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TURCK

IM18-CCM
Cabinet Guard

Instructions for Use

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1 About These Instructions

These operating instructions describe the structure, functions and the use of the product and will help you to operate the product as intended. Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device. Retain the instructions for future use during the service life of the product. If the product is passed on, pass on these instructions as well.

1.1 Target groups

These instructions are aimed a qualified personal and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

1.2 Explanation of symbols used

The following symbols are used in these instructions:

	DANGER DANGER indicates a dangerous situation with high risk of death or severe injury if not avoided.
	WARNING WARNING indicates a dangerous situation with medium risk of death or severe injury if not avoided.
	CAUTION CAUTION indicates a dangerous situation of medium risk which may result in minor or moderate injury if not avoided.
	NOTICE NOTICE indicates a situation which may lead to property damage if not avoided.
	NOTE NOTE indicates tips, recommendations and useful information on specific actions and facts. The notes simplify your work and help you to avoid additional work.
▶	**CALL TO ACTION** This symbol denotes actions that the user must carry out.
⇨	**RESULTS OF ACTION** This symbol denotes relevant results of actions.

1.3 Other documents

Besides this document the following material can be found on the Internet at www.turck.com:

- Data sheet
- Quick-Start Guide
- EU Declaration of Conformity

1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to techdoc@turck.com.

2 Notes on the Product

2.1 Product identification

These instructions apply to the following cabinet guards:

- IM18-CCM-…

2.2 Scope of delivery

The scope of delivery includes:

- Cabinet guard
- Quick-Start Guide
- Adhesive foil (Target) for attaching reflective surfaces

2.3 Legal requirements

The device is subject to the following EC directives:

- 2014/30/EU (electromagnetic compatibility)
- 2011/65/EU (RoHS Directive)

2.4 Manufacturer and service

Hans Turck GmbH & Co. KG
Witzlebenstraße 7
45472 Mülheim an der Ruhr
Germany

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats. You can access the product database at the following address: **www.turck.de/products**

For further inquiries in Germany contact the Sales and Service Team on:

- Sales: +49 208 4952-380
- Technology: +49 208 4952-390

Outside Germany, please contact your local Turck representative.

3 For Your Safety

The product is designed according to state-of-the-art technology. However, residual risks still exist. Observe the following warnings and safety notices to prevent damage to persons and property. Turck accepts no liability for damage caused by failure to observe these warning and safety notices.

3.1 Intended use

These devices are designed solely for use in industrial areas.

The IM18-CCM… cabinet guard monitors temperature, relative air humidity and the status of the door in control cabinets.

The devices may only be used as described in these instructions. Any other use is not in accordance with the intended use. Turck accepts no liability for any resulting damage.

3.2 Obvious misuse

- The device is not a safety component and must not be used for the protection of persons and property.

3.3 General safety instructions

- The device only meets the EMC requirements for industrial areas and is not suitable for use in residential areas.
- The device may only be assembled, installed, operated, parameterized and maintained by professionally-trained personnel.
- The device may only be used in accordance with applicable national and international regulations, standards and laws.
- The device must only be used in enclosed housing or control cabinets.

4 Product Description

The IM18-CCM… cabinet guard is enclosed in a plastic housing with protection to IP20 and is provided with three multicolor status LEDs. An Ethernet port is provided for connection to higher-level systems. External sensors can be connected to the device via a CAN/RS485 port. The Ethernet interface and the CAN/RS485 interface are implemented as RJ45 sockets.

The device is provided with a distance sensor as well as a temperature and humidity sensor.

The Linux operating system is preinstalled on the device. The device functions must be programmed as required.

4.1 Device overview

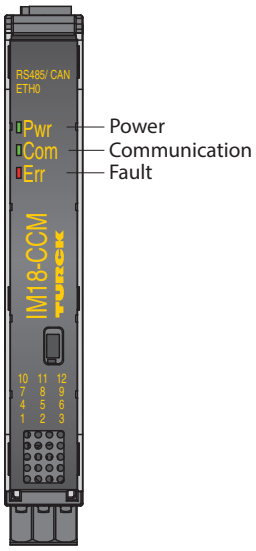

Fig. 1: Front view

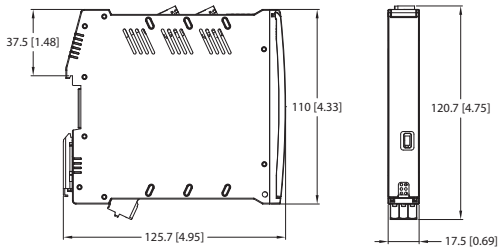

Fig. 2: Dimensions

4.1.1 Indication elements

The device is provided with a 3-color Pwr LED. Two 2-color user LEDs (Com and Err) are also provided. The LEDs can be programmed.

4.2 Properties and features

- Freely programmable cabinet guard
- Sensors for monitoring humidity, temperature and distance
- 3 status LEDs
- Linux operating system (Debian)
- 1 Ethernet port (RJ45 socket):
  - Dynamic IP address (DHCP)
  - 1GbE interface
  - Max. cable length 100 m
- 1 CAN/RS485 port (RJ45 socket):
  - Max. cable length 30 m
  - Max. CAN transmission rate: 1 Mbit/s
  - Max. RS485 transmission rate: 3 Mbit/s

4.3 Operating principle

The ambient temperature and humidity are monitored by a humidity and temperature sensor and the door status is monitored by a distance sensor. The device communicates with the higher-level system via the Ethernet port.

4.4 Functions and operating modes

The device uses integrated sensors to monitor temperature, relative air humidity and the distance to the control cabinet door. The information can be transferred to higher-level systems via the Ethernet interface and Modbus TCP.

External sensors can for example be connected via Modbus RTU and the RS485 interface or via CAN. The operating system provided on the device is the Debian Linux distribution. This enables the smart preprocessing of data through the integration of tailored programs. The device functions can be programmed as required.

4.4.1 System partitions and recovery system

The device is provided with two operating system partitions and a recovery system. If one system partition is damaged or an update fails, the partitions make it possible to revert to the previous executable system. A recovery system is started in the event that both system partitions fail. The recovery system resets the device to the factory settings.

5 Installing

NOTICE
Reflective surfaces
Malfunction when monitoring the control cabinet door
- ▶ Cover glass and highly reflective surfaces on the control cabinet door with matt adhesive foil (supplied with the device).

The device can be mounted on a DIN rail according to EN 60715 (TH35). The minimum clearance from other devices must be at least 15 mm.

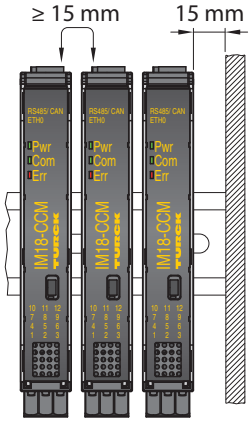

Fig. 3: Minimum clearance

- ▶ Fasten the device vertically and free-standing on a DIN rail.

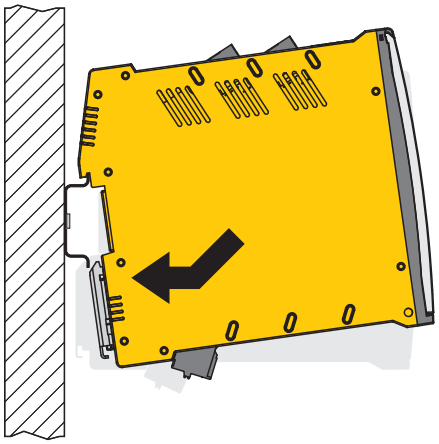

Fig. 4: DIN rail mounting

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6 Connection

NOTICE
Laser class 1 device
Risk of blinding from laser beams
- ▶ Do not look into the device from the front.

6.1 Connecting the device to the higher-level via Ethernet

The device is provided with an RJ45 socket for connecting the device to an Ethernet system. The maximum cable length is 100 m. The use of CAT6 S/FTP cables is recommended.

- ▶ Connect the Ethernet interface to the ETH0 RJ45 port.

6.2 Connecting an external sensor

The device is provided with a CAN/RS485 interface for connecting an external sensor. The CAN/RS485 interface is implemented as an RJ45 socket. The maximum cable length is 30 m.

- ▶ Connect the external sensor to the device via the CAN/RS485 interface.

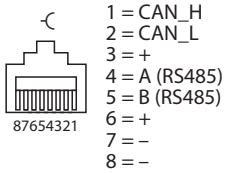

Fig. 5: Wiring diagram

6.3 Connecting the power supply

The power supply can be connected using spring-loaded terminals. The removable terminal blocks are coded.

- ▶ Only use cables (rigid or flexible) with a cross section of 0.2…2.5 mm².
- ▶ When wiring with multiple stranded cables (litz): Fix the wire ends with ferrules.
- ▶ Open spring-loaded terminals with a screwdriver.
- ▶ Insert the stripped cable ends into the guide holes of the spring-loaded terminals.
- ▶ Remove the screwdriver.

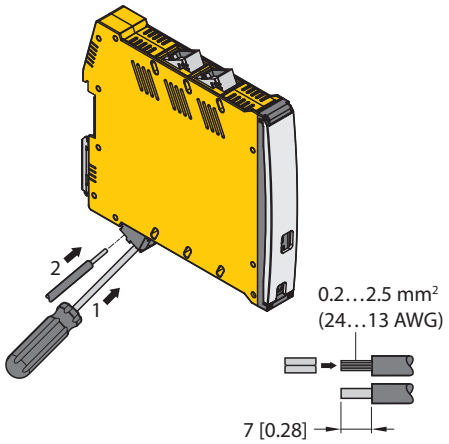

Fig. 6: Connecting the power supply via spring-loaded terminals

6.4 Wiring diagram

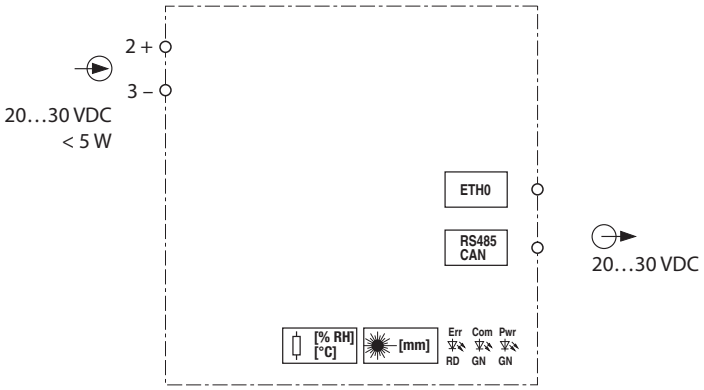

Fig. 7: IM18-CCM… wiring diagram

6.5 Terminal assignment

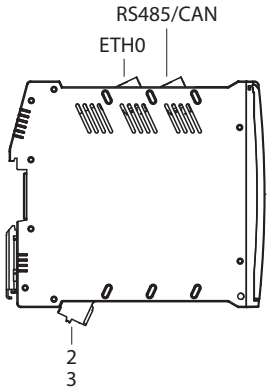

Fig. 8: IM18-CCM… terminal assignment

7 Commissioning

The device is operational automatically once the cables are connected and the power supply is switched on. All LEDs are lit in several colors during the boot procedure. After the boot procedure has been successfully completed, the Pwr LED flashes green at a frequency of 2 Hz.

The Linux operating system enables the device functions to be programmed or scripts to be imported. An SSH connection can be established once the device is connected to the network.

Additional software tools (e.g. PuTTY) are required to access the device via the console. The IP address depends on the selected connection. The user sshu also has the possibility to use sudo options.

Command example

```
$ This_is_a_console command /example/path
> Example output
Example content of a file
```

7.1 Setting the IP address

NOTE
The MAC address is printed on the side of the device.
The device is set for dynamic addressing via DHCP. The default IP address is 192.168.1.20.

The IP address can be set via the Turck Service Tool. The Turck Service Tool can be downloaded free of charge at www.turck.com.

- ▶ Connect the device to a PC via the Ethernet interface.
- ▶ Launch the Turck Service Tool.
- ▶ Click **Start DHCP** or press [F6].
- ⇨ The Turck Service Tool searches for the connected devices via the MAC address.

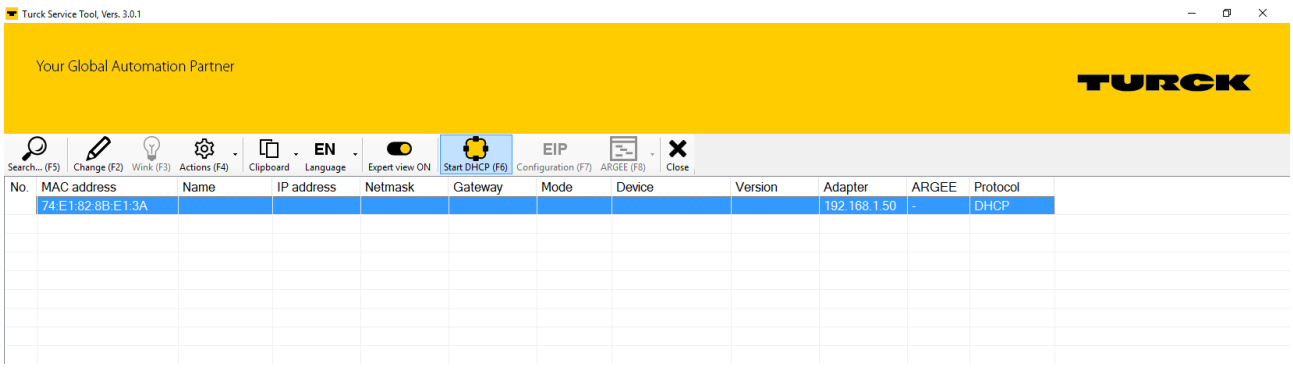

Fig. 9: Searching for a MAC address

- ▶ Click the device.
- ▶ Click **Change** or press [F2].
- ▶ Set the IP address as well as the network mask if necessary.
- ▶ Accept the changes by clicking **Set in device**.

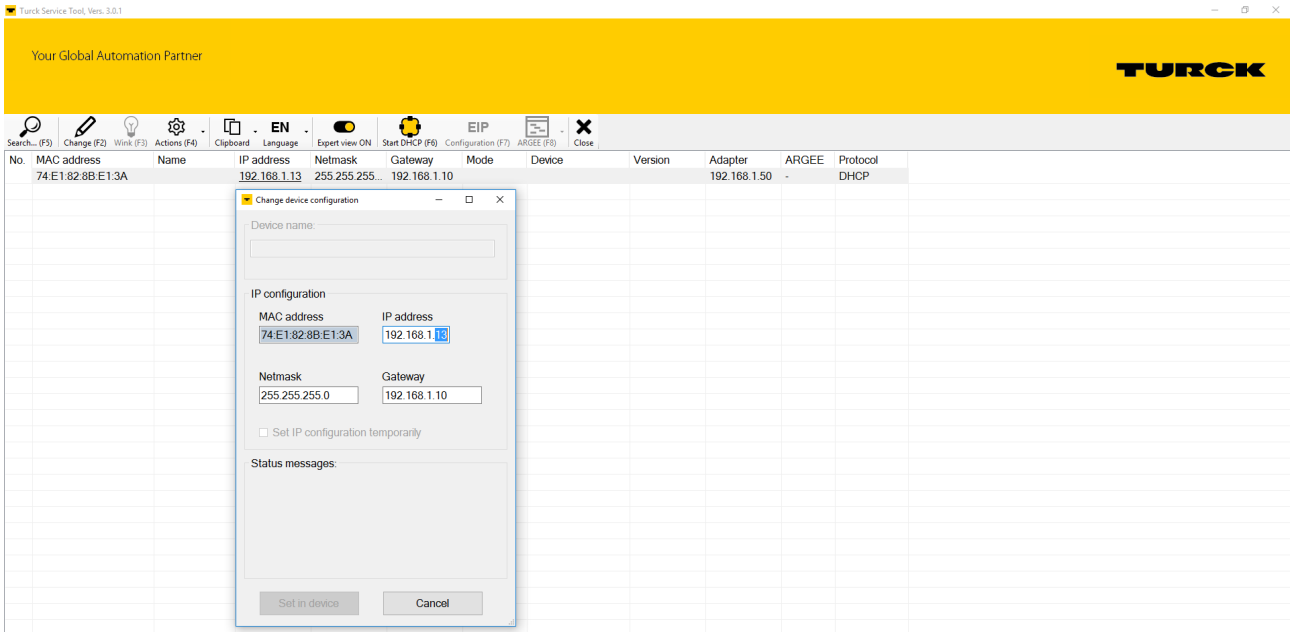

Fig. 10: Setting the IP address

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7.2 Establishing a network connection

After a physical connection has been established, a ping command can be used to check whether the device can be reached. An SSH connection to the device can then also be set up using an SSH or SFTP client software (e.g. PuTTY, WinSCP or similar).

NOTICE
Insufficiently secured devices
Unauthorized access to sensitive data
- ▶ Change the password after the first login. Turck recommends the use of a secure password.

▶ Establish a network connection via the ETH0 interface with the following settings:

Setting	Description
Connection type	SSH
User	sshu
Password	P@ssw0rd12ssh!
Port	1522
Default hostname	ccm <SERIAL NUMBER> (example: ccm-0407361310002001)
IP address	192.168.1.20

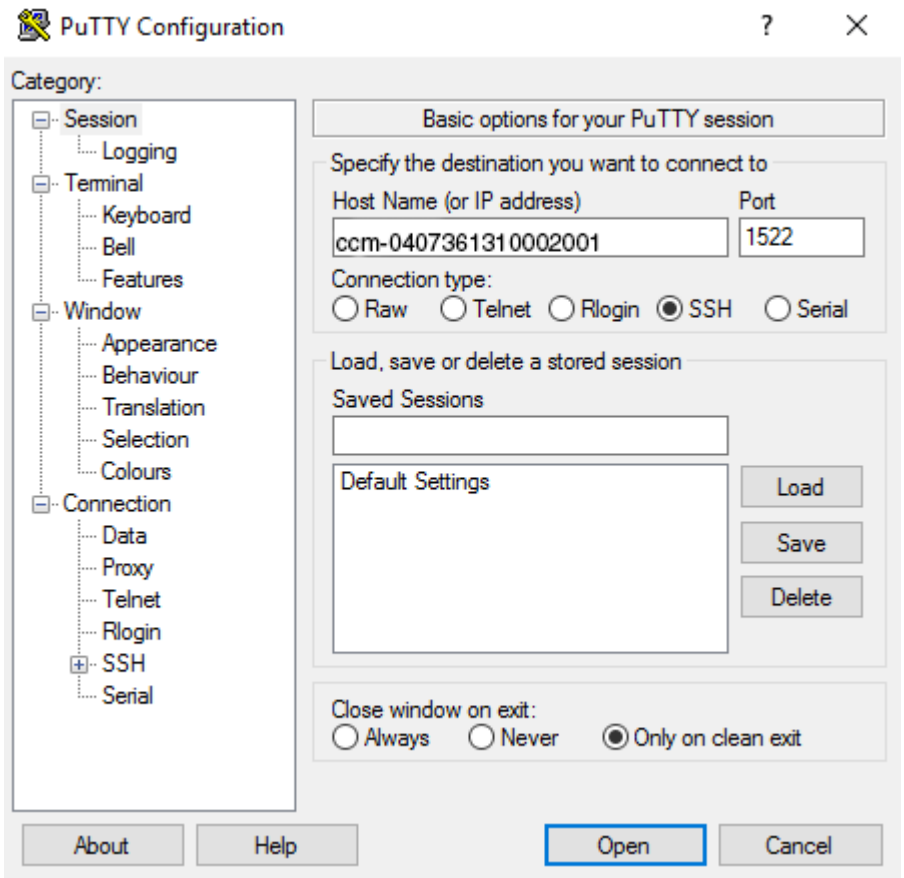

Fig. 11: Access via PuTTY

After the login, the folder **/home** in the working directory becomes active with restricted write access rights. The write and read operations are enabled in the subfolder **/home/temp**.

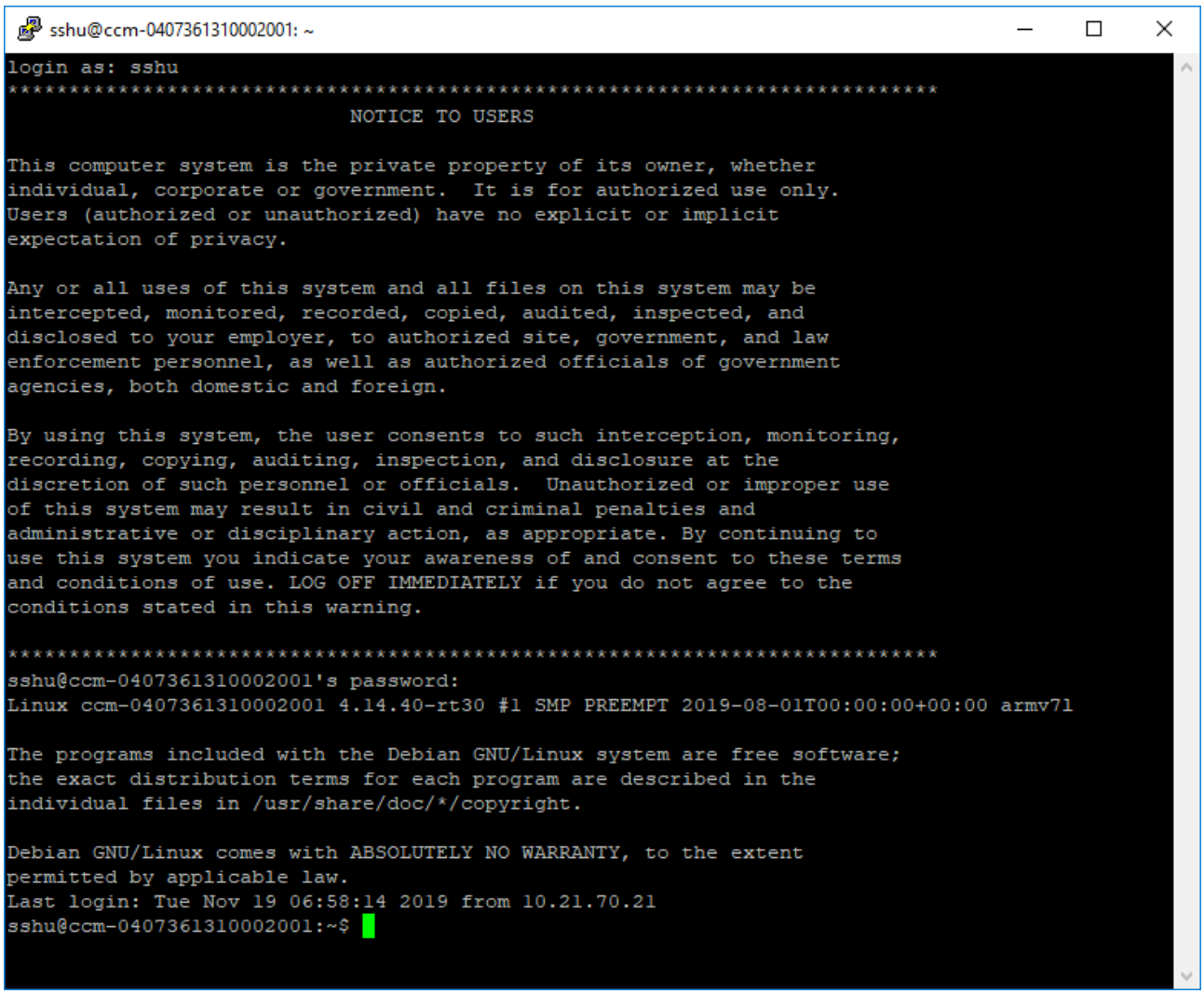

Fig. 12: Login output

7.3 Installing user programs

Additional programs can be installed via the apt or apt-get package manager in Linux by entering the required package **[PACKAGE]**. In order to achieve a separation between the operating system and user software, installation in the **/opt partition** is recommended.

▶ Install the package:

```
$ sudo apt update
$ sudo apt install [PACKAGE]
```

The device has the following partitions:

Mount point	Size	Contents
/	1024 MB	System partition
/var	256 MB	Variable and temporary data of the system
/opt	128 MB	User programs, if necessary user data
/home	416 MB	/home folder for all users
/home/temp	32 MB	Subfolder in the home directory, to which special authorizations can be issued
/home/settings	64 MB	Folder for settings and scripts for all operating systems
/home/factory	16 MB	Folder for manufacturer information

7.4 Example scripts

The folder **/home/scripts** contains different scripts for operating the interfaces and system functions. The scripts are examples of how the functions can be integrated in user-defined user programs.

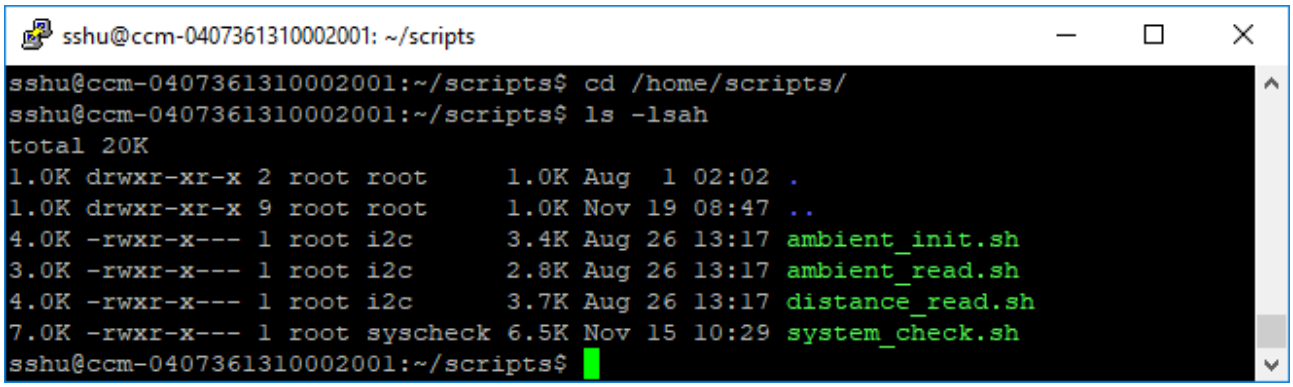

Fig. 13: Script directory in the folder /home

If a script is called without transfer parameters, a help text appears that shows the relevant parameters.

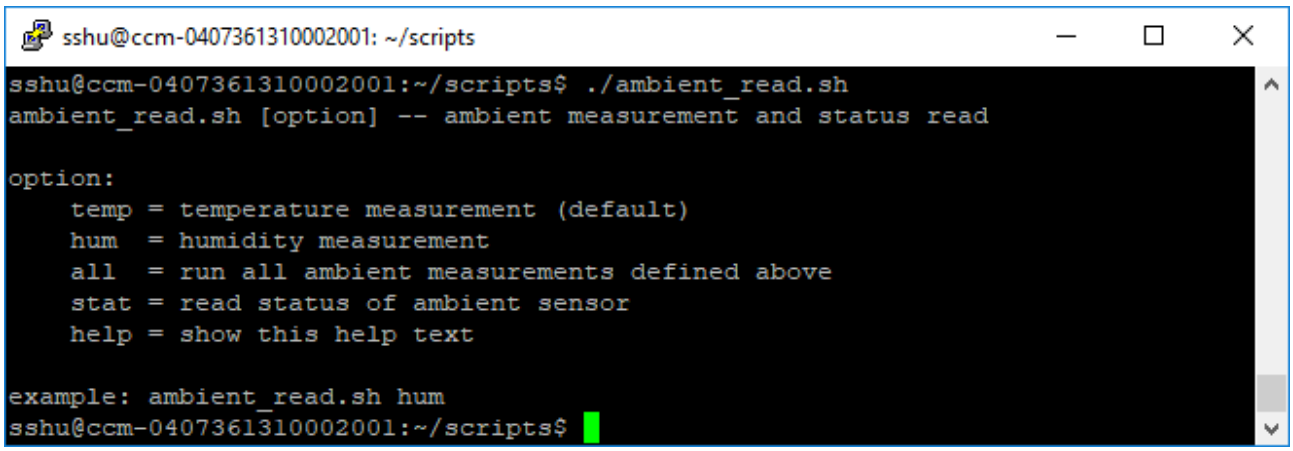

Fig. 14: Output of the help texts for scripts

The following table is an overview of the scripts present in the IM18-CCM:

Function	Script	Option	Description
Ambient temperature and air humidity	ambient_read.sh	temp	Measurement and display of the ambient temperature
		hum	Measurement and display of the ambient air humidity
		all	Measurement and display of temperature and air humidity
		help	Display help text
Distance sensor	distance_ calibrate.sh	[values]	Calibration of distance sensor
		help	Display help text
	distance_read.sh	[samples]	Measurement and display of distance
		help	Display help text
System	system_check.sh	ntc1	Measurement and display of the temperature of NTC1 (temperature dependent resistor)
		ntc2	Measurement and display of the temperature of NTC2 (temperature dependent resistor)
		supply	Measurement and display of the power supply
		all	Measurement and display of all options
		help	Display help text

Other scripts must be programmed or imported.

8 Operation

8.1 LED indications

The device is provided with three freely programmable LEDs. The default values of the LEDs are shown in the following table:

LED	Color	Meaning
Pwr	green flashing (2 Hz)	Device is operational
Com	Green	Communication active
Err	Red	Error indication

8.1.1 Programming LED indication

The LEDs can be programmed as required via the operating system. The following table shows the system names and examples for using the LEDs.

LED	Color	Name in the system	Meaning
Pwr	green flashing (2 Hz)	`ingn`	Device is operational
	Red	`inrd`	Programmable
	blue	`inbl`	Programmable
Com	Green	`bpgn`	Provided for Modbus and CAN
	Red	`bprd`	
Err	Green	`emgn`	Provided for fault indication
	Red	`emrd`	

8.2 Querying active system partition

The current status of the available systems and the active system can be queried via the following console command:

```
$ sudo rauc status
```

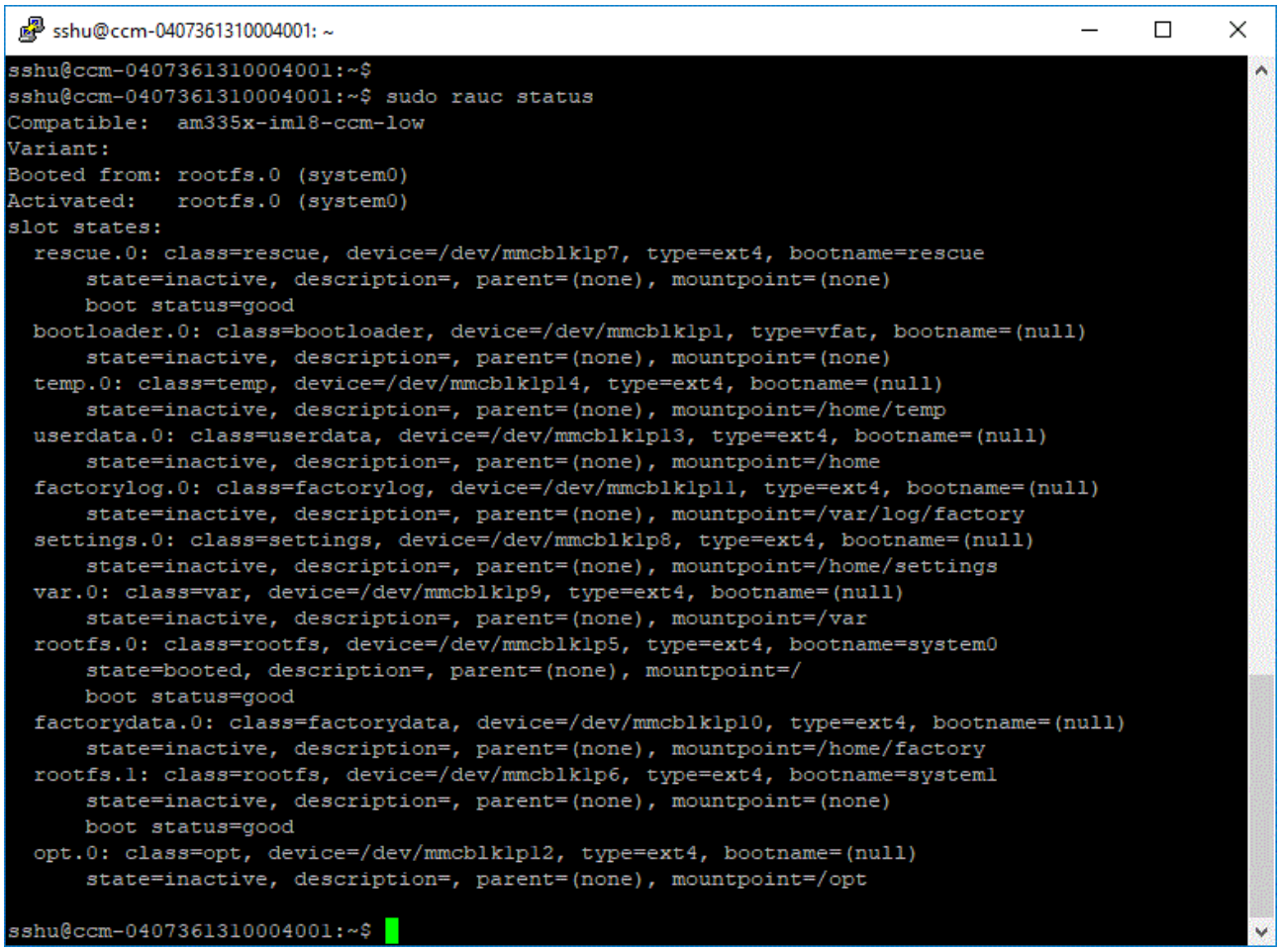

Fig. 15: Example – Querying information on the active system partition

9 Setting and parameterization

The Linux operating system enables the device functions to be parameterized for the specific application.

10 Troubleshooting

10.1 Recovery system

NOTICE
Failure of both system partitions. Data loss possible.
The recovery system resets the device to the factory settings.
▶ Take measures to prevent data loss.

The device is provided with two operating system partitions and a recovery system. If one system partition is damaged or an update fails, the partitions make it possible to revert to the previous executable system or recovery system.

The active system is marked as faulty after three failed boot operations in succession. The other system partition becomes the active system.

The faulty system is first of all updated in an update operation. This increases the availability of the system. If both operating system partitions are marked as faulty at the same time, a recovery system is started. The recovery system automatically restores the device to the factory settings. This resets all data in the other partitions to the factory settings.

11 Maintenance

Ensure that the plug connections and cables are always in good condition.

The devices are maintenance-free, clean dry if required.

11.1 Carrying out a firmware update via the console

The firmware update can either be transferred to the device with a suitable tool (e.g. WinSCP or FileZilla) or as a secure copy.

- ▶ Load the update file (e.g. IM18-CCM30-MTI-24VDC_V1.0.2.raucb) via a suitable tool (e.g. WinSCP) to the device.
- ▶ Alternatively: Transfer the update file as a secure copy to the device: `scp Path/To/Your/File/updatefile.raucb sshu@ip_of_your_board:/home/update`
- ▶ Carry out the update with the following command: `sudo rauc install /path/To/The/Updatefile/updatefile`
- ⇨ If no error messages appear, the firmware was successfully installed.

11.2 Transferring the firmware update via WinSCP

The following example carries out a firmware update using the WinSCP and PuTTY tools.

Requirements

- WinSCP is installed.
- PuTTY is installed.
- The update file is available as a .raucb file on a local computer.

Transferring a firmware file with WinSCP

▶ Log into the device in WinSCP with the following entries:

Entry field	Value
Transmission protocol	SFTP
Computer name	Name (here: ccm-0407361310004001) or IP address of the device (here: 192.168.100.150)
Port	1522
User name	sshu
Password	P@ssw0rd12ssh!

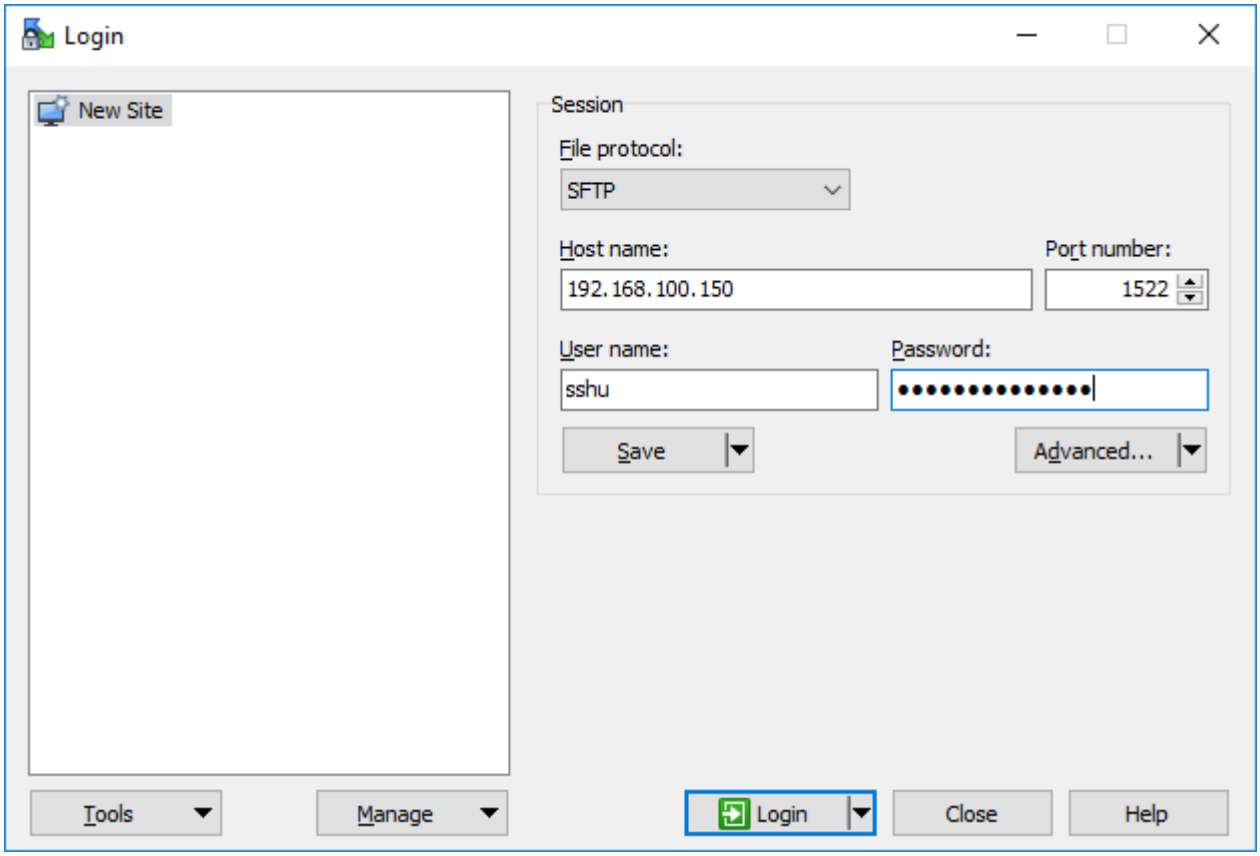

Fig. 16: WinSCP – Login

▶ Navigate in WinSCP to the memory location of the update file on the host PC.

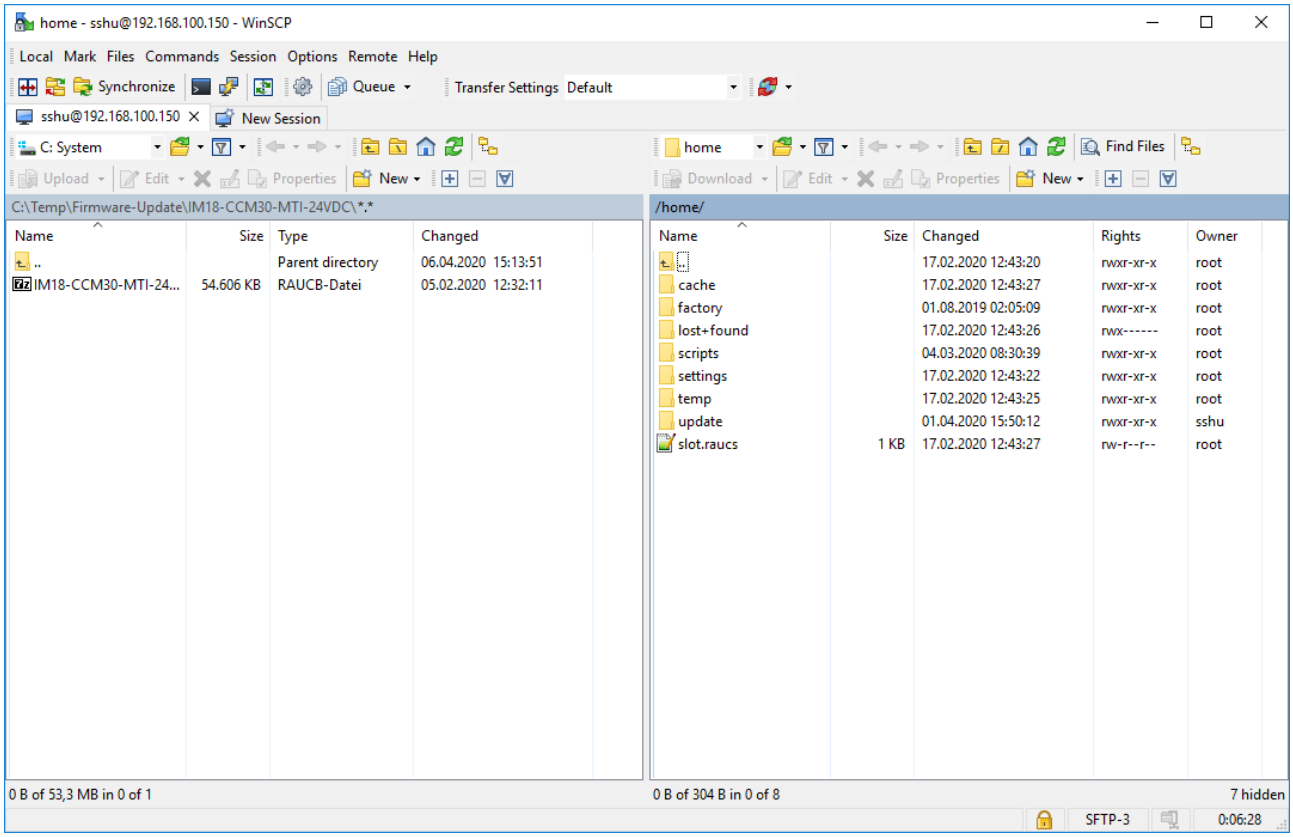

Fig. 17: WinSCP – Memory location of the firmware file on the host PC

▶ Navigate to the directory **home/update** on the device.

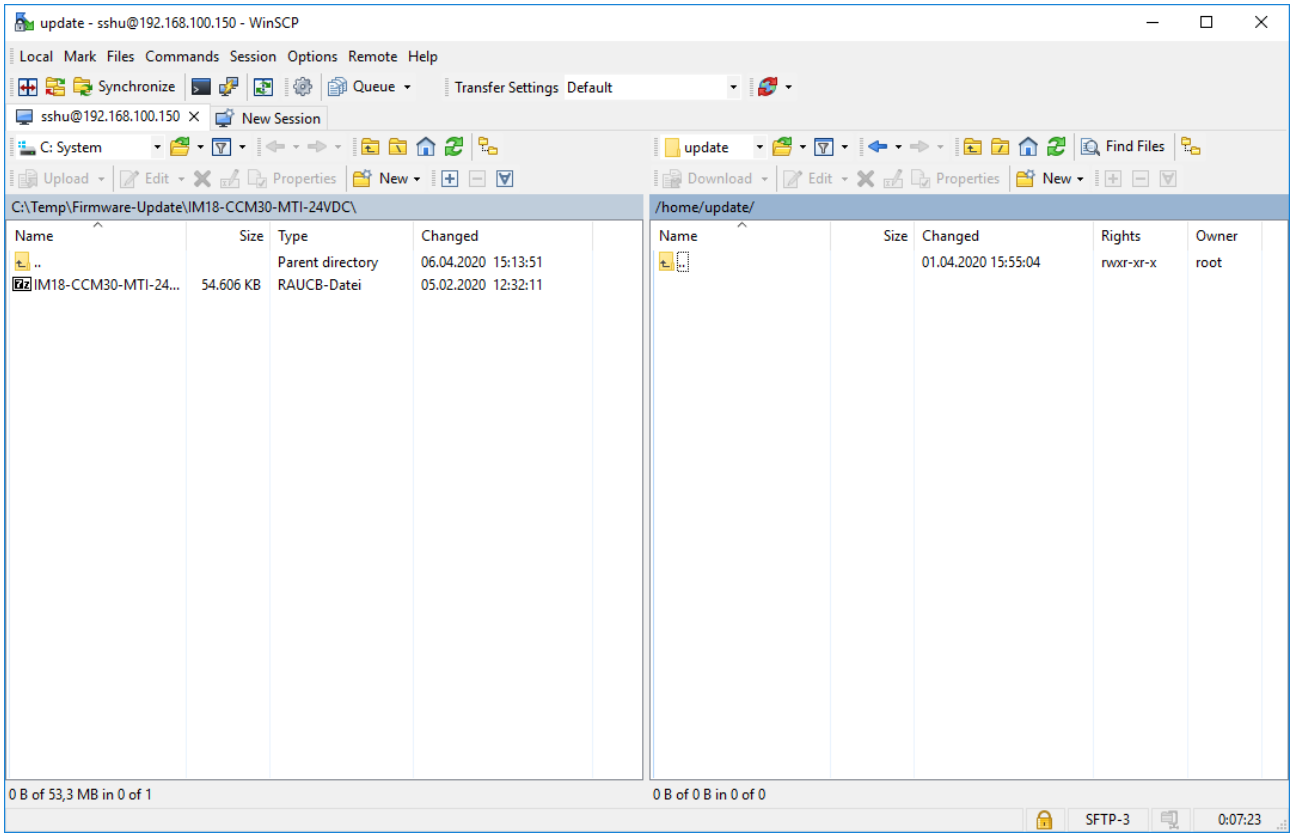

Fig. 18: WinSCP – Directory /home/update on the device

- ▶ Save the firmware file in the directory **/home/update** by drag and drop or by clicking Upload.

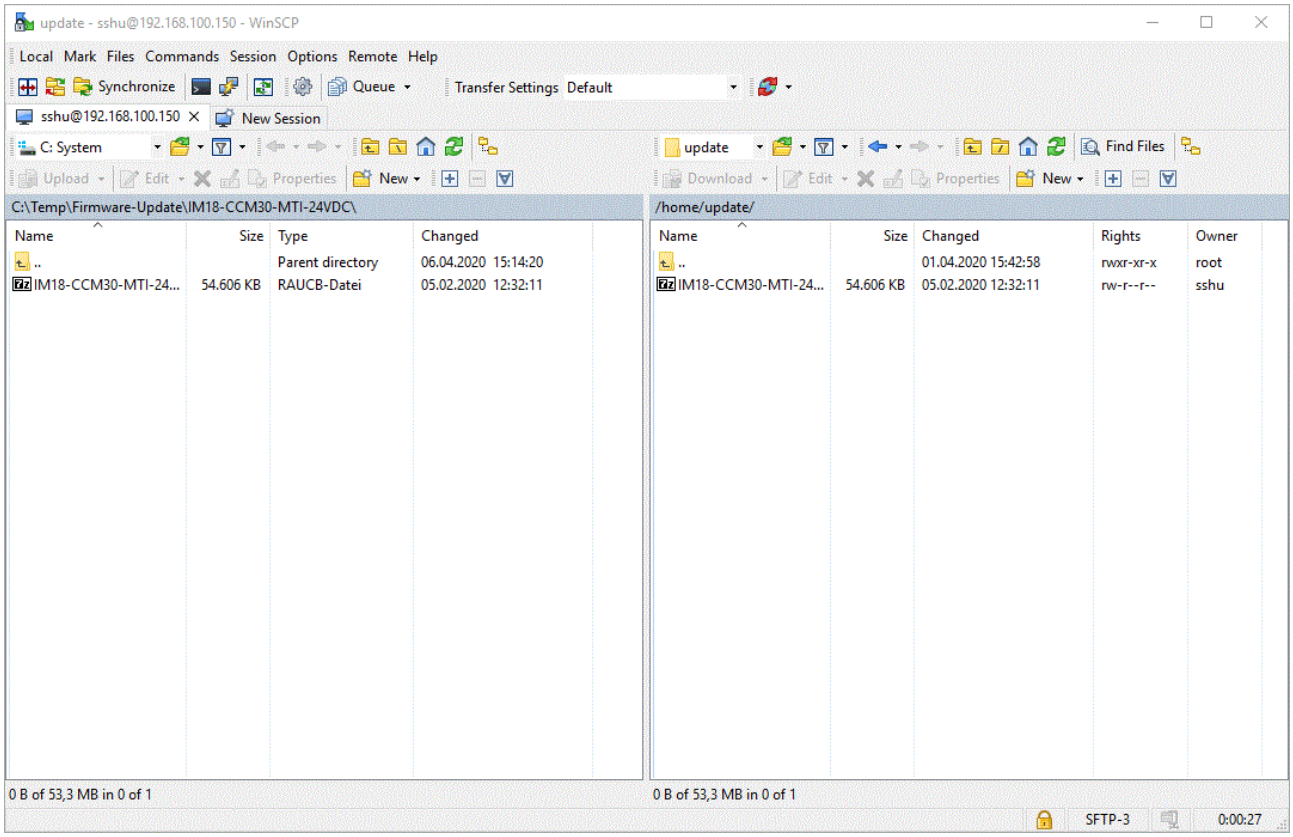

Fig. 19: Directory **/home/update**

- ▶ Confirm with **OK**.
- ⇨ The transfer of the update file is displayed by WinSCP as follows:

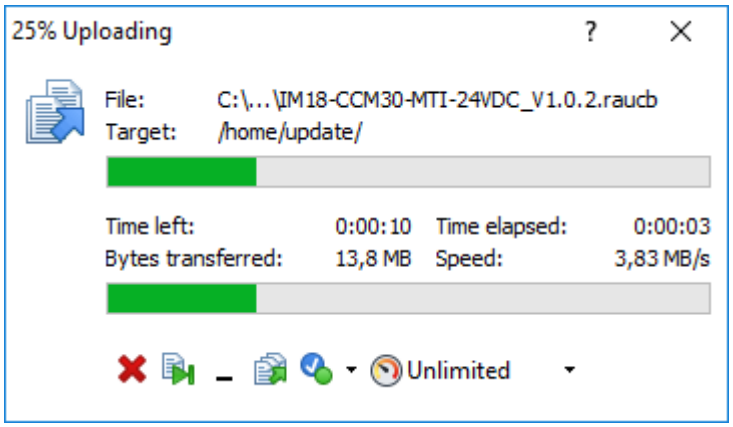

Fig. 20: WinSCP – File transfer

- ⇨ The firmware update has been transferred.

11.3 Carrying out a firmware update with PuTTY

Requirements

- PuTTY is installed.
- The update file was loaded onto the device as a .raucb file.

NOTE
The session can be loaded via **Load** for later repetitions.

▶ Open PuTTY.
▶ Enter the following settings in PuTTY:

- Host Name: Name or IP address of the device (in this case: 192.168.1.20)
- Port: 1522

▶ Optional: Assign a name for the current session (here: IM18-CCM30-MTI-24VDC_1).
▶ Click **Open**.

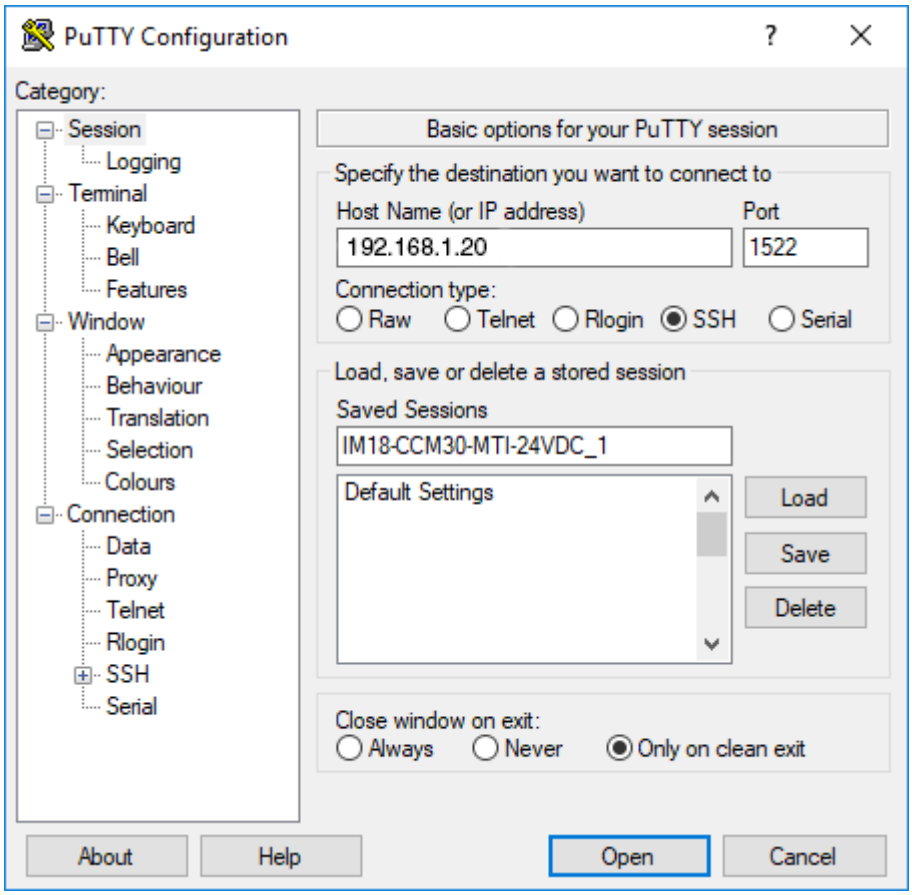

Fig. 21: PuTTY configuration

- Log in on the device with user name “sshu” (password: “P@ssw0rd12ssh!”). The password entered is not displayed in PuTTY.
- Carry out the update with the command `sudo rauc install /home/update/[file name].raucb`.

Example: `sudo rauc install /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb`

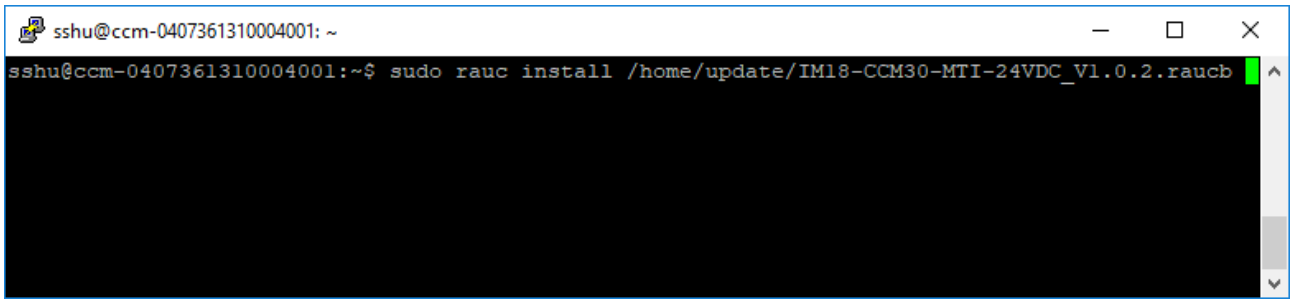

Fig. 22: PuTTY – Starting the firmware update

- Wait until the message `Installing `Path/To/Your/File/file.raucb` succeeded` is displayed.
- Restart the device with the command `sudo reboot.`.

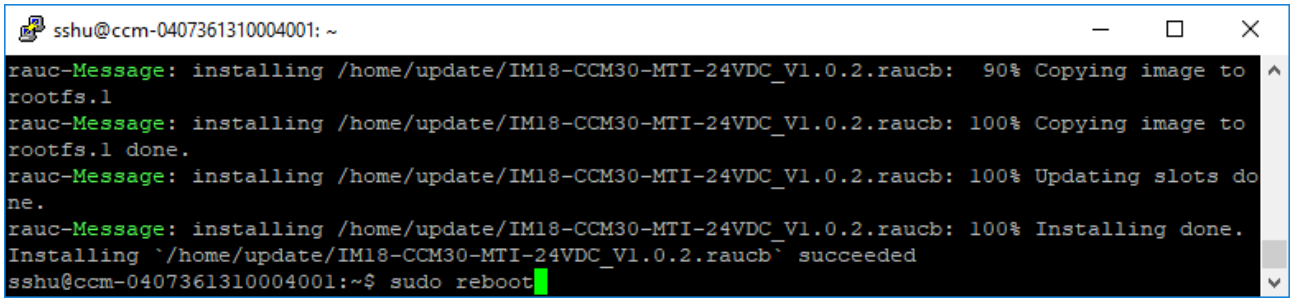

Fig. 23: PuTTY – Restarting the device

- Check the current firmware status, e.g. read out directly from the partition via PuTTY: `cat /slot.raucs`

⇨ The output shows the line `bundle.version=V1.0.2` shows the current version number.

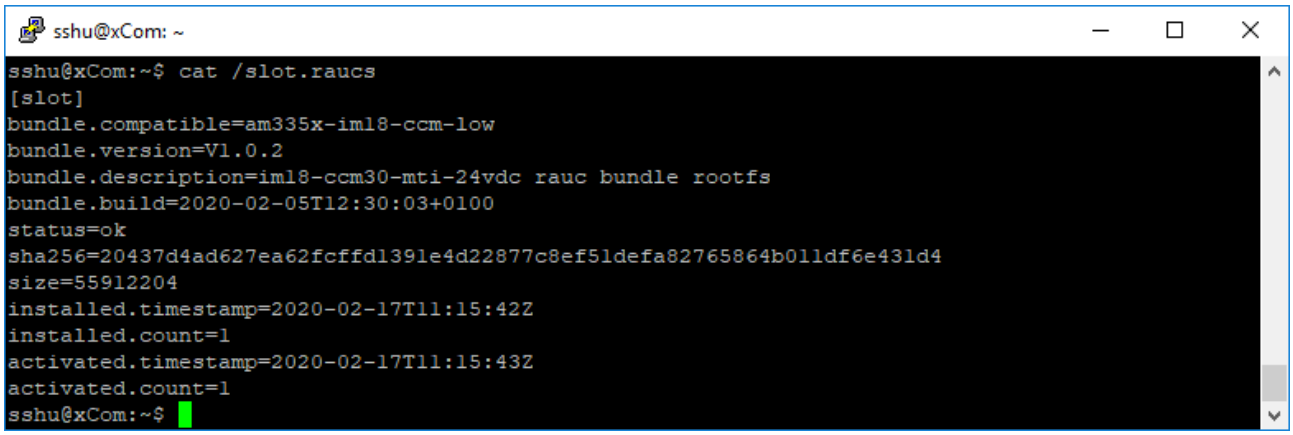

Fig. 24: PuTTY - Reading out the firmware version from the device

12 Repair

The device must not be repaired by the user. The device must be decommissioned if it is faulty. Observe our return acceptance conditions when returning the device to Turck.

12.1 Returning devices

Returns to Turck can only be accepted if the device has been equipped with a Decontamination declaration enclosed. The decontamination declaration can be downloaded from
https://www.turck.de/en/retoure-service-6079.php
and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

13 Decommissioning

- Separate connections and the power supply.
- Undo the terminal connections on the device.
- Remove the device from its rail fixing as shown in the figure.

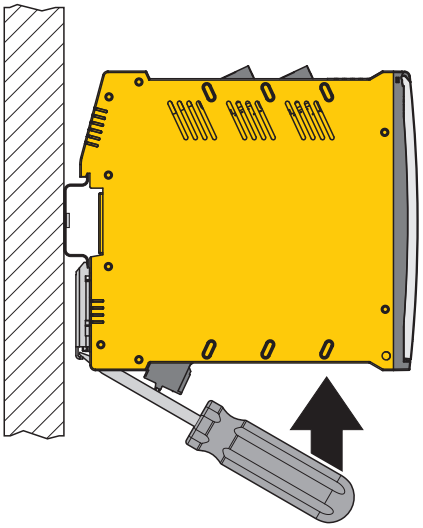

Fig. 25: Decommissioning

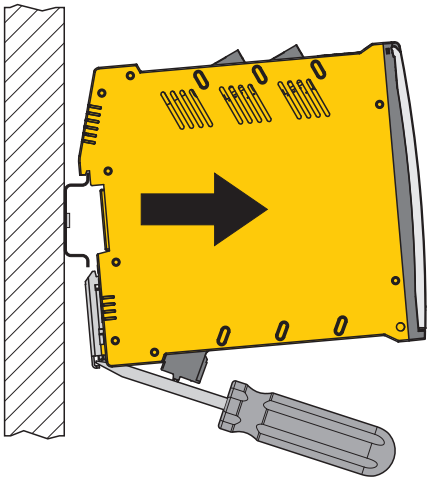

Fig. 26: Decommissioning

14 Disposal

The devices must be disposed of correctly and must not be included in normal household garbage.

15 Technical data

Technical data	IM18-CCM-MTI/24VDC
Rated voltage	24 VDC
Supply voltage range	20…30 VDC
Power supply current	Max. 2 A with all peripheral options
Electrical connection	Removable spring-loaded terminal, 2-pin
Terminal cross-section	≤ 2.5 mm^2
Operating temperature	0...+70 °C
Storage temperature	-25…+75 °C
Relative humidity	10…90 % (internal), No condensation (at 45 °C storage)
Installation height	≤ 2000 m above sea level
Type of protection	IP20
Housing material	Polycarbonate/ABS
Dimensions	125 mm × 110 mm × 18 mm
Interfaces	1× 1GbE (ETH0)
	1× CAN/RS485
HMI	1× RGB LED
	2× RG LED
Sensors	1× distance sensor
	1× Temperature and air humidity sensor
Operating system	Debian
Microprocessor	AM3352BZCZA60 (TI Sitara, 32-Bit ARM Cortex-A8)
RAM	1 Gbit 128 MB DDR3L
Flash	4 GB eMMC

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