

CMTS 1-00N | CMTS 2-00N

Cable Modem Termination System

Operation instructions



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WARNING

- Observe the safety instructions supplied with the device! They are also available at the following Internet address:
https://download.axing.com/BAs/Sicherheitshinweise_9sprachig.pdf
- Use the device only as described in these operating instructions and in particular in accordance with the state of the art. If the device is used for other purposes, no warranty will be assumed!



Herewith AXING AG declares that the marked products comply with the valid guidelines.

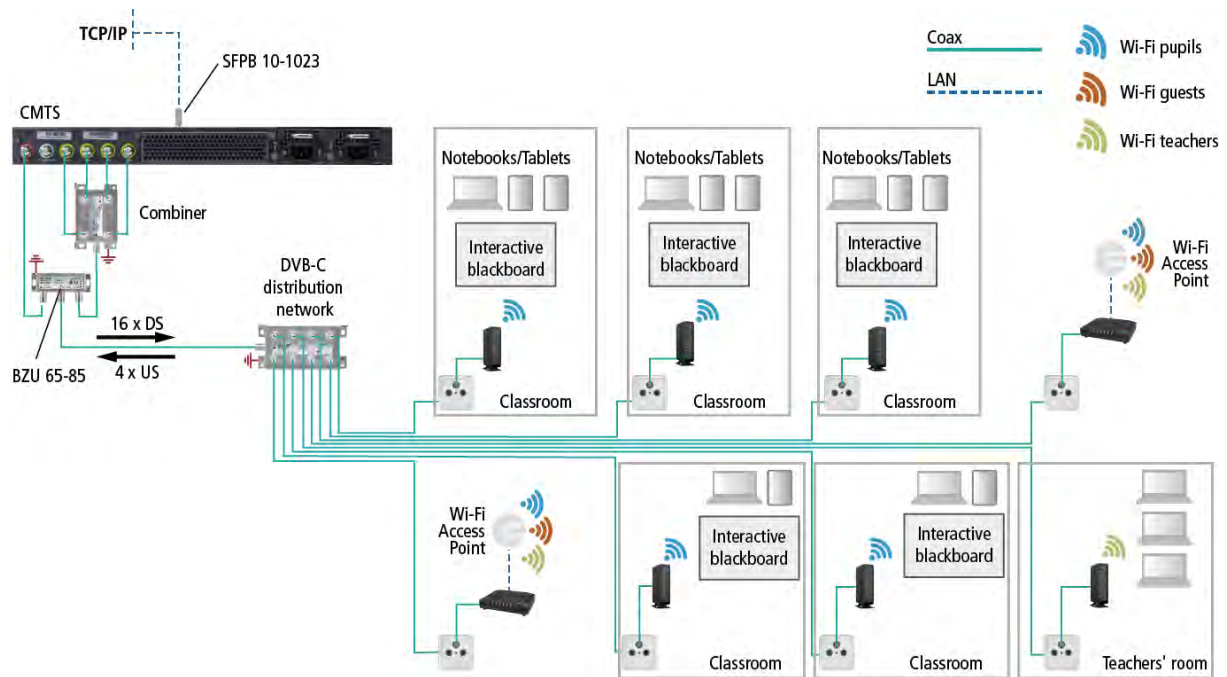


WEEE Nr. DE26869279 | Electrical and electronic components must not be disposed of as residual waste, it must be disposed of separately.

1. Product description

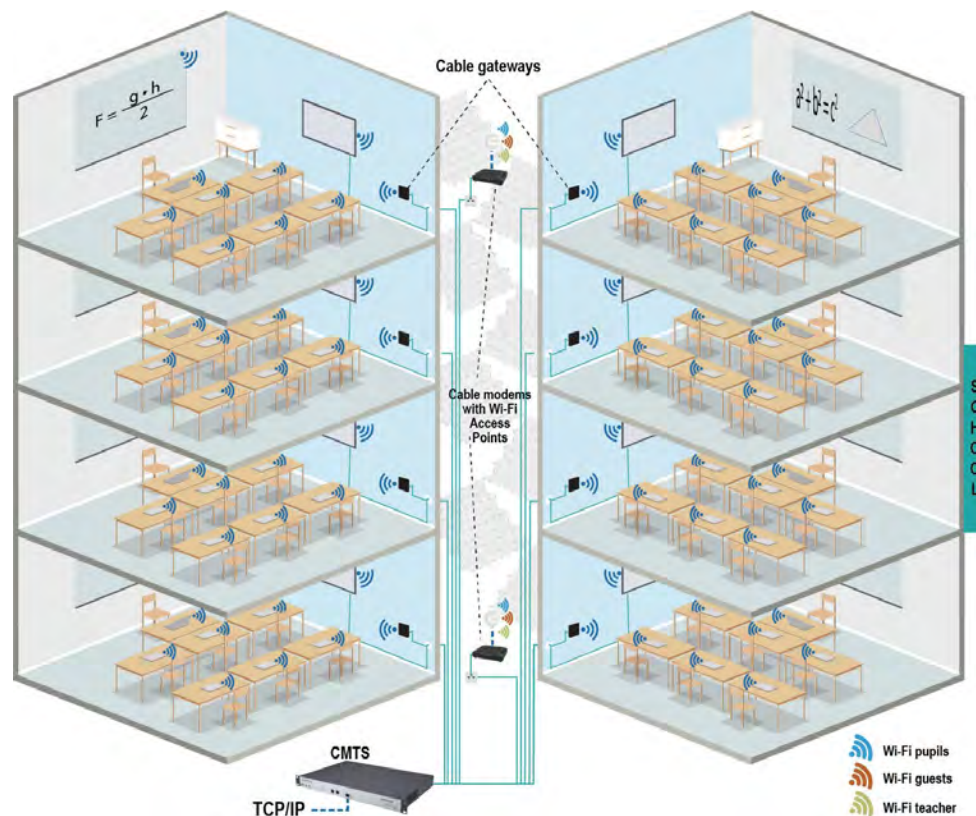
1.1. General

The CMTS 1-00N establishes the connection to the Internet backbone for up to 252 modems. The downstream modulator adds the data coming from the Internet onto one or more carriers and sends the data to the cable modem. The upstream demodulator receives the data sent from the cable modem to the CMTS. Upstreams and downstream are merged or separated for the distribution network via a diplexer BZU 65-85. The CMTS translates between TCP/IP and DOCSIS and controls the data traffic and quality of service (QoS).



DOCSIS2.0 or DOCSIS3.0 modems are supplied via downstream and upstream channels. Such cable modems then provide access points for Internet and data services via Ethernet and WiFi. High-performance WiFi access points, switches and other network technology can also be connected to such a modem. TV and radio are transmitted as usual via the same coaxial cable.

1.1.1. Application examples – CMTS solution for a school



IP services are fed into the cable system via the CMTS. Internet access is then provided by the DOCSIS cable modems and gateways. With the help of additional WiFi access points, demand-oriented networks can be created for all areas in your school, e.g. for pupils, for guests or for administration/teachers.

Any additional or possible television supply that may be required is provided via a cable connection, via a headend with SAT reception or also via an existing SAT IF installation.

Similar solutions are also feasible for residential homes, hospitals, student residences and many more.

1.2. Scope of delivery

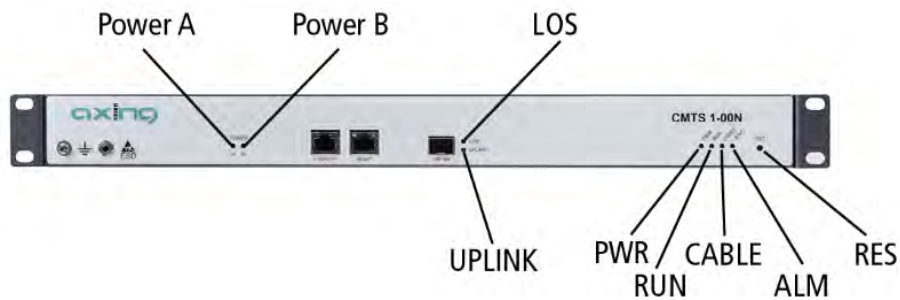
- 1 × CMTS 1-00N or CMTS 2-00N Cable Modem Termination System
- 1 × AC power cord
- 1 × Grounding cable
- 1 × Network cable
- 4 × Cage nut and mounting screw
- 1 × Quick start guide

1.3. Available Accessories

- BZU 65-85 Diplexer 65/85 MHz
- CZU 2-00 Additional power supply unit
- CZU 3-00 Startup kit with accessories for CMTS
- SFPB 10-1023 Bidirectional SFP+ Transceiver 10G | 10 km | TX 1270 nm | RX 1330 nm
- SFPB 10-1032 Bidirectional SFP+ Transceiver 10G | 10 km | TX 1330 nm | RX 1270 nm

1.4. Display elements and connectors

1.4.1. LEDs at front side

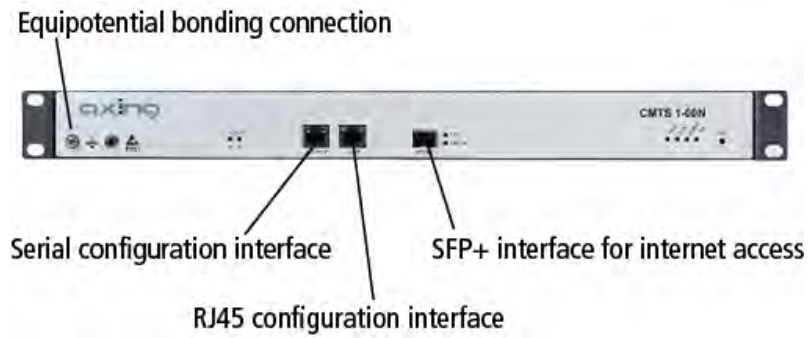


LED	Description
PWR A	On: The power supply unit A is working correctly. Off: The power supply unit A is not working correctly.
PWR B	On: The power supply unit B is working correctly. Off: The power supply unit B is not working correctly.
LOS	Off: Signal quality OK. On: Loss of signal.
UPLINK	On: There is a hardware connection to the connected router or switch. Off: No connection.
ALM	On (red): If an a failure has occurred.
PWR	On: The power supply is normal. Off: The power supply is of or voltage to low.
RUN	Green blinking: CMTS initialisation is in progress. Permanently lit green: CMTS initialisation is complete.

The meaning of the LED **CABLE** and the LED **ALM** are interrelated:

CABLE	ALM	Description
Blinking with 0,5 Hz	Off	DHCP complete
	On	DHCP failure
1 Hz	Off	Descriptor file uploaded successfully
	On	Failure when uploading the descriptor file
2 Hz	Off	Software update successfully
	On	Failure during software update
4 Hz	Off	Loading the configuration successfully
	On	Failure when loading the configuration
An	Off	Zero config successfully
An	On	Failure at zero config

1.4.2. Connectors at front side



1.4.3. Connectors at rear side



2. Mounting and Installation

- Installation must be performed by authorized and skilled electricians only.
- The headend must only be operated indoors.
- Before mounting and installation, pull the mains plug!
- The DVB-C network must be installed and grounded according to the EN 60728-11 standard.
- Install the device in compliance with the safety regulations defined by the EN 60728-11 standard.

2.1. Mounting in a 19" rack

Notes:

- In order to allow sufficient heat dissipation, there must be sufficient space (more than 10 cm) at the fan inlet on the back of the device.
- There must also be at least 5 cm free space in front of the unit.
- If necessary, there should be space underneath the unit to route the connected cables to the rear.



- Slide the device into the 19 " rack.
- Screw the device with four screws (1).
- Install the device in compliance with the safety regulations defined by the EN 60728-11 standard.

2.1.1. Removing the 19" mounting brackets

If the device is not installed in a 19" rack, the mounting brackets can be removed.

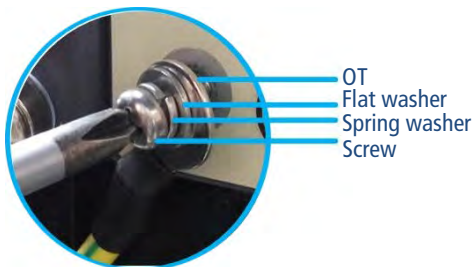


- Remove the two screws of each mounting bracket counterclockwise.
- Keep the mounting brackets and screws for later use.

2.2. Equipotential bonding

- ➔ The device must be connected to the equipotential bonding according to EN 60728-11. Use the equipotential bonding connection at the device.

Equipotential bonding connection



- ➔ Remove the ground screw, spring washer, and flat washer anticlockwise using a magnetic Phillips screwdriver.
- ➔ Insert the ground screw into the spring washer, flat washer, and one OT terminal of the ground wire successively, secure it to the CMTS 1-00N clockwise using a Phillips screwdriver, and then connect the other OT terminal to the ground point of the cabinet, rack, or mounting platform.
- ➔ To connect the outer conductor of the coaxial cable to the equipotential bonding, use e.g. QEW earthing angles or CFA earth connection blocks at the inputs and output.

2.3. Power Supply

The units have a power supply unit as standard.

- Connect the device to a mains socket using the enclosed mains cable.

2.3.1. Installing an additional power supply unit

An additional power supply unit CZU 2-00 can be built into the CMTS. If both power supply modules work properly, you can replace one of them during operation.

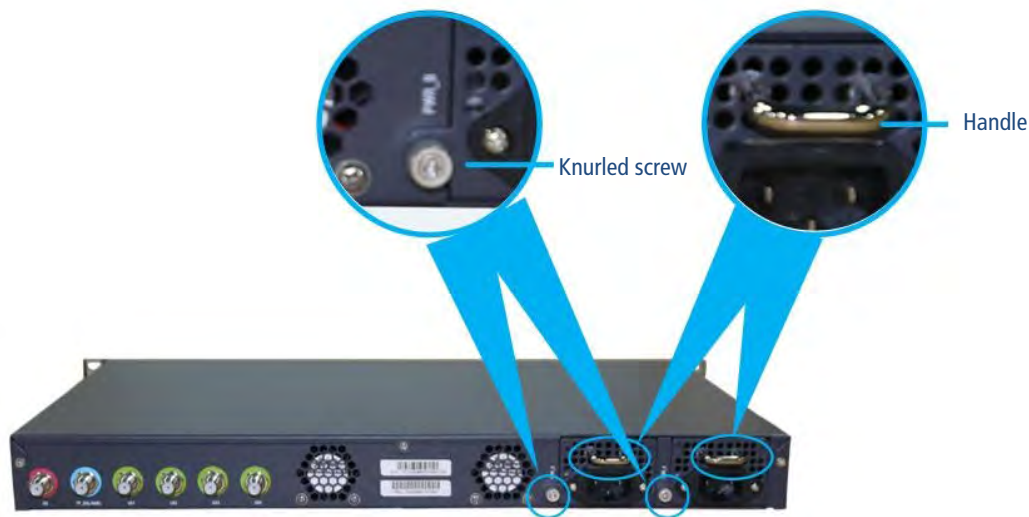


WARNING

- Do not replace the power supply module during operation if only one power supply module is installed.
- The installation or replacement of a power supply module must be carried out only by a professional in accordance with the applicable directives. In case of incorrect installation, no liability is assumed.
- Do not touch any conductors, terminals or parts marked with a sign for dangerous voltage to avoid injury and damage.

2.3.1.1. Steps for mounting

- Remove the additional power supply unit from the packing carton and verify that the model and specification are correct.
- Unscrew the cover plate for the additional power supply unit on the CMTS.
- Hold the additional power supply unit by its handle with one hand, hold the underside of the unit with the other hand and slowly slide it onto the guide rails until the fixing screw touches the threaded holes on the chassis.
- Tighten the screw.
- Connect both power supply units to mains sockets (100 ... 240 VAC / 50 ... 60 Hz).



2.3.1.2. Removing a power supply module

Removing a power supply module is done in reverse order of installation.

2.4. SFP+ interface 10 GE for internet access

The CMTS has an SFP+ interface on the front. A corresponding SFP+ module (Enhanced Small Form-factor Pluggable) is required for connection to the Internet.

There are a large number of SFP+ modules on the market with different interfaces (Ethernet with RJ45, fibre optic with LC/UPC in single or dual fibre technology, etc.).

For the optical connection to a switch, we recommend the SFPB 10-1023 or SFPB 10-1032 modules from AXING.

2.4.1. Installing an SFP+ module

- Only unpack the SFP+ module immediately before installation.
- Do not touch the connections on the back of the module.
- Insert the module into the CMTS with the connections facing downwards until you feel it click into place.

2.4.2. Installing the optical module



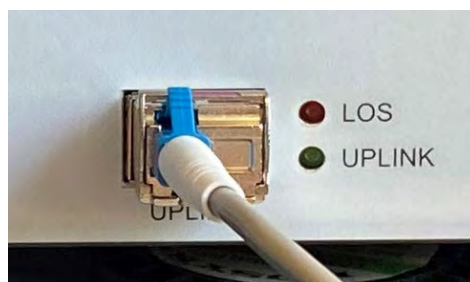
Laser radiation is invisible to the human eye.



- Direct eye exposure to laser beam may cause physical damage.
- When performing work on the optical distribution network, make sure that the lasers of the connected transmitter have been switched off by disconnecting the mains plug.
- Do not open the unit or tamper with it! Under no circumstances should you look inside the optical connectors either with the naked eye and/or optical instruments! This can prove seriously harmful to your health. Laser radiation is invisible to the human eye.
- This unit may be only be operated by personnel who have received the necessary training in handling optical and electrical devices and have been instructed in the safety rules for handling lasers.

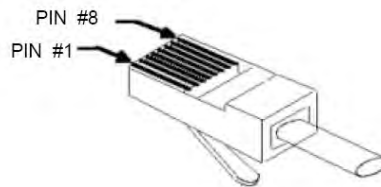
2.4.2.1. Connecting optical fibers

- Do not remove the protective caps from the LC/UPC connector and SFP+ module until immediately before connecting the fibre optic cable.
- Keep the protective caps.
- Insert the LC/UPC connector into the socket of the SFP+ module until it clicks into place.



2.5. RJ45 configuration interface MGMT

A Cat.5 cable with RJ45 connectors is used for the RJ45 configuration interface.



- ➔ Insert a plug into the RJ-45 socket of the Ethernet interface of the PC or switch.
- ➔ Insert the other plug into the RJ-45 socket of the RJ45 configuration interface **MGMT**.

2.6. Serial configuration interface Console

For a serial connection between PC and CMTS an 8-wire shielded cable with RJ-45 male and Sub-D 9 female connector is used.



RJ45	Signal	Sub-D 9	Signal
1	RTS	8	CTS
2	DTR	6	DSR
3	TXD	2	RXD
4	SG	5	SG
5	SG	5	SG
6	RXD	3	TXD
7	DSR	4	DTR
8	CTS	7	RTS

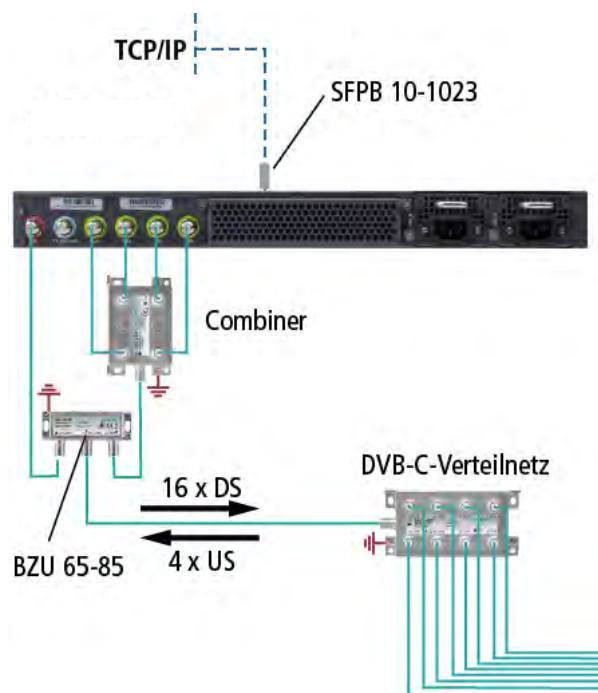
- ➔ Insert the Sub-D 9 socket into the serial port of the PC.
- ➔ Insert the RJ-45 connector into the serial configuration interface **Console** on the CMTS.

2.7. RF connections

→ Use highly shielded coaxial cables with F-connectors.



- Connect the upstream connections with a suitable combiner. For example, use a reverse-operated 4-way splitter (AXING BVE 4-01P or BVE 4-02P).
- Connect the combiner and the downstream connection with the help of a diplexer BZU 65-85.
- Connect the diplexer to the existing DVB-C distribution network.



2.8. Marking cables and bundling cables

After installation and to facilitate future maintenance work, make sure to mark the connected cables.

Make sure that fiber optic cables, configuration cables and power cables are laid separately.

Do not bundle fiber optic cables with wire clamps. Use Velcro straps or cable ties instead. The bundled cables must be laid without twisting or severe bending.

3. Powering on the CMTS 1-00N

This section includes checking before switching on and checking the display after switching on.


WARNING

Make sure that the CMTS is switched off before checking the installation to avoid injury and damage.

3.1. Checks before switching-on

After the installation is complete, check the following items:

- The CMTS is correctly connected to the equipotential bonding.
- The mains cable(s) is/are connected to the mains socket.
- The diameters of the mains cable and grounding cable are in accordance with the technical design document and requirements.
- The mains cable and the grounding cable are made entirely of copper core materials and are intact and without damage to the sheath.
- The mains cable and the earthing cable are correctly laid, and there is an appropriate cable reserve.
- The mains cable and the grounding cable and signal cables are laid separately.

3.2. Checking the installation

Interface	Inspection item	Inspection standard
Uplink interface	Uplink interface to connect the GE/PON module	Check that the module is properly inserted in the SFP+ interface GE .
	Connection status of the uplink GE/PON interface	Check that the GE indicator is normal.
	Check whether the Rx power and Tx power of the uplink GE/PON interface module are within the rated range (vary depending on the optical module specifications).	Measure the value with an optical power meter and check that the Rx power and Tx power of the uplink GE/PON interface are within the rated range.
Radio frequency (RF) interface	Downstream channel frequency	Measure the downlink channel frequencies using a spectrum analyzer and check that each channel is enabled and the channel frequency complies with the planned value.
	Downstream output level	Measure the output level of the enabled downstream channels using a spectrum analyzer and check that the output level complies with the planned value.
	MER of the downstream channels	Measure the MER of the enabled downstream channels using a spectrum analyzer and check that the MER complies with the planned value.
	Upstream channel frequency	Check that the cable modems comes online normally, the channels are enabled, and the channel frequency complies with the planned value.
	SNR of the enabled uplink channel	Check that the CM comes online normally by commands conducted over the CC8800D.
	Check the preset value of radio-frequency power for each enabled uplink channel (the CM comes online normally).	Measure the output level of the enabled upstream channels and check that the cable modems comes online normally by commands conducted over the CMTS.

4. Configuration

The CMTS 1-00N supports user configuration by local and remote login in the following methods:

- Out-of-band management interface **MGMT**
- Serial **Console** interface

4.1. Configuration with the Web Interface

Web access is available for operation with a graphical user interface. This allows you to log in to the CMTS and configure the necessary parameters. The CMTS supports Windows/Android/IOS based HTTP browsers.



- ➔ Connect the PC to the RJ-45 Ethernet connection **MGMT**.
- ➔ Enter the device IP address (e.g. `http://192.168.0.10`) in the address bar of the browser and press Enter.
The login dialogue will appear.



- ➔ Enter the factory default user name admin and the password admin (change user name and password after the first commissioning).
- ➔ Click **Login**.
The start page opens.

Use the button with the question mark to open the online help for the configuration.

4.2. Configuration with command lines

4.2.1. TELNET or SSH via RJ45 configuration interface MGMT

The notebook is connected to the configuration interface **MGMT** of the CMTS 200 via a crossover network cable.

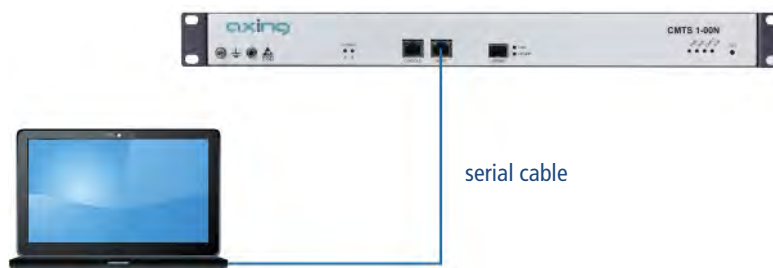


The configuration interface **MGMT** supports TELNET and SSH clients. For configuration, a terminal emulation software (such as the HyperTerminal of Windows) is necessary, which you may have to install on your PC. For details on how the terminal emulation software works, refer to its operating manual or online help.

The default IP address of the interface is 192.168.0.10.

4.3. Access via the serial configuration interface Console

The PC is connected via a serial cable to the configuration interface **Console** of the CMTS.



The serial configuration interface **Console** supports a serial consol. For configuration, a terminal emulation software (such as the HyperTerminal of Windows) is necessary, which you may have to install on your PC. For details on how the terminal emulation software works, refer to its operating manual or online help.

Required interface parameters:

- Baud rate = 115200
- Data bit = 8
- Verification method = None
- flow control mode = None
- Stop bit = 1

Log in to the CMTS 1-00N over the Console interface using the terminal emulation software and then make the basic configurations.

4.3.1. Command line operation

After connecting to the CMTS 1-00N over the TELNET, SSH, or HyperTerminal, the following information will be displayed.

```
*****  
*  
* AXING AG, Switzerland CLI . *  
* Copyright 2020, All rights reserved by AXING AG, Switzerland *  
*  
*****  
User Access Verification
```

You need to enter the user name and password which are set to admin by default.

```
User Access Verification  
  
Username: admin  
Password: *****  
AXING CMTS 2-00> █
```

5. Maintenance

5.1. Cleaning the fan filter

There is a cover with a filter in front of the fans. This should be cleaned frequently depending on the degree of pollution in the environment.



- Open the two knurled screws on the top of the fan cover.
- Fold the cover away to the rear.
- Clean the filter of the fan, e.g. by vacuuming off debris and dust.
Under no circumstances use liquids for cleaning.
- Replace the cover and retighten the two knurled screws.

6. Technical data

Type	CMTS 1-00N	CMTS 2-00N
Max. number of modems in the network	256	512
Downstream		
Number of channels	16	32
Data rate	800 Mbps	1600 Mbps
Frequency range	87 ... 1002 MHz	
Channel bandwidth	6 MHz / 8 MHz	
Modulation	QAM64, QAM256	
Output level	43 dBmV = 103 dB μ V @ 16 chs 46 dBmV = 106 dB μ V @ 8 chs 49 dBmV = 109 dB μ V @ 4 chs 52 dBmV = 112 dB μ V @ 2 chs 55 dBmV = 115 dB μ V @ 1 ch	40 dBmV = 100 dB μ V @ 32 chs 43 dBmV = 103 dB μ V @ 16 chs 46 dBmV = 106 dB μ V @ 8 chs 49 dBmV = 109 dB μ V @ 4 chs 52 dBmV = 112 dB μ V @ 2 chs 55 dBmV = 115 dB μ V @ 1 ch
MER	≥ 39 dB @ Equalizer off ≥ 43 dB @ Equalizer on	
Upstream		
Number of channels	4	8
Data rate	120 Mbps	240 Mbps
Frequency range	5 ... 65 MHz	
Channel bandwidth	1.6 MHz / 3.2 MHz / 6.4 MHz	
Reception level range	-7...+23 dBmV @ 6.4 MHz -10...+20 dBmV @ 3.2MHz -13...+17 dBmV @ 1.6MHz	
Demodulation	QPSK, QAM16, QAM32, QAM64	
Interfaces		
Internet	1 \times 10GE SFP+	
Ethernet connectors (LAN)	1 \times RJ45	
Ethernet standards	IEEE 802.3ah, 1000 Base-T	
Serial	1 \times 115200 bps	
Connectors		
Connector type	F-female	
Return loss	≥ 13 dB	
General		
Operating voltage	90...264 VAC 47...63Hz	90...264 VAC 47...63Hz
Power consumption	50 W	70 W
Operating temperature range	0 ... +40°C	
Operating humidity (non-condensing)	10 ... 90%	
Dimensions (W \times H \times D) appr.	483 \times 44 \times 300 mm	
Weight	4.50 kg (with one power supply unit)	

