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**TURCK**

# IM18-CCM50...

## Cabinet Guard

Instructions for Use

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# 1 About these instructions

These instructions for use 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 at 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](http://www.turck.com):

- Data sheet
- Quick Start Guide
- Declarations of Conformity (current version)

## 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](mailto:techdoc@turck.com).

## 2 Notes on the product

### 2.1 Product identification

These instructions apply to the following cabinet guard:

- IM18-CCM50-MTI/24VDC

### 2.2 Scope of delivery

The scope of delivery includes:

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

### 2.3 Turck service

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database under [www.turck.com](http://www.turck.com) contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats.

The contact details of Turck subsidiaries worldwide can be found on p. [▶ 36].

## 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

The IM18-CCM... cabinet guard monitors temperature, relative air humidity and the door status 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 meets the EMC requirements for industrial areas. When used in residential areas, take measures to avoid radio interference.
- 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.

### 3.4 Notes on UL approval

- Laser class 1 product: The device complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

## 4 Product description

The IM18-CCM50-MTI/24VDC cabinet guard is enclosed in a plastic housing with protection to IP20 and is provided with three multicolor status LEDs. Two Ethernet ports are provided for connection to higher-level systems. External sensors can be connected to the device via a CAN/RS485 port. The Ethernet interfaces and the CAN/RS485 interface are implemented as RJ45 sockets. 3-pin spring-loaded terminals are provided for connecting the power supply, relay output, analog input and GPIOs.

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

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

### 4.1 Device overview

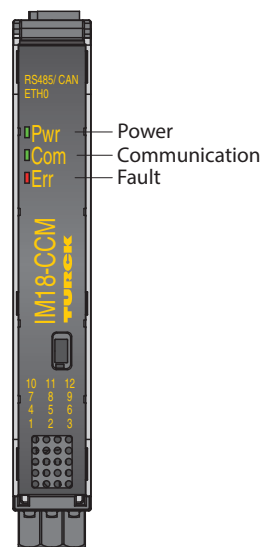


Fig. 1: Front view

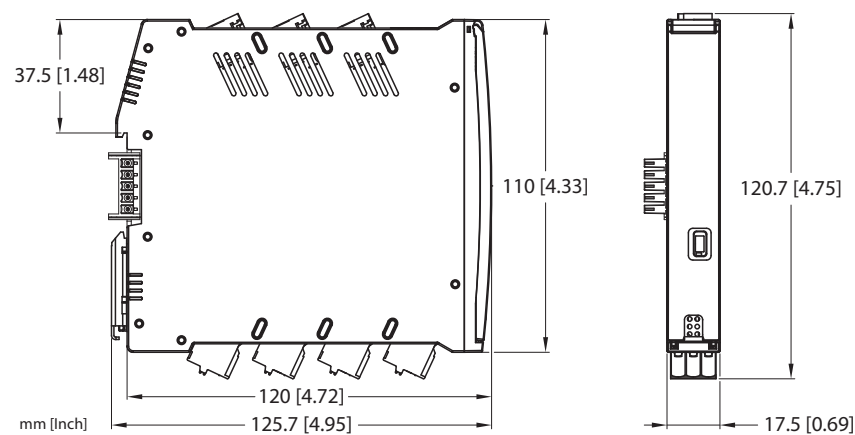


Fig. 2: Dimensions

#### 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)
- 2 Ethernet ports (RJ45 sockets)
- 1 CAN/RS485 port (RJ45)
- 2 GPIO ports
- 1 relay
- 2 analog inputs
- USB Host connection
- TPM-IC

## 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 via Ethernet to higher-level systems.

The following interfaces are provided on the device:

- 2 Ethernet interfaces
- CAN/RS485 interface
- 2 GPIOs
- 2 analog inputs (configurable as current or voltage input)
- Changeover contact relay
- USB interface

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 Ethernet interfaces

The device is provided with two Ethernet interfaces ETH0 and ETH1.

The ETH0 interface is a 1 GbE interface in accordance with 1000BASE-T for connecting to higher-level storage systems or cloud services.

The ETH1 interface is compliant with the 100BASE-TX standard. The transmission speed is 100 Mbit/s. The ETH1 enables the device to be connected to an industrial Ethernet network.

The Ethernet interfaces are set for dynamic addressing via DHCP. The following default IP addresses are also available:

- ETH0: 192.168.1.20
- ETH1: 192.168.2.20

The max. cable length is 100 m.

### 4.4.2 CAN/RS485 interface

External devices can be connected to the cabinet guard, e.g. sensors for condition monitoring. The sensors can be connected for example via RJ45. The corresponding bus terminals are integrated in the cabinet guard. The CAN/RS485 interface provides a nominal voltage of 24 VDC for the supply of the external devices.



#### 4.4.3 GPIOs

The GPIOs can be configured separately as digital inputs or outputs. Additional sensors can be connected to the GPIOs. Simple shell scripts are provided on the system as support for the configuration.

#### 4.4.4 Analog inputs

The two analog inputs can be configured separately as current inputs (0...35 mA) or voltage inputs (0...5 V, 0...10 V or 0...20 V). Additional sensors can be connected to the analog inputs. Simple shell scripts are provided on the system as support for the configuration.

#### 4.4.5 Relay

The device is provided with a changeover relay for connecting resistive loads. The load capacity is 48 V/0.5 A for 100000 switching cycles. Limit value violations can, for example, be forwarded as switching signals via the relay output. Simple shell scripts are provided on the system as support for the configuration.

#### 4.4.6 Trusted Platform Module controller (TPM controller)

The device is provided with a trusted platform module controller (TPM controller) in accordance with the TCG specification (TCG TPM 2.0). The TPM controller allows the possibility of additional safety functions, e.g. when using the device for license and data protection requirements.

#### 4.4.7 USB Host interface

The USB Host interface makes it possible to access the device, e.g. for expanding the memory with a USB stick. The USB Host interface is implemented as a USB 2.0 high-speed interface. The USB interface is protected from unauthorized system access by the Linux tool USBGuard. Access to the device via the USB interface is only possible for allowed USB devices.

## 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.

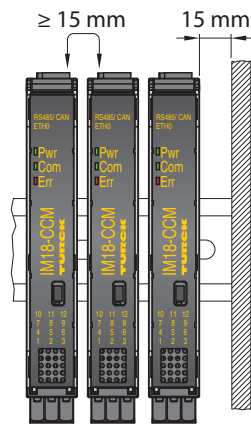


Fig. 3: Minimum clearance

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

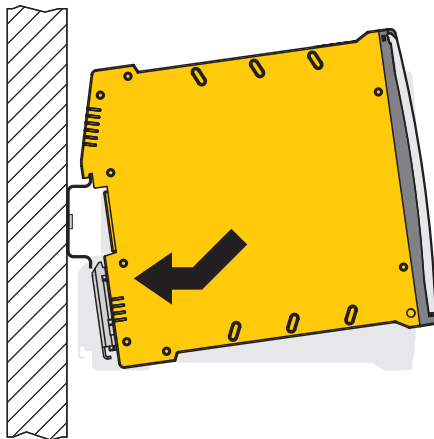


Fig. 4: DIN rail mounting

## 6 Connection



### CAUTION

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 two RJ45 sockets 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 via the ETH0 or ETH1 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.

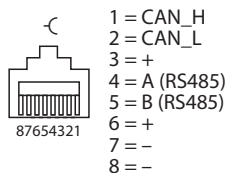


Fig. 5: Pin layout of the CAN/RS485 interface

### 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 mm<sup>2</sup>.
- ▶ When using stranded wire: secure the wire ends with ferrules.
- ▶ Prise open the spring-loaded terminals using a screwdriver.
- ▶ Insert the stripped cable ends into the guides of the spring-loaded terminals.
- ▶ Remove the screwdriver.

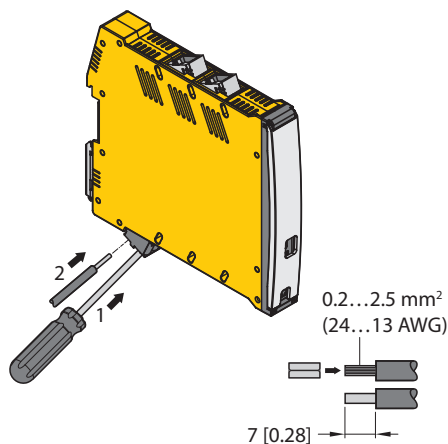


Fig. 6: Connecting the power supply via spring-loaded terminals

## 6.4 Block diagram

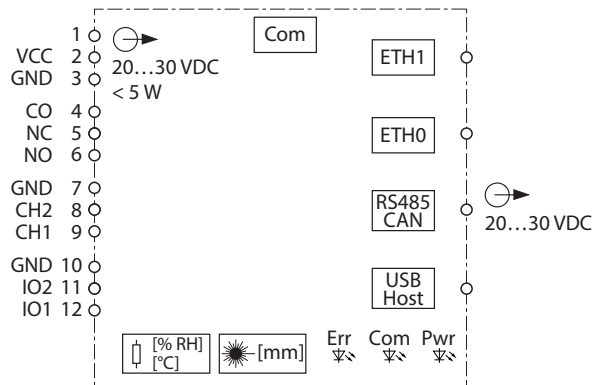


Fig. 7: Block diagram

## 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 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 or ETH1 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)
ETH0 IP address	192.168.1.20
ETH1 IP address	192.168.2.20

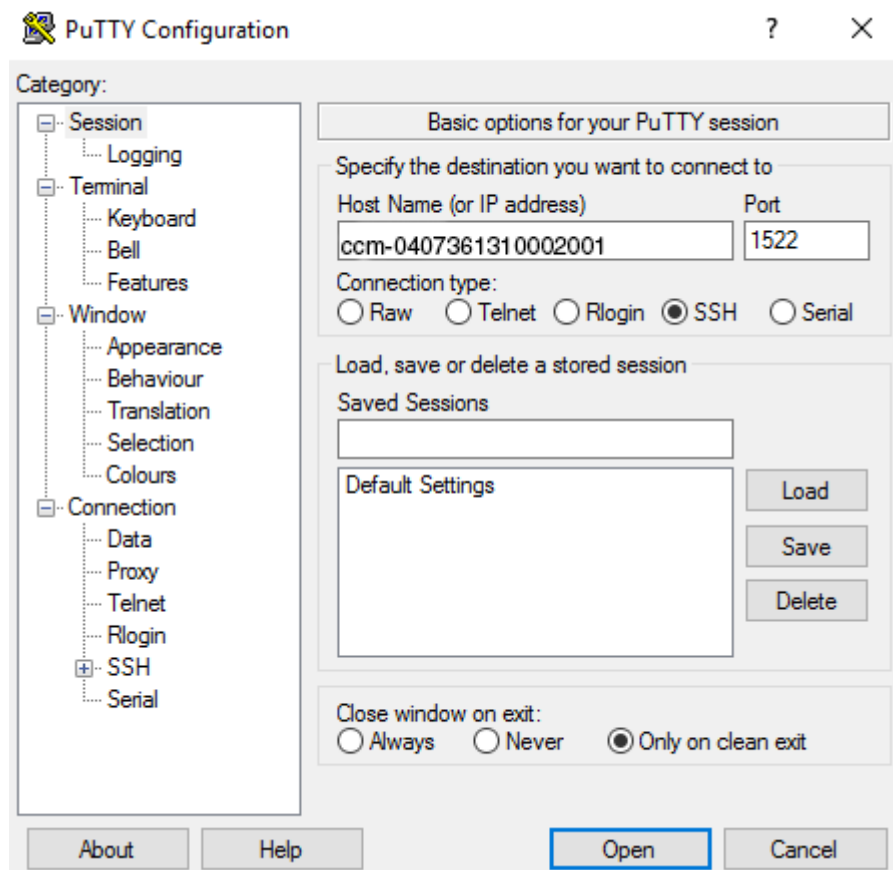
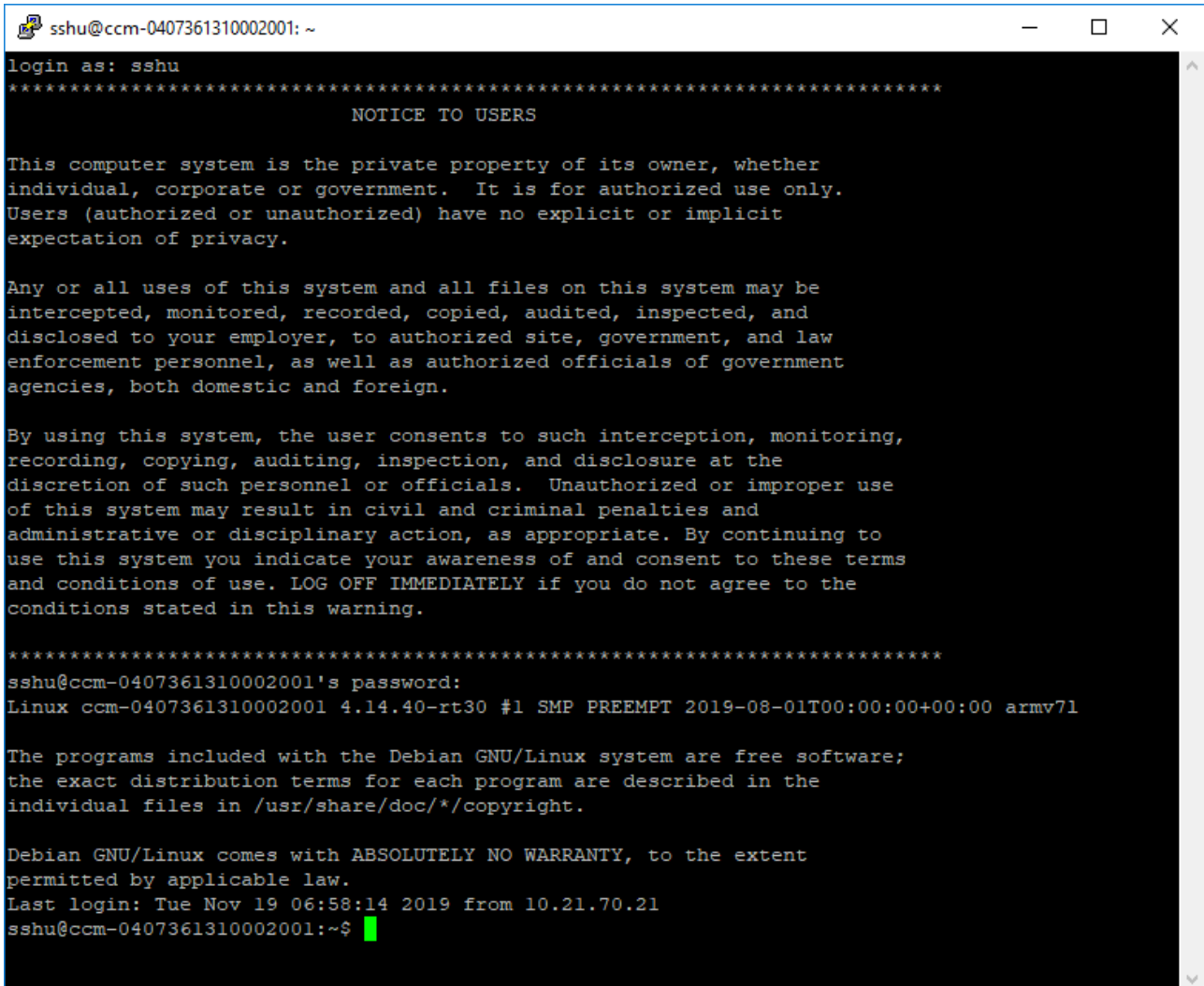


Fig. 8: Access via PuTTY

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



```
ssh@ccm-0407361310002001: ~  
login as: sshu  
*****  
NOTICE TO USERS  
  
This computer system is the private property of its owner, whether  
individual, corporate or government. It is for authorized use only.  
Users (authorized or unauthorized) have no explicit or implicit  
expectation of privacy.  
  
Any or all uses of this system and all files on this system may be  
intercepted, monitored, recorded, copied, audited, inspected, and  
disclosed to your employer, to authorized site, government, and law  
enforcement personnel, as well as authorized officials of government  
agencies, both domestic and foreign.  
  
By using this system, the user consents to such interception, monitoring,  
recording, copying, auditing, inspection, and disclosure at the  
discretion of such personnel or officials. Unauthorized or improper use  
of this system may result in civil and criminal penalties and  
administrative or disciplinary action, as appropriate. By continuing to  
use this system you indicate your awareness of and consent to these terms  
and conditions of use. LOG OFF IMMEDIATELY if you do not agree to the  
conditions stated in this warning.  
  
*****  
ssh@ccm-0407361310002001's password:  
Linux ccm-0407361310002001 4.14.40-rt30 #1 SMP PREEMPT 2019-08-01T00:00:00+00:00 armv7l  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Tue Nov 19 06:58:14 2019 from 10.21.70.21  
ssh@ccm-0407361310002001:~$ █
```

Fig. 9: Login output

## 7.2 Installing user programs

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

- ▶ Install the package:

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

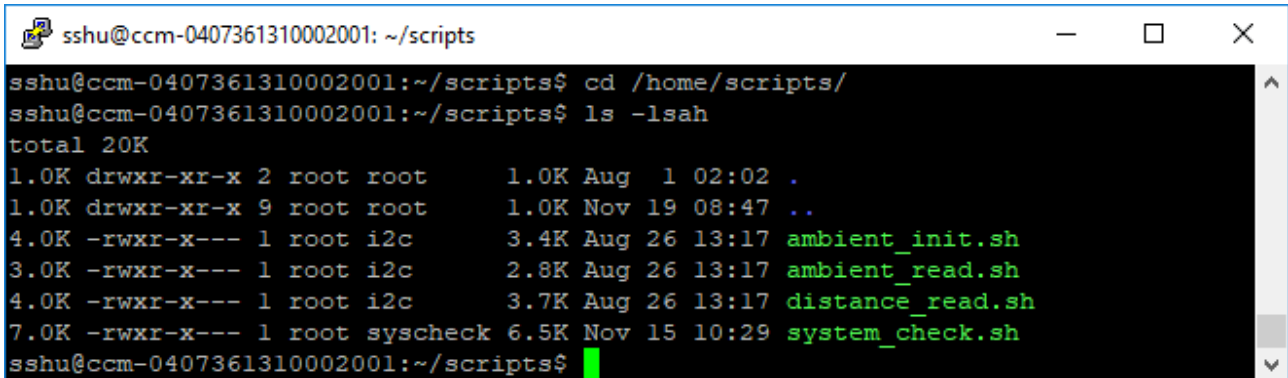
The device has the following partitions:

Mount point	Size	Contents
/	1.4 GB	System partition
/var	256 MB	Variable and temporary data of the system
/opt	1.6 GB	User programs, if necessary user data
/home	768 MB	/home folder for all users
/home/temp	1 GB	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



### 7.3 Example scripts

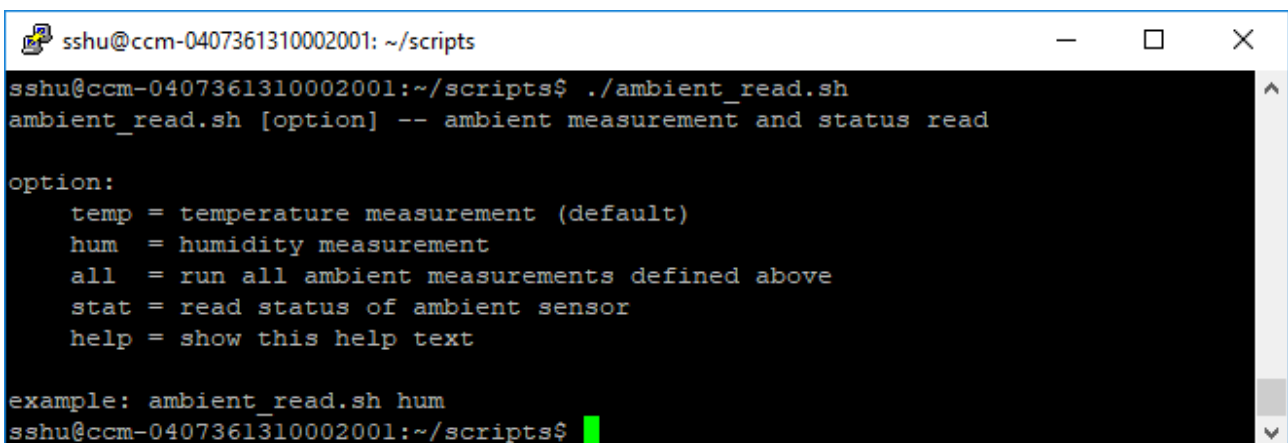
The folder **/home/scripts** contains different scripts for operating the interfaces and system functions. The scripts are examples of how the functions can be integrated in user-defined user programs.



```
ssh@ccm-0407361310002001: ~/scripts
ssh@ccm-0407361310002001:~/scripts$ cd /home/scripts/
ssh@ccm-0407361310002001:~/scripts$ ls -lsah
total 20K
1.0K drwxr-xr-x 2 root root    1.0K Aug  1 02:02 .
1.0K drwxr-xr-x 9 root root    1.0K Nov 19 08:47 ..
4.0K -rwxr-x--- 1 root i2c     3.4K Aug 26 13:17 ambient_init.sh
3.0K -rwxr-x--- 1 root i2c     2.8K Aug 26 13:17 ambient_read.sh
4.0K -rwxr-x--- 1 root i2c     3.7K Aug 26 13:17 distance_read.sh
7.0K -rwxr-x--- 1 root syscheck 6.5K Nov 15 10:29 system_check.sh
ssh@ccm-0407361310002001:~/scripts$
```

Fig. 10: Script directory in the /home folder

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



```
ssh@ccm-0407361310002001: ~/scripts
ssh@ccm-0407361310002001:~/scripts$ ./ambient_read.sh
ambient_read.sh [option] -- ambient measurement and status read

option:
  temp = temperature measurement (default)
  hum  = humidity measurement
  all  = run all ambient measurements defined above
  stat = read status of ambient sensor
  help = show this help text

example: ambient_read.sh hum
ssh@ccm-0407361310002001:~/scripts$
```

Fig. 11: 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
System	system_check.sh	ntc1	Measurement and display of the temperature of the NTC1 (temperature dependent resistor)
		ntc2	Measurement and display of the temperature of the NTC2 (temperature dependent resistor)
		supply	Measurement and display of the power supply
		all	Measurement and display of all options
		help	Display help text
Analog inputs	analog_init.sh	[channel] [range]	Configure input range [range] for one channel [channel] [range]: 5V, 10V, 20V or 20mA [channel]: 1 or 2
		help	Display help text
	analog_read.sh	1	Measurement of the analog value on channel 1
		2	Measurement of the analog value on channel 2
		help	Display help text
GPIO	gpio_init.sh	[pin] in	Configure GPIO [pin] as an input [pin]: 1 or 2
		[pin] out [level]	Configure GPIO [pin] as output and define level [level] [pin]: 1 or 2 [level]: low or high
	gpio_read.sh	[pin]	Read level on GPIO [pin]
		help	Display help text
	gpio_write.sh	[pin] [level]	Set level [level] on GPIO [pin]
		help	Display help text

Function	Script	Option	Description
Relay	relay_read.sh	status	Read and display status of the relay
		help	Display help text
	relay_write.sh	inactive	Set relay in opened state: CO-NC: closed CO-NO: opened
		active	Set relay in closed state: CO-NC: opened CO-NO: closed
		help	Display help text

Other scripts must be programmed or imported.

## 8 Setting and parameterization

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

### 8.1 User groups – overview

The different user groups are defined in the operating system of the device in order to assign application-specific access rights.

Name	Description	Assigned periphery
led	Enables access to the LEDs	All LEDs
gpio	Enables access to the digital GPIOs and the relay	Scripts gpio*.sh and relay*.sh and corresponding periphery
analogin	Enables access to the analog inputs	Scripts analog*.sh and corresponding periphery
i2c	Enables access to the distance sensor	Scripts distance*.sh, Tool vl5311_distance and corresponding periphery
rs485	Enables access to the RS485 interface	
home	User group for shared /home directory	
syscheck	Enables access to the system internal sensors	Script system_check.sh and corresponding periphery

### 8.2 Linux system paths and interfaces – overview

The following table shows an overview of the most important system devices and system paths as well as interfaces under Linux. Refer to the example scripts at `/home/scripts/` for instructions for use.

device/system path and interface	
eth0	Ethernet interface
eth1	Ethernet interface
usb1	USB Host interface
/dev/rtc0	Microprocessor internal RTC
/dev/rtc1	Buffered hardware RTC
/dev/tpm0	TPM-IC
/dev/ttyO1	RS485 interface
can0	CAN interface
/sys/class/hwmon/hwmon0/	sysfs path for sht3x driver for temperature and air humidity sensor
vl5311_distance	Tool for configuring and reading the distance sensor
/sys/bus/iio/devices/iio:device0/	sysfs path for microprocessor internal ADC (12-bit)
/sys/class/gpio	sysfs path for GPIO of the microprocessor internal ( $\mu$ P)
/sys/class/leds/	sysfs path for LED
in_voltage0_raw	Analog input AIN1: ADC channel
gpio70	Analog input AIN1: Switching from voltage measurement (low) or current measurement (high)
gpio75	Analog input AIN1: Voltage measurement range switching 0...5 V (low) or 0...10 V (high)

device/system path and interface	
gpio76	Analog input AIN1: Voltage measurement range switching 0...5 V (low) or 0...20 V (high)
in_voltage1_raw	Analog input AIN2: ADC channel
gpio71	Analog input AIN2: Switching from voltage measurement (low) or current measurement (high)
gpio77	Analog input AIN2: Voltage measurement range switching 0...5 V (low) or 0...10 V (high)
gpio78	Analog input AIN2: Voltage measurement range switching 0...5 V (low) or 0...20 V (high)
gpio47	Digital output GPIO1: Switching between input (low) or output (high)
gpio61	Digital output GPIO1: Set level when configured as output: low or high
gpio66	Digital output GPIO1: Read level at GPIO1 (irrespective of configuration)
gpio103	Digital output GPIO1: Diagnostic signal: low (output inactive or error) or high (output active, no error)
gpio67	Digital output GPIO2: Switching between input (low) or output (high)
gpio68	Digital output GPIO2: Set level when configured as output: low or high
gpio69	Digital output GPIO2: Read level at GPIO2 (irrespective of configuration)
gpio104	Digital output GPIO2: Diagnostic signal: low (output inactive or error) or high (output active, no error)
gpio23	Relay: Switching between inactive NC (low) and active NO (high)
in_voltage2_raw	System internal: internal measurement of the operating voltage
in_voltage3_raw	System internal: Temperature sensor NTC1
in_voltage4_raw	System internal: Temperature sensor NTC2

### 8.3 Analog inputs – available modes and configurations

Signal type	Measuring range	µP gpio: Voltage and current measurement switching	µP gpio: Range switching 0...10 V	µP gpio: Range switching 0...20 V
Voltage measurement	0...5 V	Direction: Output, level: low	Direction: Output, level: low	Direction: Output, level: low
Voltage measurement	0...10 V	Direction: Output, level: low	Direction: Output, level: high	Direction: Output, level: low
Voltage measurement	0...20 V	Direction: Output, level: low	Direction: Output, level: low	Direction: Output, level: high
Current measurement	0...20 mA	Direction: Output, level: high	Direction: Output, level: low	Direction: Output, level: low

### 8.4 Analog inputs – available modes and configurations

GPIO configuration	Level	µP gpio: Switching between input or output	µP gpio: Set level at output	µP gpio: Set level	µP gpio: Diagnostic signal
Input		Direction: Output, level: low	Direction: Output, level: low or high	Direction: Input	Direction: Input
Output	low	Direction: Output, level: high	Direction: Output, level: low	Direction: Input	Direction: Input
Output	high	Direction: Output, level: high	Direction: Output, level: high	Direction: Input	Direction: Input

### 8.5 Relay – available modes

Status	CO-NC connection	CO-NO connection	µP gpio: Switchover
Inactive	Closed	Open	Direction: Output, level: low
Active	Open	Closed	Direction: Output, level: high

## 9 Operation

### 9.1 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

#### 9.1.1 Programming LED indication

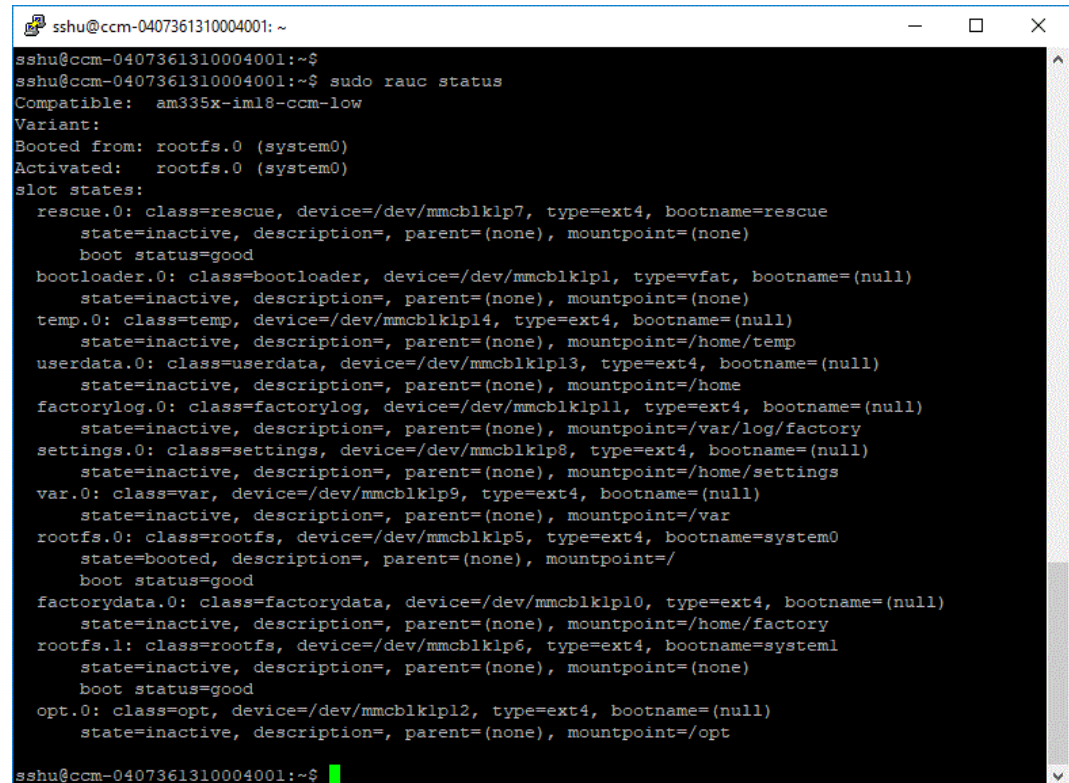
The LEDs can be programmed as required via the operating system. The following table shows the system names and examples for using the LEDs.

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	

## 9.2 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
```



```
ssh@ccm-0407361310004001: ~  
ssh@ccm-0407361310004001:~$  
ssh@ccm-0407361310004001:~$ sudo rauc status  
Compatible: am335x-impl8-ccm-low  
Variant:  
Booted from: rootfs.0 (system0)  
Activated: rootfs.0 (system0)  
slot states:  
  rescue.0: class=rescue, device=/dev/mmcbklp7, type=ext4, bootname=rescue  
             state=inactive, description=, parent=(none), mountpoint=(none)  
             boot status=good  
  bootloader.0: class=bootloader, device=/dev/mmcbklp1, type=vfat, bootname=(null)  
                state=inactive, description=, parent=(none), mountpoint=(none)  
  temp.0: class=temp, device=/dev/mmcbklp4, type=ext4, bootname=(null)  
           state=inactive, description=, parent=(none), mountpoint=/home/temp  
  userdata.0: class=userdata, device=/dev/mmcbklp13, type=ext4, bootname=(null)  
              state=inactive, description=, parent=(none), mountpoint=/home  
  factorylog.0: class=factorylog, device=/dev/mmcbklp11, type=ext4, bootname=(null)  
                state=inactive, description=, parent=(none), mountpoint=/var/log/factory  
  settings.0: class=settings, device=/dev/mmcbklp8, type=ext4, bootname=(null)  
               state=inactive, description=, parent=(none), mountpoint=/home/settings  
  var.0: class=var, device=/dev/mmcbklp9, type=ext4, bootname=(null)  
          state=inactive, description=, parent=(none), mountpoint=/var  
  rootfs.0: class=rootfs, device=/dev/mmcbklp5, type=ext4, bootname=system0  
            state=booted, description=, parent=(none), mountpoint=/  
            boot status=good  
  factorydata.0: class=factorydata, device=/dev/mmcbklp10, type=ext4, bootname=(null)  
                 state=inactive, description=, parent=(none), mountpoint=/home/factory  
  rootfs.1: class=rootfs, device=/dev/mmcbklp6, type=ext4, bootname=system1  
             state=inactive, description=, parent=(none), mountpoint=(none)  
             boot status=good  
  opt.0: class=opt, device=/dev/mmcbklp12, type=ext4, bootname=(null)  
          state=inactive, description=, parent=(none), mountpoint=/opt  
ssh@ccm-0407361310004001:~$
```

Fig. 12: Example – querying information on the active system partition

## 9.3 Enable USB device

USB devices must be enabled by the Linux tool USBGuard before use.

- ▶ Connect the USB device to the USB Host interface.
- ▶ Call up the list of the existing USB devices:  

```
$ sudo usbguard list-devices  
> 11 block id 0424:2440 serial "000000225001" name "Ultra  
Fast Media" hash "IshTzwLfa...
```
- ⇒ The identification number by which the USB device is activated appears at the beginning of the line (here: 11).
- ▶ Enable USB device via an entry in `/etc/usbguard/rules.conf`:  

```
$ sudo usbguard allow-device 11
```

A USB device can be permanently enabled via the `--permanent` or `-p` option. The enabled state is retained after the cabinet guard is restarted.

- ▶ Permanently enable the USB device via an entry in `/etc/usbguard/rules.conf`:  

```
$ sudo usbguard allow-device --permanent 11
```



### NOTE

If a USB device is reconnected via a USB hub after it is enabled, it is given a new ID and must be enabled again.



## 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!

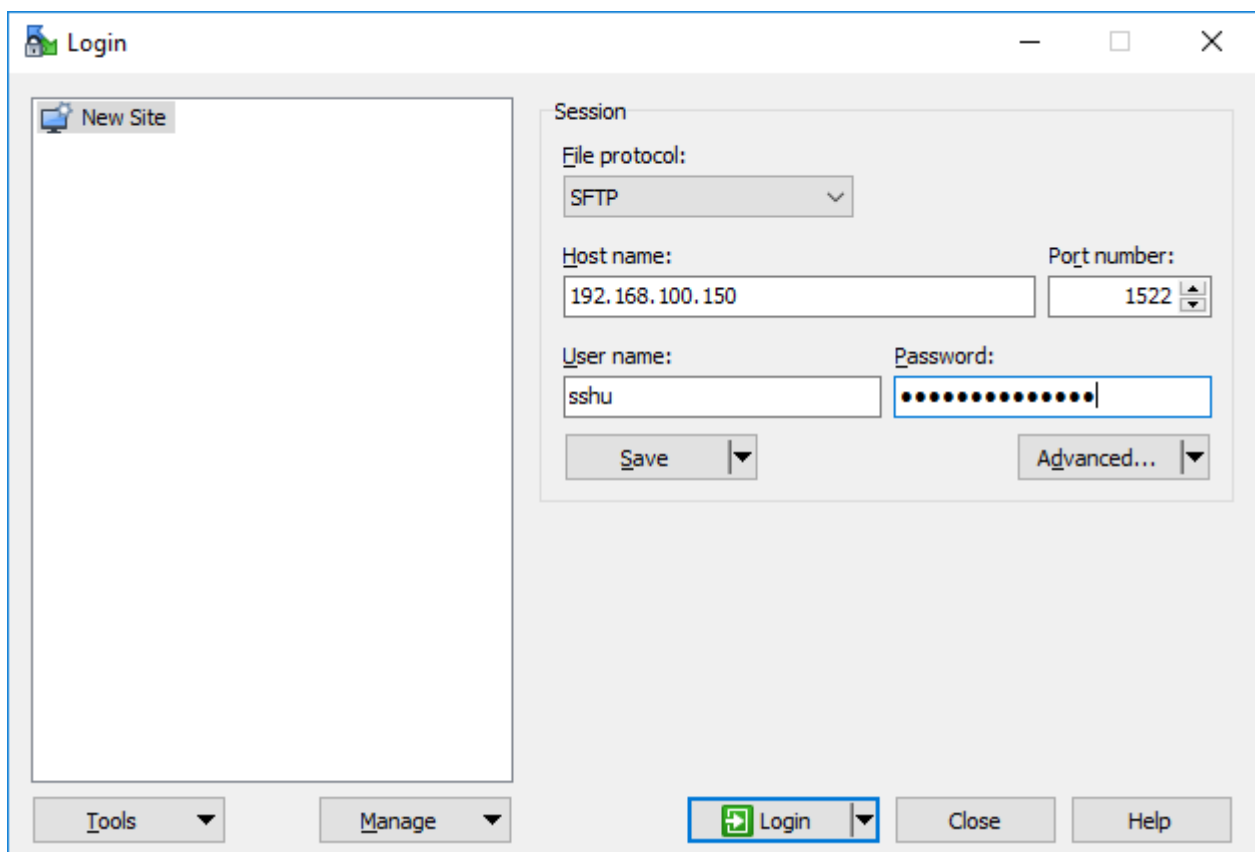


Fig. 13: WinSCP – login

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

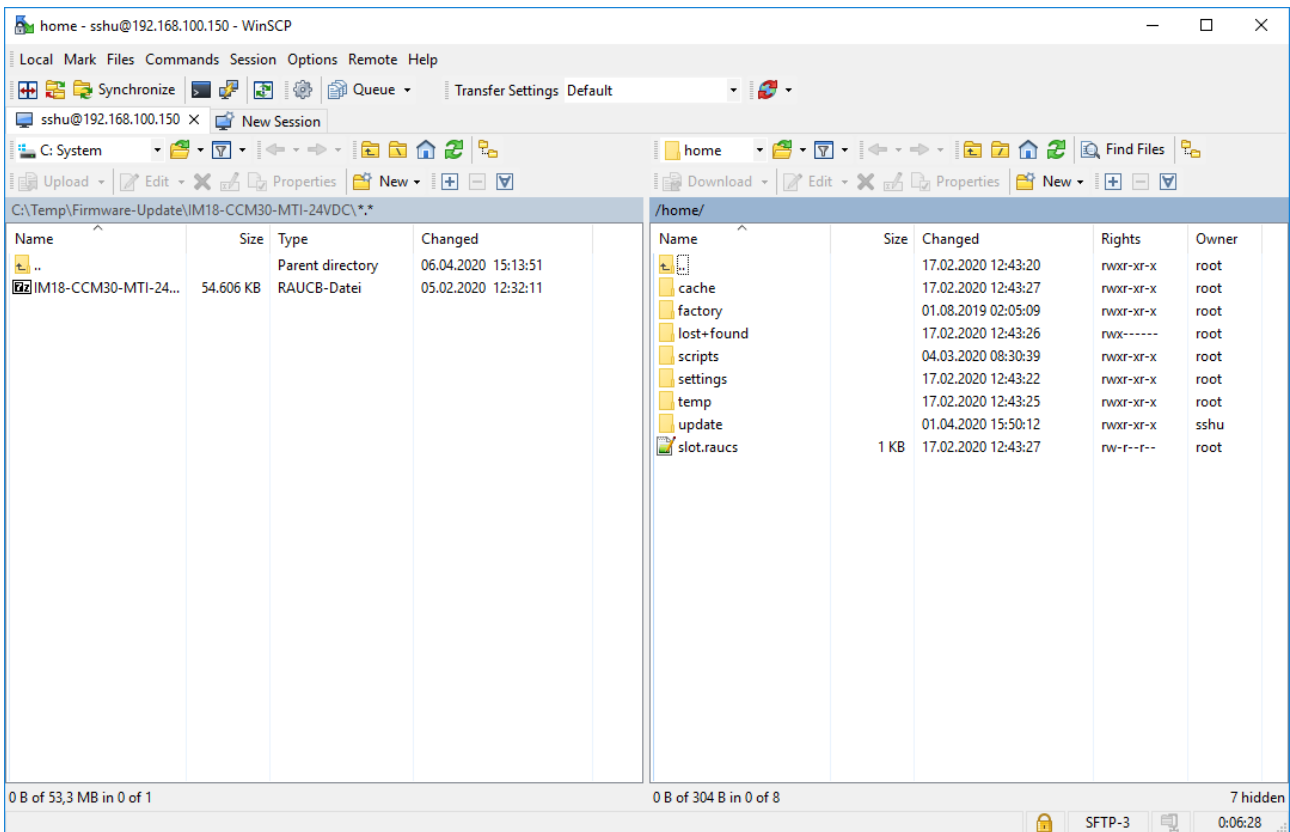


Fig. 14: WinSCP – memory location of the firmware file on the host PC

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

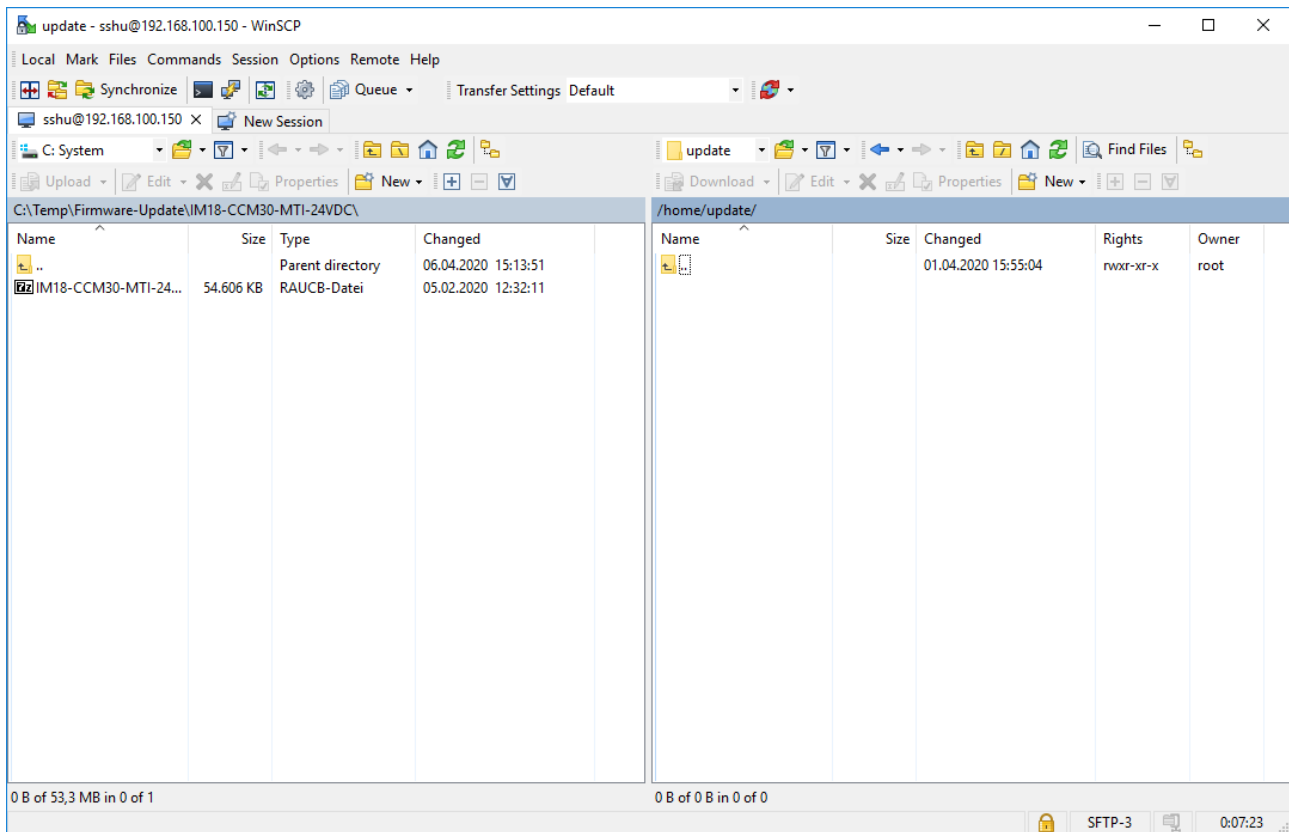


Fig. 15: WinSCP – directory /home/update on the device

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

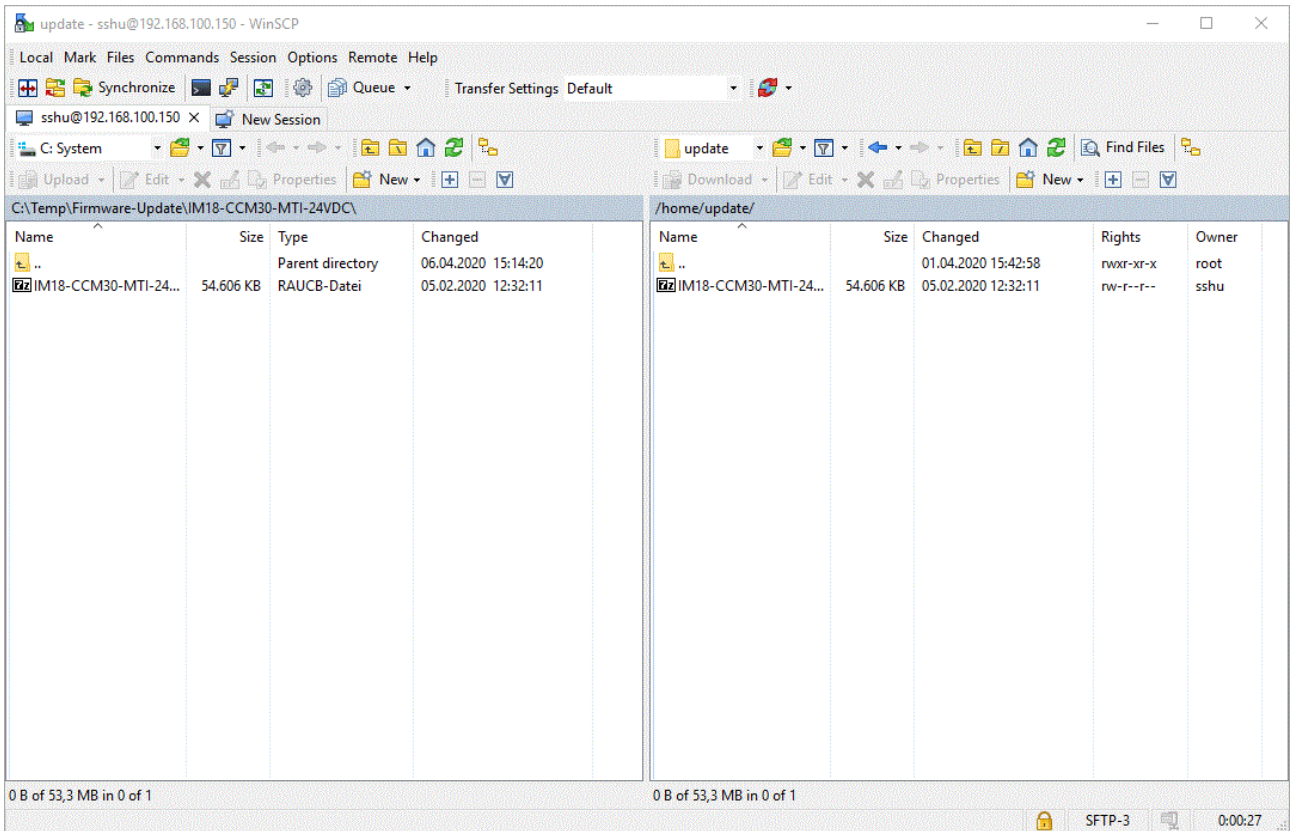


Fig. 16: Directory `/home/update`

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

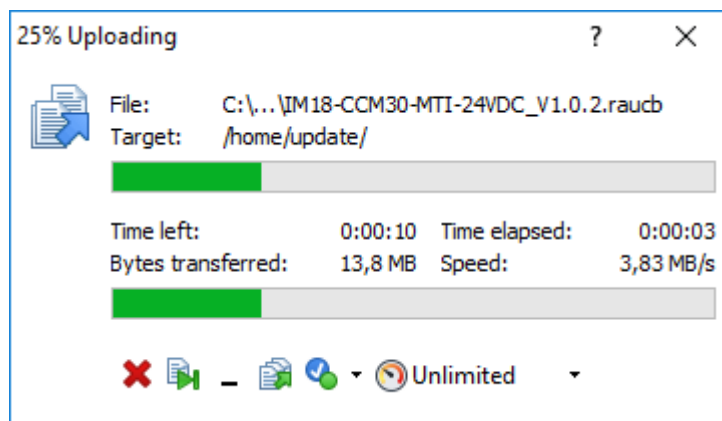


Fig. 17: WinSCP – file transfer

- ⇒ The firmware update has been transferred.

## 11.3 Carrying out a firmware update with PuTTY

### Requirements

- PuTTY is installed.
- The update 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 (here: 192.168.1.20)
- Port: 1522
- ▶ Optional: Assign here a name for the current session (here: IM18-CCM50-MTI-24VDC\_1).
- ▶ Click **Open**.

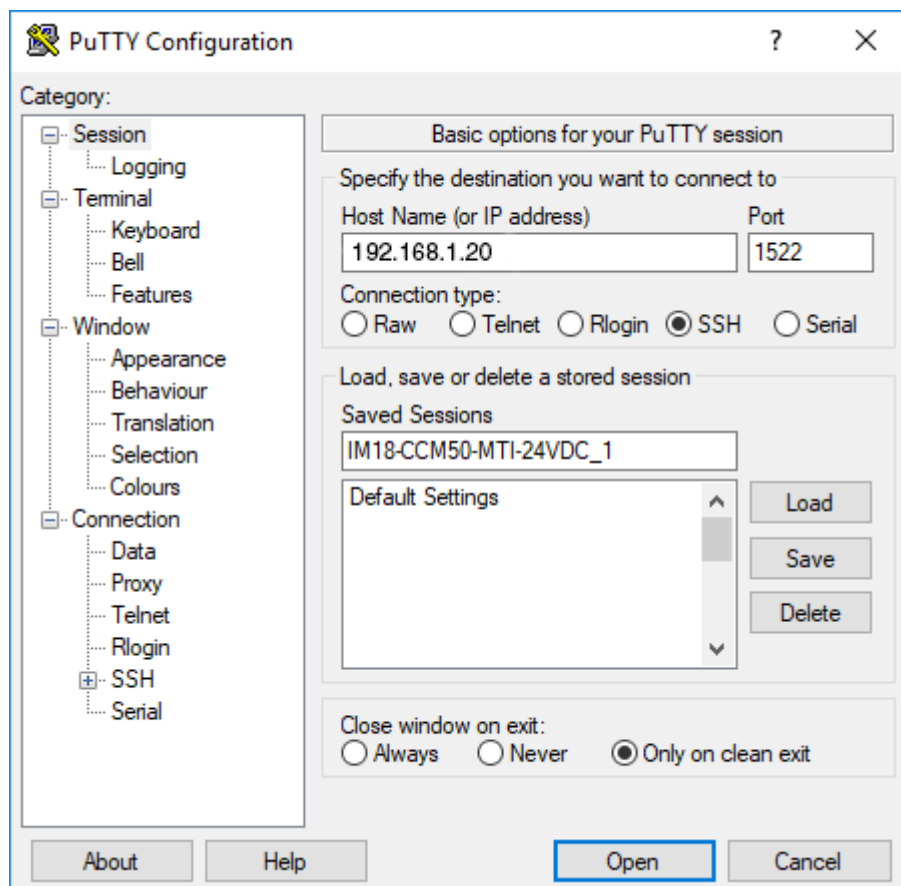
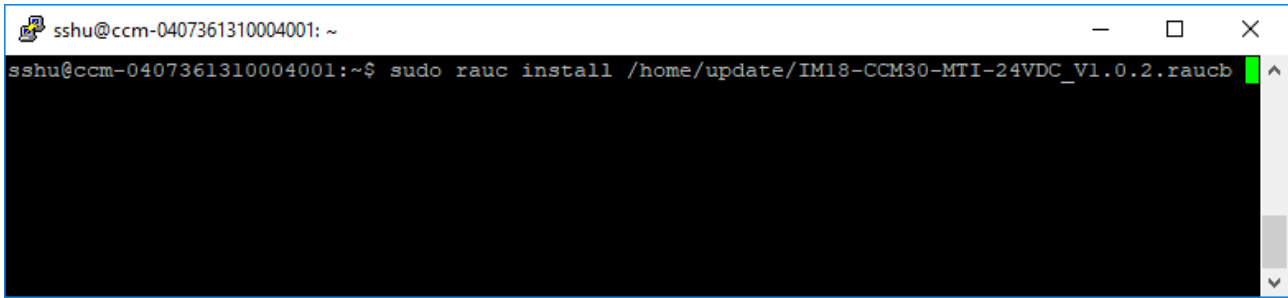


Fig. 18: PuTTY configuration

- ▶ Log into the device with user name "ssh" (password: "P@ssw0rd12ssh!"). The password entry is not shown in PuTTY.
- ▶ Carry out the update with the command `sudo rauc install /home/update/[file name].raucb`.

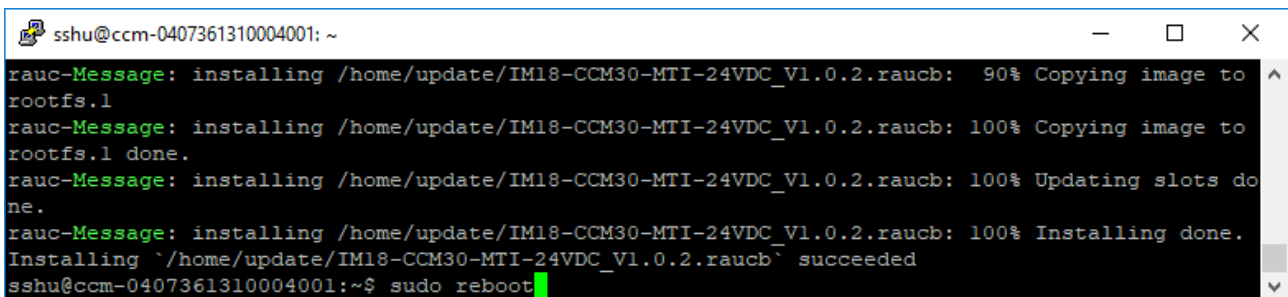
**Example:** `sudo rauc install /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb`



```
ssh@ccm-0407361310004001: ~  
ssh@ccm-0407361310004001:~$ sudo rauc install /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb
```

Fig. 19: PuTTY – starting the firmware update

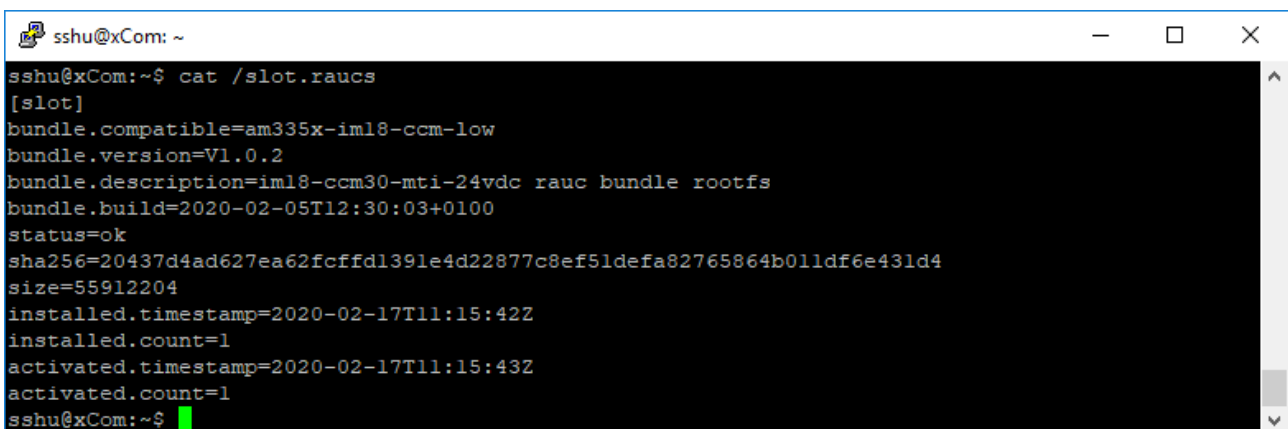
- ▶ Wait until the message `Installing `Path/To/Your/File/file.raucb` succeeded` is displayed.
- ▶ Restart the device with the `sudo reboot` command.



```
rauc-Message: installing /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb: 90% Copying image to rootfs.1  
rauc-Message: installing /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb: 100% Copying image to rootfs.1 done.  
rauc-Message: installing /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb: 100% Updating slots done.  
rauc-Message: installing /home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb: 100% Installing done.  
Installing `/home/update/IM18-CCM30-MTI-24VDC_V1.0.2.raucb` succeeded  
ssh@ccm-0407361310004001:~$ sudo reboot
```

Fig. 20: PuTTY – restarting the device

- ▶ Check the current firmware status, e.g. read out via PuTTY directly from the partition:  
`cat /slot.raucs`
- ⇒ The line `bundle.version=V1.0.2` in the output shows the current version number.



```
ssh@xCom: ~  
ssh@xCom:~$ cat /slot.raucs  
[slot]  
bundle.compatible=am335x-impl8-ccm-low  
bundle.version=V1.0.2  
bundle.description=impl8-ccm30-mti-24vdc rauc bundle rootfs  
bundle.build=2020-02-05T12:30:03+0100  
status=ok  
sha256=20437d4ad627ea62fcffd1391e4d22877c8ef51defa82765864b011df6e431d4  
size=55912204  
installed.timestamp=2020-02-17T11:15:42Z  
installed.count=1  
activated.timestamp=2020-02-17T11:15:43Z  
activated.count=1  
ssh@xCom:~$
```

Fig. 21: PuTTY - reading out the firmware version of 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 figures.

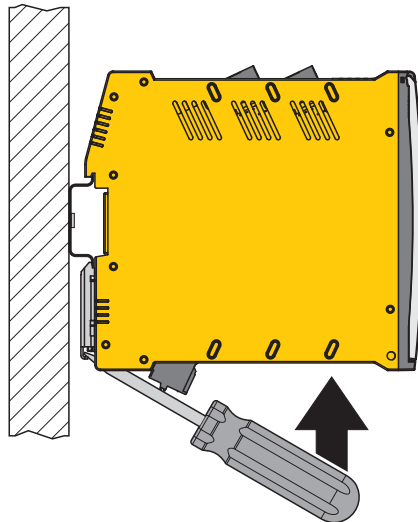


Fig. 22: Undo the device with the screwdriver

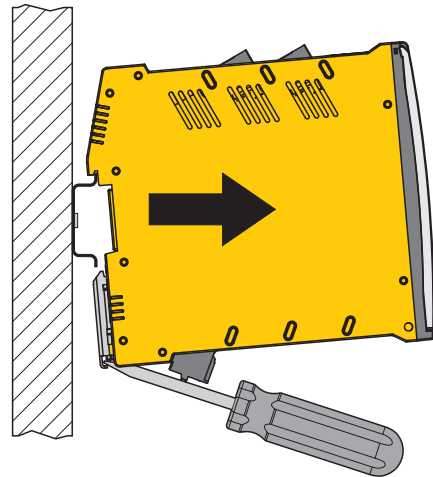


Fig. 23: Remove the device from the DIN rail

## 14 Disposal



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

## 15 Technical data

Technical data	IM18-CCM50-MTI/24VDC
ID	100022405
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 terminals, 2-pin
Terminal cross-section	≤ 2.5 mm <sup>2</sup>
GPIO inputs	Number: 2
	Signal voltage High signal: 12...30 V
	Signal current High signal: 2.5...6.5 mA
	Signal voltage Low signal: 0...5 V
	Signal current Low signal: 0...1.0 mA
	No potential isolation
GPIO outputs	Number: 2
	Voltage drop to U <sub>B</sub> U <sub>B</sub> < 1.6 V at 100 mA U <sub>B</sub> < 2.5 V at 200 mA
	Output current: < 200 mA
	Output type: Push-pull
	Short-circuit proof, no potential isolation
Analog current input	Measuring range: 0...35 mA
	Input current: < 50 mA
	Input resistance: < 125 Ω
	Accuracy: < ±2 % at 25 °C ambient temperature
	Limit frequency: 20 Hz (-3 dB)
	Measured value display: 12-bit full range
	12-bit ADC resolution
Analog voltage input	Measuring ranges: 0...5 V/0...10 V/0...20 V
	Max. input voltage: 35 V
	Input resistance: > 100 kΩ
	Accuracy: < ±2 % at 25 °C ambient temperature
	Limit frequency: 20 Hz (-3 dB)
	Measured value display: 12-bit full range
	12-bit ADC resolution
Relay	Voltage: ≤ 48 V
	Current: 0.5 V
	Switching cycles: > 100000

Technical data	IM18-CCM50-MTI/24VDC
USB Host interface	Type: USB 2.0 high-speed (480 Mbps), type A socket, power supply of a connected USB device possible Output voltage: 5 V ± 10 % Output current: ≤ 0.5 A Cable length: ≤ 2 m
Type of protection	IP20
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 × 100 Mbit Ethernet (ETH1) 1 × CAN/RS485 2 digital inputs or outputs 2 analog inputs 1 × relay with changeover function
HMI	1 × RGB LED 2 × RG LEDs
Sensors	1 × distance sensor 1 × temperature and air humidity sensor
Operating system	Debian
Microprocessor	AM3358BZCZA100 (TI Sitara, 32-Bit ARM Cortex-A8)
RAM	8 Gbit 1 GB DDR3L
Flash	8 GB eMMC

Contains Open Source Software: See /licenses

## 16 Turck subsidiaries — contact information

<b>Germany</b>	Hans Turck GmbH & Co. KG Witzlebenstraße 7, 45472 Mülheim an der Ruhr <a href="http://www.turck.de">www.turck.de</a>
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<b>Italy</b>	TURCK BANNER S.R.L. Via San Domenico 5, IT-20008 Bareggio (MI) <a href="http://www.turckbanner.it">www.turckbanner.it</a>

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