Filter priority

The settings for priority define which VLAN / DSCP priority types are to be excluded from the rate limitation and always forwarded.

Each data type is classified according to IEEE 802.1Qbb and defined separately.



Forwarded traffic by priority

	Unicast	Multicast	Broadcast
VLAN Priority 7 (PCP: 7): Network control (NC)	☑	☐	☐
VLAN Priority 6 (PCP: 6): Internetwork control (IC)	☑	☐	☐
VLAN Priority 5 (PCP: 5): Voice (VO), < 10 ms latency and jitter	☑	☐	☐
VLAN Priority 4 (PCP: 4): Video (VI), < 100 ms latency and jitter	☑	☐	☐
VLAN Priority 3 (PCP: 3): Critical applications (CA)	☐	☐	☐
VLAN Priority 2 (PCP: 2): Excellent effort (EE)	☐	☐	☐
VLAN Priority 1 (PCP: 0): Best effort (BE)	☐	☐	☐
VLAN Priority 0 (PCP: 1): Background (BK)	☐	☐	☐

Figure 8: Forwarded traffic by priority

6.5.2.4 Filter MAC

These settings define from which MAC addresses or address ranges traffic is to be forwarded without restriction.

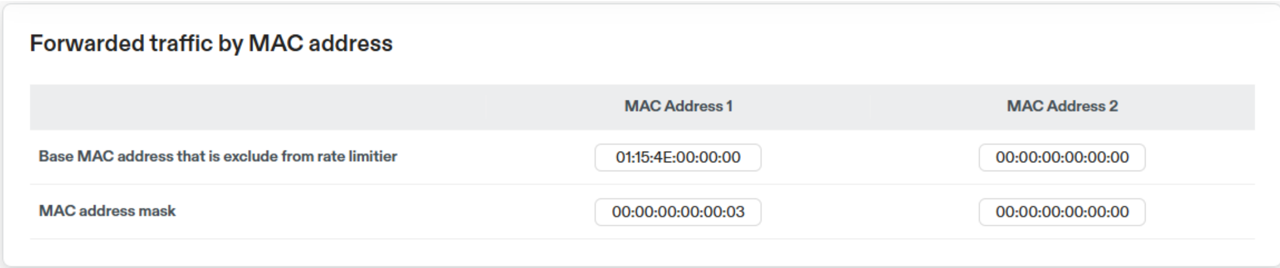


Figure 9: Forwarded traffic by MAC address

6.5.3 User administration

The integrated user administration allows creating and managing user accounts. The availability of the functions depends on the user's group membership.

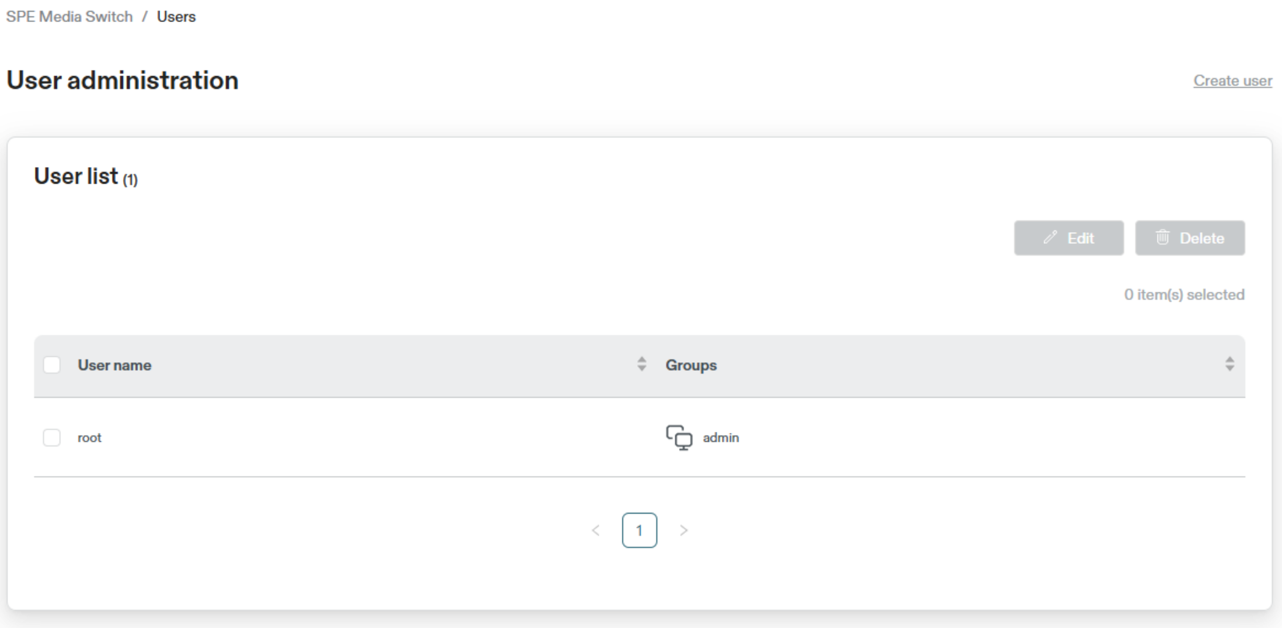


Figure 10: User administration

Creating a user

To open the dialog for creating a new user, click **Create user** in the upper right corner.

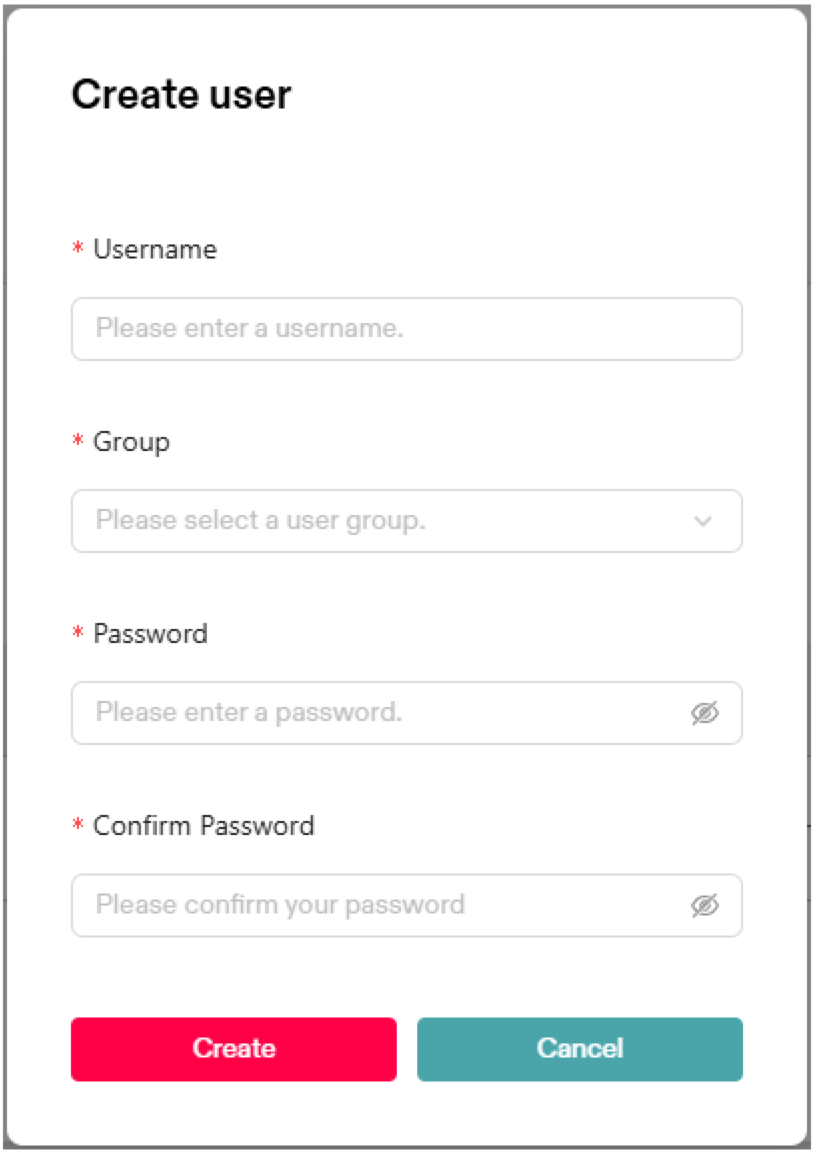


Figure 11: Create user dialog

This window serves to specify user name, user group (see below), and password.

Edit user

To open the edit dialog, click **Edit User**. In this dialog, the user can be added to other groups and the password can be changed. The operation can only be performed for individual user accounts.

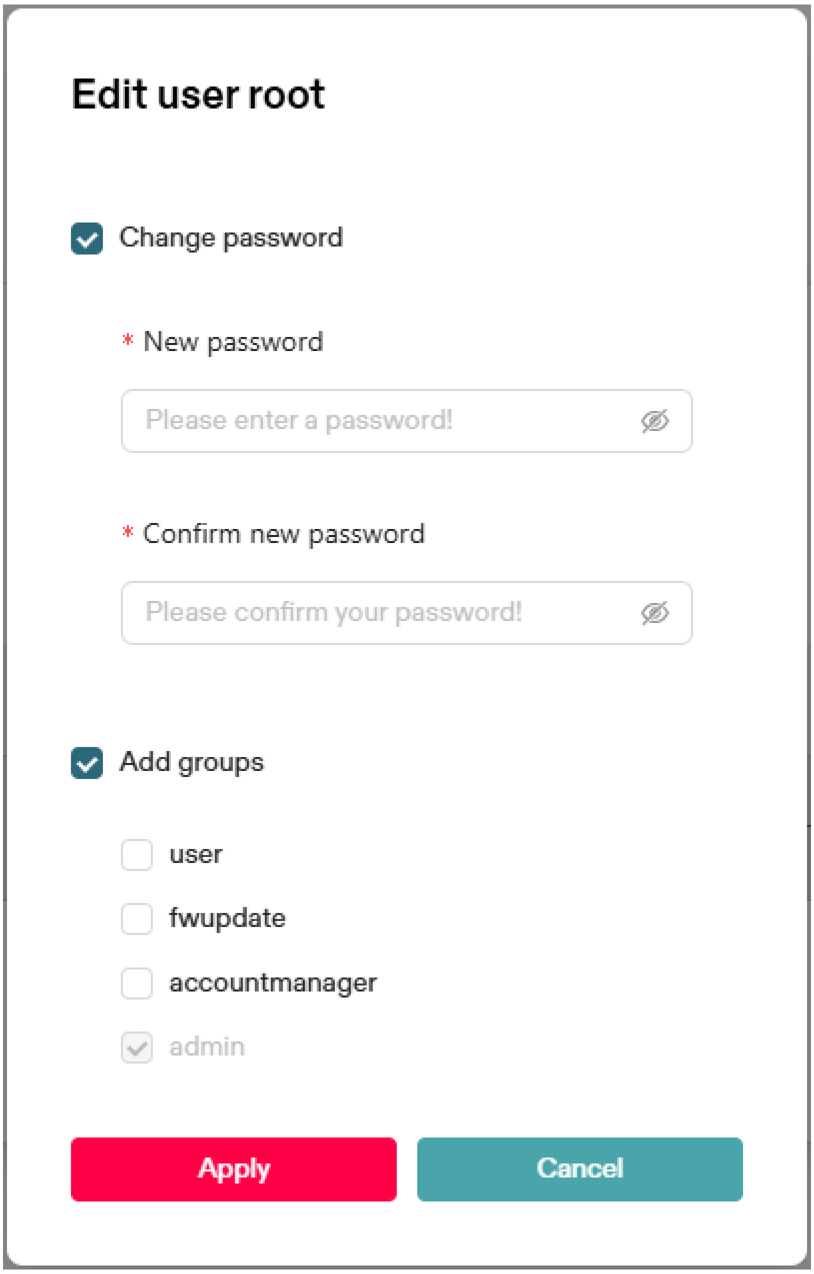


Figure 12: Edit user dialog

Deleting users

The button **Delete** opens the dialog box to confirm the deletion of all selected user accounts.

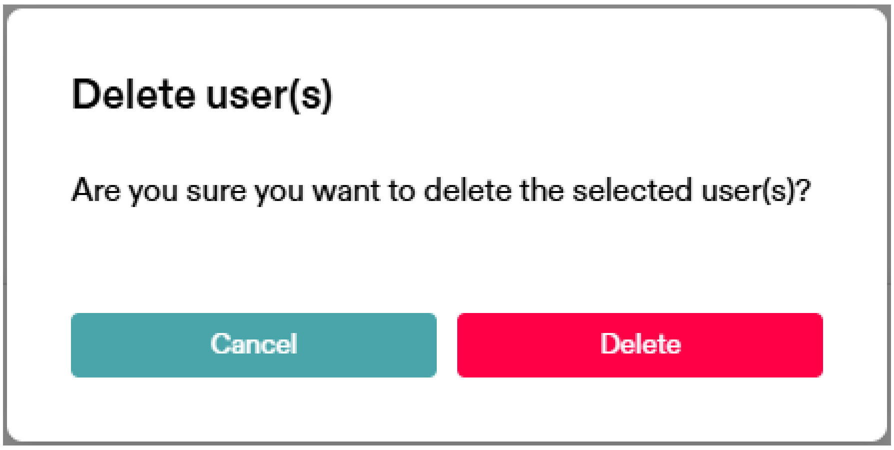


Figure 13: Delete user dialog

User groups

The available user groups are:

Group	Description
user	Standard user without administration rights
fwupdate	User is allowed to perform firmware updates
accountmanager	User is allowed to manage users
admin	User has full administration rights

Table 16: User groups

The following table shows the respective rights of each group to access functions of the device:

Account / Rights	admin	fwupdate	accountmanager	user
Dashboard view	X	X	X	X
Configuration of rate limiter	X	-	-	X
Diagnosis view	X	X	X	X
User administration	X	-	X	-
Firmware update	X	X	-	-
User database reset	X	-	X	-
Rate limiter reset	X	-	-	X

Table 17: Rights of the user groups

6.5.4 Updating the firmware

Downloading the firmware

On the overview page https://hilscher.atlassian.net/wiki/x/ZwAKIQ, you can see which firmware version is the current version. On the subpage , you can download the firmware for the switch as ZIP file with the name `LFW-NS90-SPE-Va.b.c.d.zip` (`a`, `b`, `c` and `d` are place holder for the version number).

Unpack the ZIP file into a folder of your choice. When unpacking, subfolders are created for the supported protocol variants. The folder SPE_MS_OMB contains the needed update file `FWUPDATE.zip`.

Requirements

- You have the firmware file `FWUPDATE.zip`.
- The switch is connected to a network.
- You know the IP address of the switch.

Updating the firmware

➢ Open a browser and navigate to:
`http://<IP address>/netx`
(Replace `<IP address>` with the IP address of the switch.)

➾ The user interface opens and shows the tab `Dashboard` with data about the switch.

➢ Click the profile picture in the upper right corner and enter the standard login details.
User name: `root`
Password: `password`

➢ Click **Sign-in**.

➾ The icon changes to **root.**

➢ Click **Firmware upload** in the left menu.

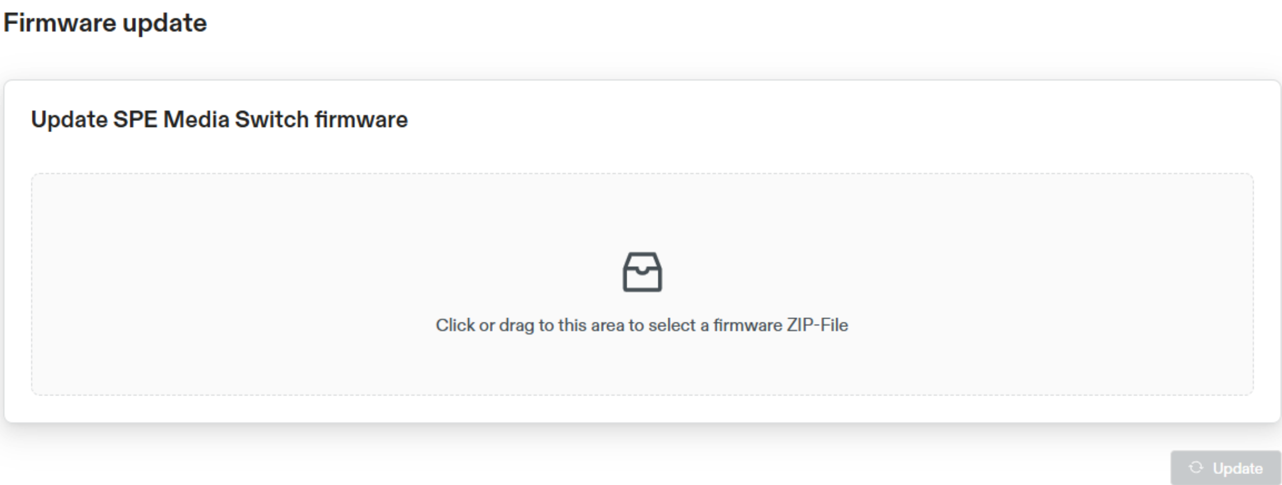


Figure 14: Firmware update

- Click in the area labeled `Click or drag to this area to select a firmware ZIP-File` or use the mouse to drag the file into it.

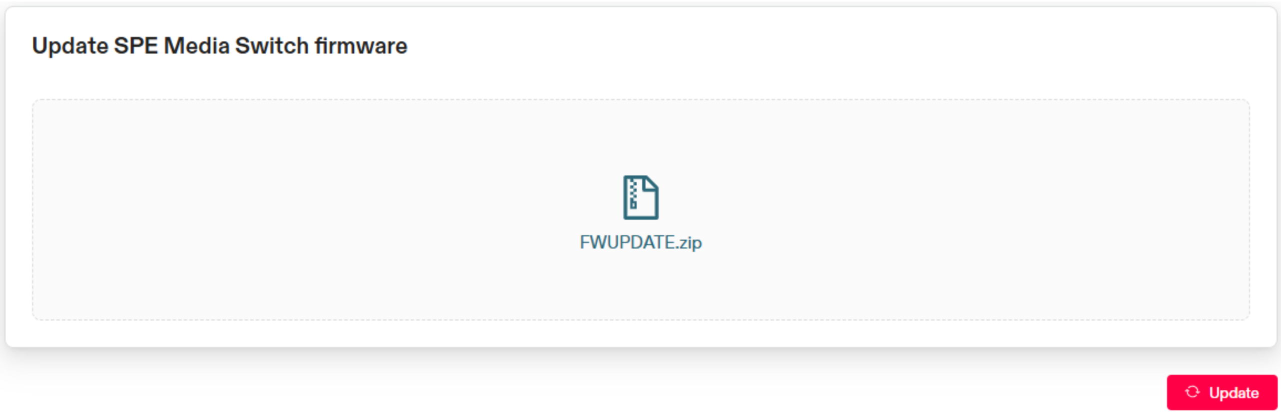


Figure 15: Firmware update dialog

- The name of the file is displayed in the area.
- Click **Update**.
- A status window is displayed showing the current status of the upload as a diagram. After a successful upload, the device restarts automatically.

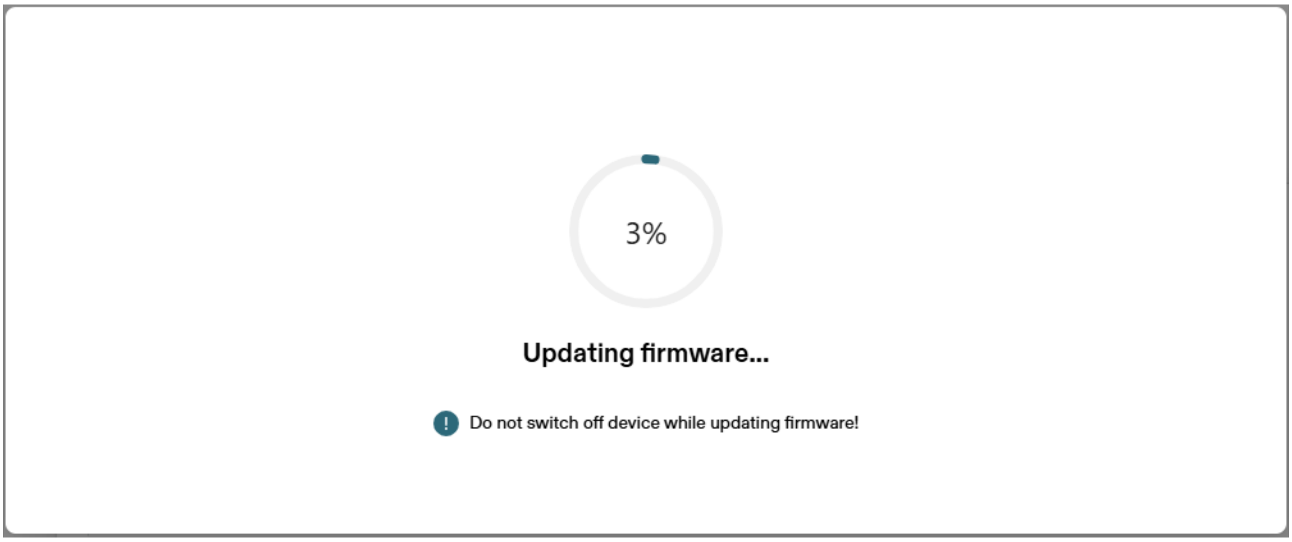


Figure 16: Firmware update progress

Note:
After the reset, the switch requires a new IP address.

6.5.5 Factory settings

With the option **Factory Reset**, user database and rate limiter configuration can be reset to factory settings.

Note:
The factory settings refer to the installed firmware version. It is not possible to return to a previously installed firmware version using this function.

Which settings can be reset depends on the assigned user group of the logged-in user.

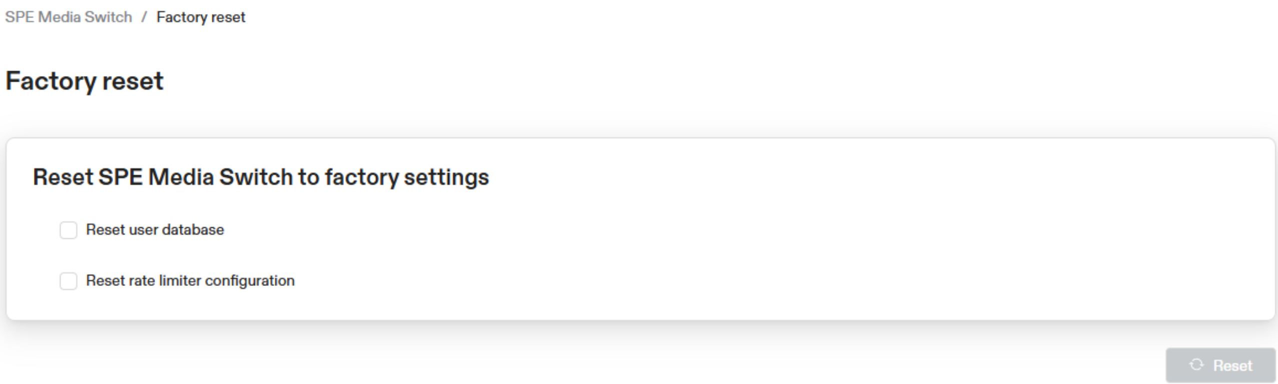


Figure 17: Factory reset

6.6 Firmware upgrade to 1.2

With version 1.2., the user interface of the device changes fundamentally. Some functions (like the firmware update) move directly from a separate entry page to the "Dashboard". For this upgrade, the firmware must be refreshed one more time using the method described below.

Section *Updating the firmware* [▸ page 35] then applies to all following firmware updates.

Downloading the firmware

On the overview page https://hilscher.atlassian.net/wiki/x/ZwAKIQ, you can see which firmware version is the current version. On the subpage , you can download the firmware for the switch as ZIP file with the name `LFW-NS90-SPE-Va.b.c.d.zip` (`a`, `b`, `c` and `d` are place holder for the version number).

Unpack the ZIP file into a folder of your choice. When unpacking, subfolders are created for the supported protocol variants. The folder SPE_MS_OMB contains the needed update file `FWUPDATE.zip`.

Requirements

- You have the firmware file `FWUPDATE.zip`.
- The switch is connected to a network.
- You know the IP address of the switch.

Updating the firmware

- ➢ Open a browser and navigate to:
  http://<IP address>/netx
  (Replace <IP address> with the IP address of the switch.)
- ➺ The user interface opens and shows the tab Diagnostics with data about the switch.

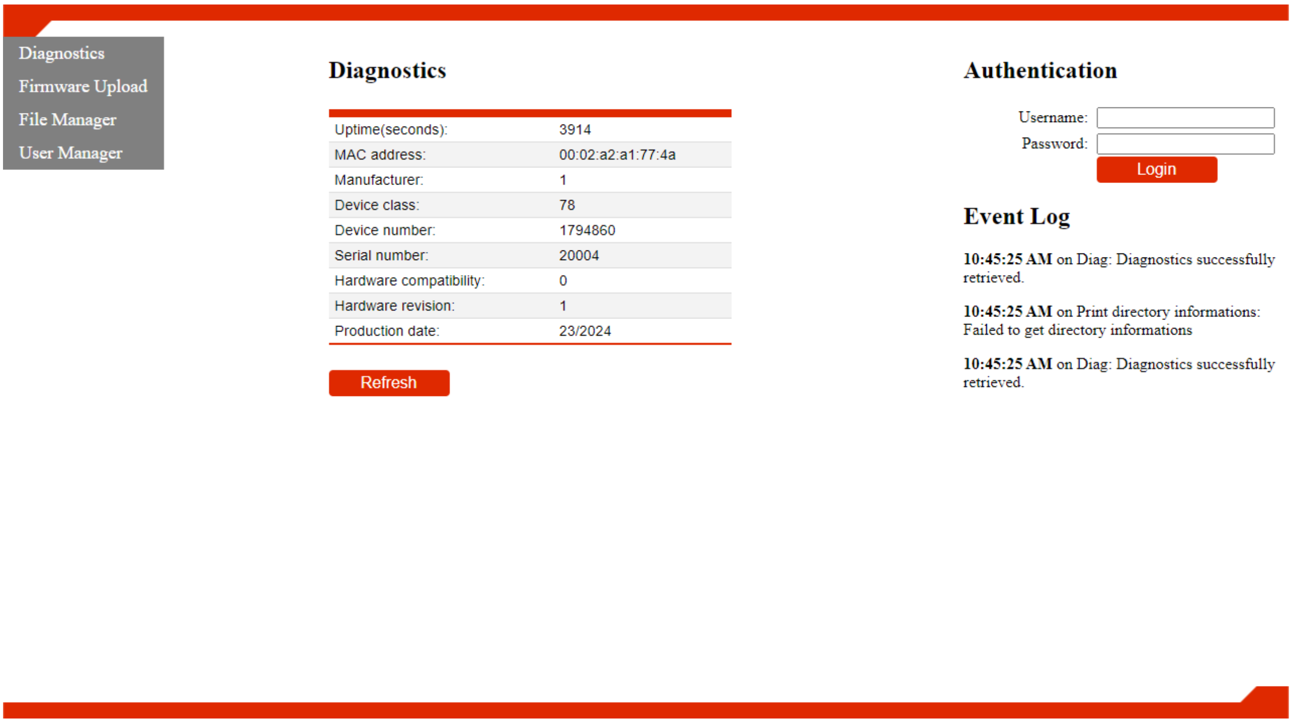


Figure 18: Diagnostics

- ➢ Below Authentication, enter the standard login name.
  User name: root
  Password: password
- ➢ Click **Login**.
- ➺ The notification **Logged in as „root“** is displayed.
- ➢ Click **Firmware upload** in the left menu.
- ➢ Click **Choose a firmware file to upload** and select the firmware file FWUPDATE.ZIP.
- ➺ The name of the file is displayed above the button **Send file**.
- ➢ Click **Send file**.
- ➺ In the status information on the right, the notification
  on FirmwareUpload: Upload in progress ...
  is displayed and shortly afterwards
  on FirmwareUpload: Upload is successful is displayed.

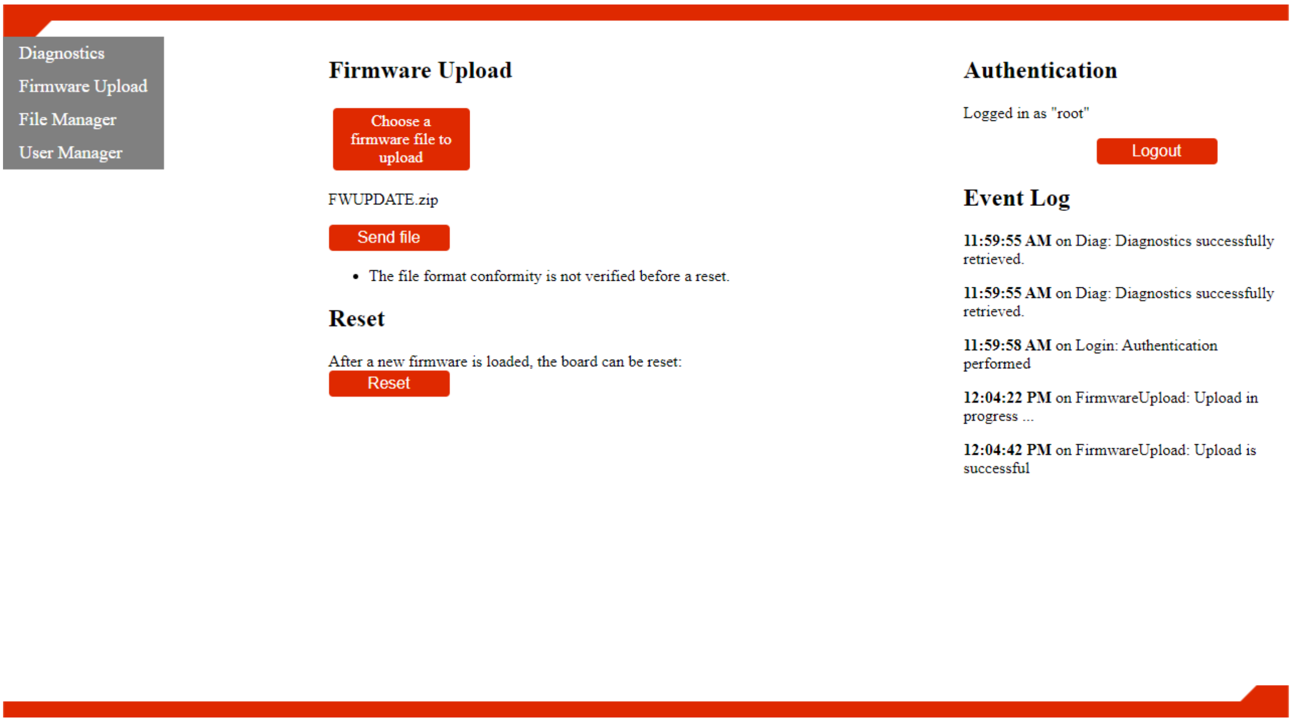


Figure 19: Firmware upload

➢ Click **Reset**.

⇨ The switch starts with the new firmware.

Note:
After the reset, the switch requires a new IP address.

7 Technical data

NS 90-RE-SPE\6I20/OMB	Parameter	Value
Product	Product name	NS 90-RE-SPE\6I20/OMB
	Part number	1794.860
	Description	SPE Media Switch for Open Modbus/TCP with IEC 63171-6 connector
Communication controller	Type	netX 90
Power supply	Supply voltage	24 V DC (18,3 V … 30 V)
	Current consumption (typical/maximum)	33 mA (at 24 V) Maximum 43 mA
	Power consumption (typical)	792 mW
	Connector	ICC25
Communication interface X2	Communication standard	Ethernet
	Interface type	10BASE-T, 100BASE-TX, isolated
	Connector	RJ45
Communication interface X3	Communication standard	Ethernet
	Interface type	10BASE-T1L
	Connector	IEC 63171-6
Displays	LED display	SYS, System status LED
		APP, Applikation status LED
		COM 0, Communication status LED 0 (Duo LED)
		COM 1, Communication status LED 1 (Duo LED)
Permissible environmental conditions	Operating temperature range	–25 °C … +70 °C
	Storage temperature range	–40 °C … +85 °C
	Humidity	10 % … 95 % relative humidity, no condensation permitted
	Altitude	0 m … 2000 m
Device	Dimensions (L x W x H)	94 mm x 25 mm x 78 mm (without connector) 94 mm x 25 mm x 86 mm (with connector)
	Weight	76 g
	Degree of protection	IP20
	Mounting	DIN rail (DIN EN 60715)
	Housing material	Polyamid
Compliance	RoHS	Yes
Compliance with EMC guidelines	CE sign	Yes
	UKCA sign	Yes
	Emission	EN IEC 61000-6-4 / BS EN IEC 61000-6-4
	Immunity	EN IEC 61000-6-2 / BS EN IEC 61000-6-2

Table 18: Technical data NS 90-RE-SPE\6I20/OMB

8 Decommissioning/Disposal

8.1 Putting the device out of operation

NOTICE

Risk of unsafe plant operation

To prevent property damage, do not remove this device from a production plant without ensuring a safe operation of the plant during or after the removal of the device.

- Remove all communication cables from the device.
- Remove the cable for operating voltage supply.
- Dismount the device from the DIN rail as described in section Removing device from Top Hat Rail.

8.2 Disposal and recycling of waste electronic equipment

Waste electronic equipment must be disposed of properly after the end of use.

Waste electronic equipment

This product must not be disposed of with household waste.

Dispose of this product in accordance with local regulations in your country.

When disposing of the product, observe the following:

- Observe national and local regulations for the disposal of waste electronic equipment and packaging.
- Delete personal data stored in the waste electronic device.
- Dispose of this product in an environmentally friendly manner at a local collection point for waste electronic equipment.
- Dispose of packaging in such a way that a high level of recycling is possible.

Alternatively, you can return our products to us for disposal. The prerequisite is that no additional foreign substances are contained. Before returning, please contact us via the Return Merchandise Authorization (RMA) form on www.hilscher.com.

In Europe, the directive 2012/19/EU waste electrical and electronic equipment applies. Different policies and laws may apply nationally.

9 Appendix

9.1 Legal notes

Copyright

Important notes

Utmost care was/is given in the preparation of the documentation at hand consisting of a user's manual, operating manual and any other document type and accompanying texts. However, errors cannot be ruled out. Therefore, we cannot assume any guarantee or legal responsibility for erroneous information or liability of any kind. You are hereby made aware that descriptions found in the user's manual, the accompanying texts and the documentation neither represent a guarantee nor any indication on proper use as stipulated in the agreement or a promised attribute. It cannot be ruled out that the user's manual, the accompanying texts and the documentation do not completely match the described attributes, standards or any other data for the delivered product. A warranty or guarantee with respect to the correctness or accuracy of the information is not assumed.

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It is hereby expressly agreed upon in particular that any use or utilization of the hardware and/or software in connection with

- Flight control systems in aviation and aerospace;
- Nuclear fission processes in nuclear power plants;
- Medical devices used for life support and
- Vehicle control systems used in passenger transport

shall be excluded. Use of the hardware and/or software in any of the following areas is strictly prohibited:

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- For designing, engineering, maintaining or operating nuclear systems;
- In flight safety systems, aviation and flight telecommunications systems;
- In life-support systems;
- In systems in which any malfunction in the hardware and/or software may result in physical injuries or fatalities.

You are hereby made aware that the hardware and/or software was not created for use in hazardous environments, which require fail-safe control mechanisms. Use of the hardware and/or software in this kind of environment shall be at your own risk; any liability for damage or loss due to impermissible use shall be excluded.

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The warranty obligation for equipment (hardware) we produce is 36 months, calculated as of the date of delivery ex works. The aforementioned provisions shall not apply if longer warranty periods are mandatory by law pursuant to Section 438 (1.2) BGB, Section 479 (1) BGB and Section 634a (1) BGB [Bürgerliches Gesetzbuch; German Civil Code] If, despite of all due care taken, the delivered product should have a defect, which already existed at the time of the transfer of risk, it shall be at our discretion to either repair the product or to deliver a replacement product, subject to timely notification of defect.

The warranty obligation shall not apply if the notification of defect is not asserted promptly, if the purchaser or third party has tampered with the products, if the defect is the result of natural wear, was caused by unfavorable operating conditions or is due to violations against our operating regulations or against rules of good electrical engineering practice, or if our request to return the defective object is not promptly complied with.

Costs of support, maintenance, customization and product care

Please be advised that any subsequent improvement shall only be free of charge if a defect is found. Any form of technical support, maintenance and customization is not a warranty service, but instead shall be charged extra.

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