

# **CMU 100 100Base-TX to 100Base-FX Converter User Manual**

**CMU 100 / 1.E.F - 0**  
**CMU 100 / 7.E.F - 0**



|                 |                     |                  |              |              |
|-----------------|---------------------|------------------|--------------|--------------|
| <i>Company:</i> | <i>Device:</i>      | <i>Document:</i> | <i>Code:</i> | <i>Date:</i> |
| Ediseja 21      | CMU 100 / 1.E.F - 0 | User manual      | CMUMU1EF     | 01.09.2019   |

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# 1 PREFACE

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## Liability statement

We have checked the contents of this manual to ensure that the descriptions of both hardware and software are as accurate as possible. However, deviations may occur so that no liability can be accepted for any errors or omissions contained in the information given.

The contents of this manual will be checked in periodical intervals, corrections will be made in the following editions.

We reserve the right to make technical improvements without notice.

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## Copyright

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## Explanation of the symbols



Read the instructions!



Device was tested with 2,5 kV AC voltage to check the device insulation.



Device ground terminal.



Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC; the affixed product label indicates that you must not discard this electrical/electronic product in domestic household waste.

## Warnings

In this paper the following terms are used:

### Danger

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

| Company:   | Device:             | Document:   | Code:    | Date:      | Page: |
|------------|---------------------|-------------|----------|------------|-------|
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Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken. This particularly applies to damage on or in the device itself.

**General information**

These paper contain the information that is necessary for the proper and safe operation of the described devices. This paper is intended for technically qualified personnel.

**Warning!**

**Hazardous voltage is present inside the device during operation. Disregarding of safety rules can result in severe personal injury or property damage.**

**Only qualified personnel may work with described devices after being familiar with warnings and safety notices in this paper and other safety regulations.**

**Warning!**

**Device must operate completely assembled! Device must be used as described. No modifications of the device should be made.**

**Warning!**

**Do not open device while it is energized! Hazardous voltage is present inside the device. Disconnect all connectors before opening!**

**Warning!**

**If device is damaged disconnect it from power supply! Send it to the manufacturer for inspection.**

**Warning!**

**Connect to earth before attaching power supply!**

## 2 CMU 100 SYSTEM

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### 2.1 DESCRIPTION

Communication unit (CMU 100) is modular system of communication devices that can be used for various of tasks such as:

- ◆ communication converter (for example RS232 to RS485)
- ◆ star coupler (for example 1 fiber optic to 7 fiber optics)
- ◆ repeater (for example RS485/485)
- ◆ communication isolator (for example for preventing ground loops)
- ◆ communication listener - debugger
- ◆ PC serial com port extender (for example USB to 4 serial com)

CMU 100 device is a couple of software and hardware. For different purposes, different software versions and different hardware configuration have been developed.

#### 2.1.1 SOFTWARE

Software is application dependent and allows different hardware configurations. Software's task is switching between communication ports and allows almost any combination between them.

#### 2.1.2 HARDWARE

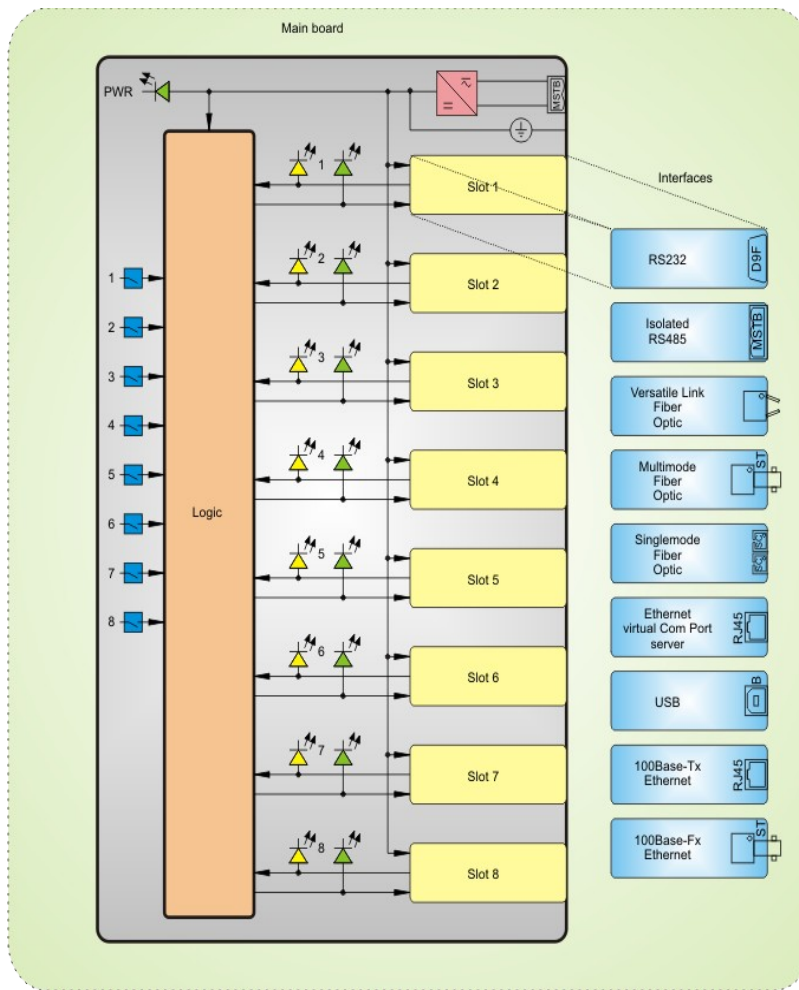
Hardware is based on main board with power supply and port switching logic. On that board, interface boards are attached. CMU 100 can handle up to 8 different interface boards. Currently available interface boards:

- ◆ RS232
- ◆ isolated RS485
- ◆ Multimode Fiber Optic with ST and SMA connectors
- ◆ Singlemode Fiber Optic with SC connectors
- ◆ Versatile Link Fiber Optic
- ◆ USB
- ◆ ethernet (with one virtual com port)

Housing is aluminium and intended for mount on standard DIN 35 rail (acc. to DIN EN 50022). 3 different housings have been made. Depends on how many interfaces device has, appropriate housing is used.

##### **Hardware settings**

All settings on the device can be made from outside by a DIL switch. It is not necessary to open the housing.



Picture 1: CMU 100 system general diagram

### 3 100BASE-TX TO 100BASE-FX CONVERTER

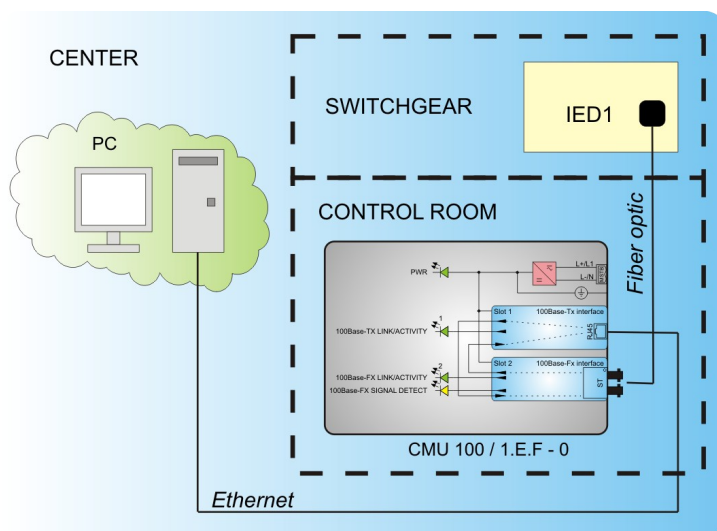
#### 3.1 DESCRIPTION

This device allows communication between two devices with different communication interfaces. It contains one 100 Mbit/s 1300 nm wave length multimode fiber optic and one RJ45 connector ethernet interface. Data is send from 1300 nm wave length multimode fiber optic to ethernet and vice versa.

Wide power supply voltage allows connection to all common station batteries. Additionally it can be also connected to standard AC voltages.

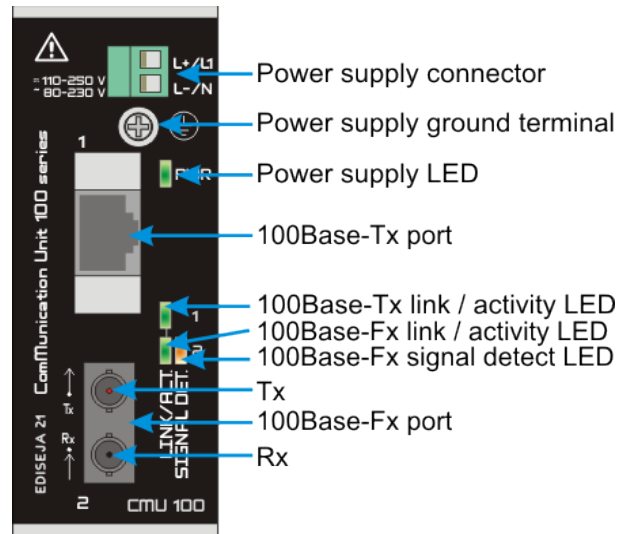
This device is intended for use in cubicles and cabinets in all kinds of power production, transmission and distribution stations. It requires no maintenace. All normaly used connectors, switches and light indicators are accessed at the front side of the device. One light indicator indicates power supply voltage, others indicate communication activity and signal detect.

#### 3.2 TYPICAL APPLICATION



Picture 2: Typical application

### 3.3 APPEARANCE



Picture 3: Front view

### 3.4 HARDWARE DESCRIPTION

This configuration of device is made from main board (power supply, LEDs), one multimode fiber optic interface board and one Ethernet board.

#### 3.4.1 MAIN BOARD

Power LED indicates that device is turned on. The steady link/activity LEDs indicate that link is established on individual port. Blinking link/activity LEDs indicate link activity. Signal detect LED indicates signal on optical port.

##### Ports Configuration

| Port      | 1          | 2          |
|-----------|------------|------------|
| Interface | 100Base-TX | 100Base-FX |

#### 3.4.2 100BASE-TX INTERFACE BOARD

##### Description

100Base-TX (100 Mbit/s) Ethernet port with RJ45 connector for connection to standard Category 5 (CAT-5) unshielded twisted-pair (UTP) cables or CAT-5 shielded twisted-pair (STP) cables. Auto MDI-MDIX function supports standard and crossover cables.

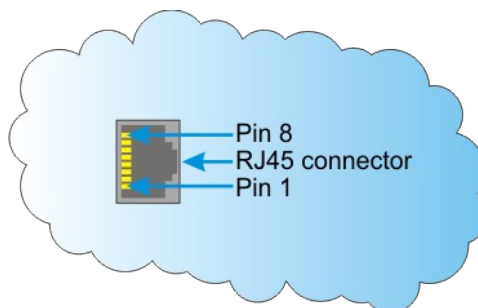
##### LED description

| Page: | Company:   | Device:             | Document:   | Code:    | Date:      |
|-------|------------|---------------------|-------------|----------|------------|
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| Activity LED     |                  |
|------------------|------------------|
| State            | Meaning          |
| Off              | No link detected |
| Green - solid    | Link established |
| Green - blinking | Link activity    |

**RJ45 Ethernet Port Pin Configuration**

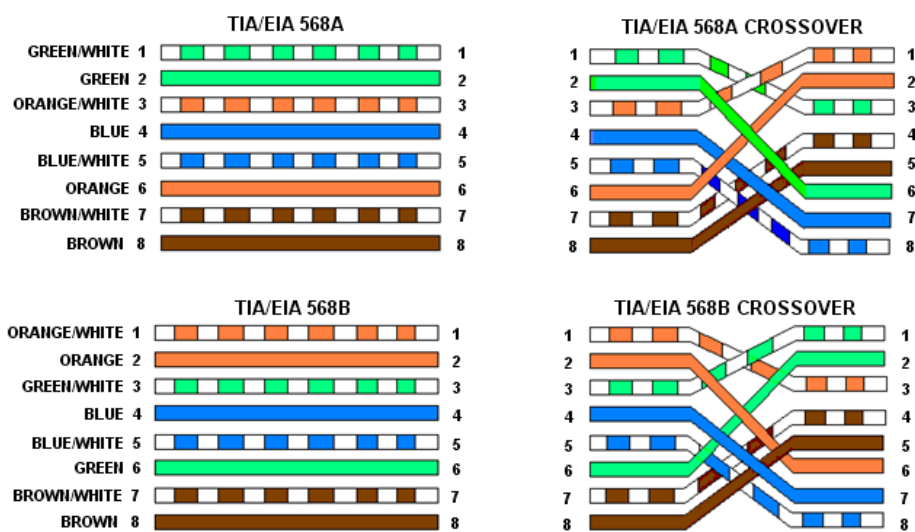
| Signal         | Direction | Contact | Function                              |
|----------------|-----------|---------|---------------------------------------|
| TX+            | Out       | 1       | Differential Ethernet transmit data + |
| TX-            | Out       | 2       | Differential Ethernet transmit data - |
| RX+            | In        | 3       | Differential Ethernet receive data +  |
| Not used       |           | 4       | Terminated                            |
| Not used       |           | 5       | Terminated                            |
| RX-            | In        | 6       | Differential Ethernet receive data -  |
| Not used       |           | 7       | Terminated                            |
| Not used       |           | 8       | Terminated                            |
| Chassis ground |           | Case    |                                       |



*Picture 4: 100Base-TX Ethernet interface board RJ45 connector appearance*

**Cable for connection**

Device can be connected to the LAN switch or to a computer via standard or crossover cable.



Picture 5: Standard and crossover cable configuration

3.4.3 100BASE-FX INTERFACE BOARD

Description

100 Mbit/s, full duplex, 1300 nm multimode fiber optic ethernet port with ST connector according to IEEE 802.3u.

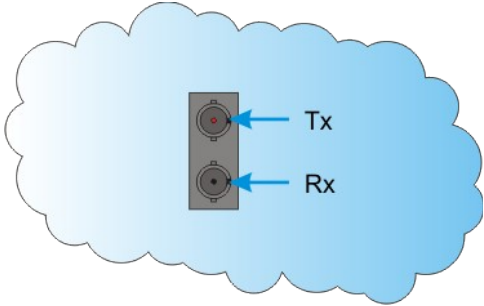
LED description

HARDWARE DESCRIPTION

| Activity LED     |                  |
|------------------|------------------|
| Green - solid    | Link established |
| Green - blinking | Link activity    |

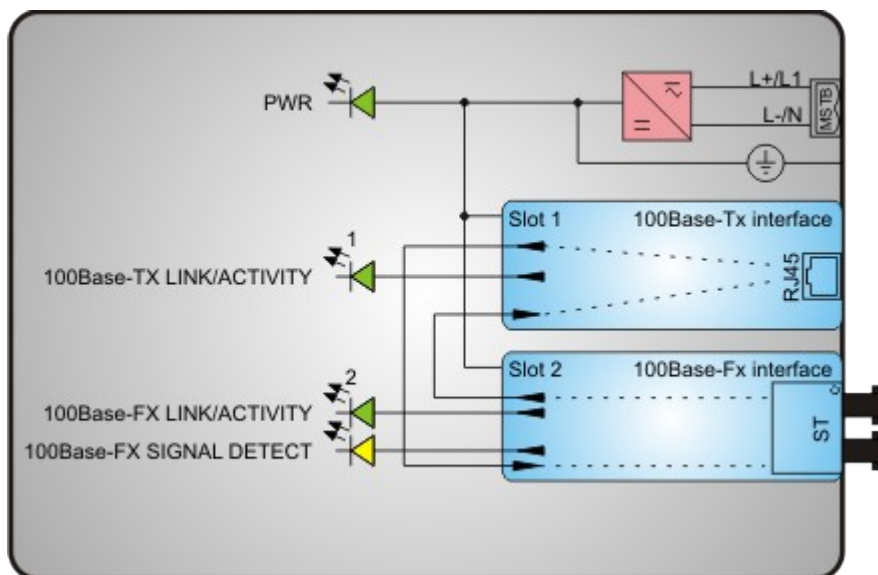
| Signal Detect LED |                 |
|-------------------|-----------------|
| Yellow - solid    | Signal detected |

Connector



Picture 6: 100Base-FX Ethernet interface board appearance

## 4 SCHEMATIC



Picture 7: General diagram

## 5 INSTALLATION

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### 5.1 INSTALLATION

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#### **Warning!**

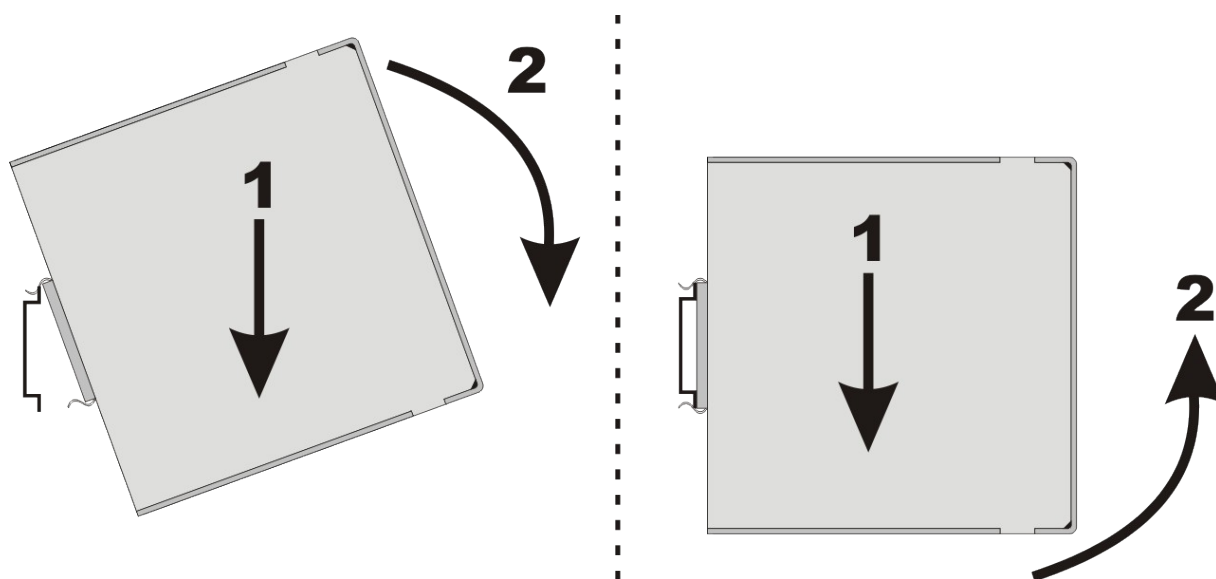
**Hazardous voltage is present inside the device during operation. Disregarding of safety rules can result in severe personal injury or property damage.**

**Only qualified personnel may work with described devices after being familiar with warnings and safety notices in this paper and other safety regulations.**

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#### **Following instruction must be taken into consideration:**

- ◆ The device must be accessible to qualified personnel only.
- ◆ The device is permitted to operate in enclosed housing or cabinet only.
- ◆ The device location must be vibration-free.
- ◆ The admissible operating temperature must be observed.
- ◆ Check the device for damage at unpacking. If device is damaged it must not be installed but it should be send to the manufacturer for repair.
- ◆ The device should not be opened.
- ◆ The device should be mounted on a 35 mm rail (acc to EN 50022).
- ◆ Attach ground wire before attaching power supply. Device must be grounded during operation!
- ◆ Single core or stranded wire 0,5 – 2,5 mm<sup>2</sup> must be used for power supply connection. If stranded wire is used, ferrules must be used to prevent fraying. Recommended stripping lenght is 5 mm.
- ◆ Protective earthing wire must be terminated with tinned copper ear terminal.
- ◆ The prescribed bending radius of the optical fibre cables must be observed.



Picture 8: left. installation, right: deinstallation

## 6 COMMISSIONING & MAINTENANCE

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### 6.1 COMMISSIONING

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#### **Warning!**

Hazardous voltage is present inside the device during operation. Disregarding of safety rules can result in severe personal injury or property damage.

Only qualified personnel may work with described device after being familiar with warnings and safety notices in this paper and other safety regulations.

---

#### **Following instruction must be taken into consideration:**

- ◆ Device must operate completely assembled! Device must be used as described. No modifications of the device should be made.
- ◆ Attach ground wire before attaching power supply. Device must be grounded during operation!
- ◆ Check if the power supply voltage complies with device operation voltage.
- ◆ Do not open device while it is energized! Hazardous voltage is present inside the device.
- ◆ If single mode fiber optic interface is used, do not look into the laser beam.

### 6.2 MAINTENANCE

The device is maintenance-free. Disconnect power supply before cleaning it. Use moist cloth. Do not use liquids.

## 7 TECHNICAL DATA

| Power supply              |                                |                           |                |
|---------------------------|--------------------------------|---------------------------|----------------|
|                           |                                | CMU 100 / 1...            | CMU 100 / 7... |
| Rated voltage             | DC                             | 110 - 250 V               | 48 - 60 V      |
|                           | AC                             | 230 V                     | 48 V           |
| Permissible voltage range | DC                             | 88 - 350 V                | 38 - 72 V      |
|                           | AC                             | 70 - 264 V                | 30 - 50 V      |
| Input current             | DC                             | 0,05 - 0,02 A             | 0,1 A          |
|                           | AC                             | 0,09 A                    | 0,1 A          |
| Fuse (internal)           | 2 A T                          |                           |                |
| Power supply indicator    | green LED marked PWR           |                           |                |
| Voltage dips              | 20 ms                          |                           |                |
| Connector type            | screw type „MSTB“ Phoenix 2pin |                           |                |
| Power Supply Wire         | crossection                    | 0,5 – 2,5 mm <sup>2</sup> |                |
|                           | type                           | single or stranded wire   |                |
|                           | voltage rating                 | 500 V                     |                |
|                           | colour                         | see valid standard        |                |
| Ground wire               | crossection                    | Cu, 2,5 mm <sup>2</sup>   |                |
|                           | colour                         | see valid standard        |                |

| Communication port 100Base-TX (interface type E) |             |
|--------------------------------------------------|-------------|
| Type                                             | ethernet    |
| Direction                                        | full duplex |
| Speed                                            | 100 Mbit/s  |
| Distance                                         | 100 m       |
| Connector type                                   | RJ45        |

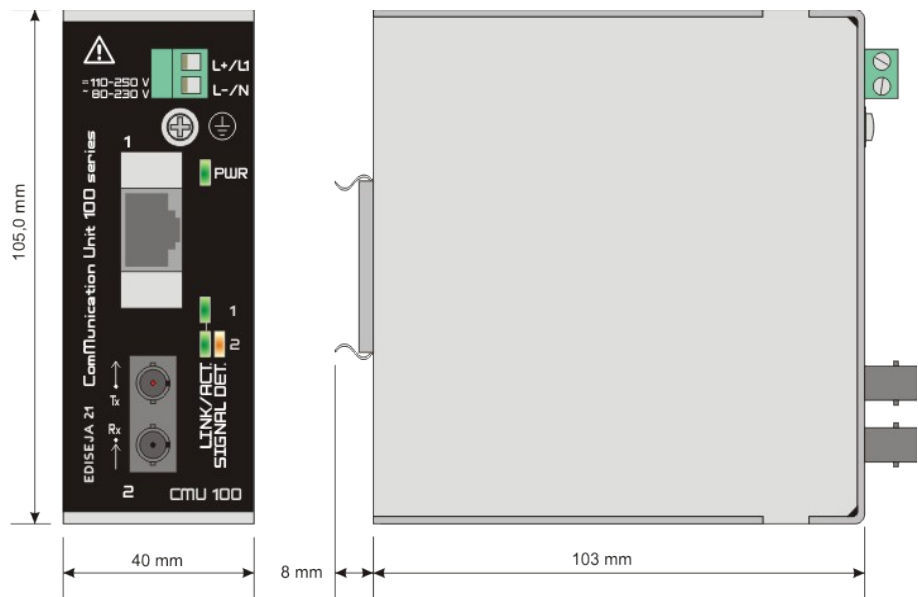
| Communication port 100Base-Fx (interface type F) |                        |
|--------------------------------------------------|------------------------|
| Type                                             | multimode fiber optic  |
| Wave lenght                                      | 1300 nm                |
| Fiber size                                       | 50/125 µm, 62,5/125 µm |
| Optical output power                             | -23 dBm                |
| Reciver sensitivity                              | -35 dBm                |
| Direction                                        | full duplex            |

## TECHNICAL DATA

| Communication port 100Base-Fx (interface type F) |              |
|--------------------------------------------------|--------------|
| <b>Speed</b>                                     | 100 Mbit/s   |
| <b>Distance</b>                                  | up to 2000 m |
| <b>Connector type</b>                            | ST           |

| Other data                  |                                             |                     |       |
|-----------------------------|---------------------------------------------|---------------------|-------|
| Weight                      | approx. 0,3 kg                              |                     |       |
| Dimensions<br>(see picture) | (H)                                         | (D)                 | (W)   |
|                             | 105 mm                                      | 111 mm + connectors | 40 mm |
| Temperature range           | 0 °C to +55 °C                              |                     |       |
| Humidity operating          | up to 95 % (noncondensing)                  |                     |       |
| Enclosure                   | Material                                    | Al                  |       |
|                             | IP                                          | 20                  |       |
| Mount type                  | standard DIN 35 rail (acc. to DIN EN 50022) |                     |       |
| Class                       | I                                           |                     |       |
| Overvoltage category        | II                                          |                     |       |

8 DIMENSIONS



Picture 9: Dimensions

CMU 100 / 

Power supply: DC 110 - 250 V or AC 230 V

Power supply: DC 48 - 60 V or AC 48 V

(Device width: 2 ports - 40 mm, 3 ports - 55 mm, 4 - 8 ports - 85 mm)

|                                                                                          |             |
|------------------------------------------------------------------------------------------|-------------|
| None .....                                                                               | leave empty |
| RS232 noisolated, Rx & Tx support (up to 230 kbit/s, 15 m) .....                         | 1           |
| RS232 nonisolated, Rx & Tx support (custom made: LDU version with rectifiers) .....      | C           |
| RS485 isolated, half duplex (19,2 kbit/s – 115,2 kbit/s, 1200 m) .....                   | 5           |
| RS485 isolated, half duplex (4,8 kbit/s - 38400 kbit/s, 1200 m) .....                    | M           |
| RS485 isolated, half duplex (300 bit/s – 2400 bit/s, 1200 m) .....                       | L           |
| Versatile (650 nm) fiber optic for 1 mm plastic connector (up to 40 kbit/s, 110 m) ..... | P           |
| Multimode (820 nm) fiber optic with ST connector (up to 2,048 Mbit/s, 500 m) .....       | 6           |
| Multimode (820 nm) fiber optic with SMA connector (up to 2,048 Mbit/s, 500 m) .....      | 7           |
| Singlemode (1310 nm) fiber optic with SC connector (up to 2,048 Mbit/s, 20 km) .....     | S           |
| Singlemode (1310 nm) fiber optic with FC connector (up to 2,048 Mbit/s, 20 km) .....     | T           |
| Singlemode (1310 nm) fiber optic with ST connector (up to 2,048 Mbit/s, 20 km) .....     | U           |
| USB (one virtual com port) .....                                                         | 8           |
| Ethernet 10/100Base-TX port server with one virtual com port (100 m) .....               | 9           |
| Ethernet 100Base-TX (to be used with F interface only) (100 m) .....                     | E           |
| Ethernet 100Base-FX multimode (1300 nm. 2000 m) (to be used with E interface only) ..... | F           |

|                                                                      |    |
|----------------------------------------------------------------------|----|
| Converter 2 ports (when Mother Board marked as 1 or 7 is used) ..... | 0  |
| Converter 2 ports, 4 groups (4 independent channels) .....           | 7  |
| Star coupler (1 master, 2 to 7 slaves) .....                         | 12 |
| Star coupler (1 master, 4 to 6 slaves, 1 listener) .....             | 14 |
| Star coupler (2 masters, 2 to 6 slaves) .....                        | 5  |
| Star coupler (3 masters, 3 to 5 slaves) .....                        | 9  |
| Node .....                                                           | 8  |

## Software version ..... leave empty

- power supply cable with „schuko“ plug, 2 m
- RS232 cable to PC (state the length up to 15 m)
- fiber optic cables (state the length)

**List of the most common devices:**

## 2 ports converters

| Port 1 | Port 2 | Detail                                                                    | Type                |
|--------|--------|---------------------------------------------------------------------------|---------------------|
| RS232  | RS485  | 300-2400 bit/s, high voltage power supply                                 | CMU 100 / 1.1.L - 0 |
| RS232  | RS485  | 4800-38400 bit/s, high voltage power supply                               | CMU 100 / 1.1.M - 0 |
| RS232  | RS485  | 19200-115200 bit/s, high voltage power supply                             | CMU 100 / 1.1.5 - 0 |
| RS232  | FO SM  | SC connector, 20 km, high voltage power supply                            | CMU 100 / 1.1.S - 0 |
| RS232  | FO SM  | FC connector, 20 km, high voltage power supply                            | CMU 100 / 1.1.T - 0 |
| RS232  | FO SM  | ST connector, 20 km, high voltage power supply                            | CMU 100 / 1.1.U - 0 |
| RS232  | ETH    | 10/100 Mbit/s, virtual com port, high voltage power supply                | CMU 100 / 1.1.9 - 0 |
| RS485  | FO MM  | high voltage power supply                                                 | CMU 100 / 1.5.6 - 0 |
| RS485  | FO SM  | SC connector, 20 km, high voltage power supply                            | CMU 100 / 1.5.S - 0 |
| RS485  | FO SM  | FC connector, 20 km, high voltage power supply                            | CMU 100 / 1.5.T - 0 |
| RS485  | FO SM  | ST connector, 20 km, high voltage power supply                            | CMU 100 / 1.5.U - 0 |
| RS485  | ETH    | 10/100 Mbit/s, virtual com port, high voltage power supply                | CMU 100 / 1.5.9 - 0 |
| FO MM  | RS232  | high voltage power supply                                                 | CMU 100 / 1.6.1 - 0 |
| FO MM  | FO SM  | SC connector, 20 km, up to 2,048 Mbit/s, high voltage power supply        | CMU 100 / 1.6.S - 0 |
| FO MM  | FO SM  | FC connector, 20 km, up to 2,048 Mbit/s, high voltage power supply        | CMU 100 / 1.6.T - 0 |
| FO MM  | FO SM  | ST connector, 20 km, up to 2,048 Mbit/s, high voltage power supply        | CMU 100 / 1.6.U - 0 |
| FO MM  | ETH    | 500 m, 820 nm, 10/100 Mbit/s, virtual com port, high voltage power supply | CMU 100 / 1.6.9 - 0 |
| ETH TX | ETH FX | 100 Mbit/s, 1300 nm, 2000 m range, high voltage power supply              | CMU 100 / 1.E.F - 0 |

## 3 ports star couplers / converters / nodes

| Master | Slave 1 | Slave 2 | Detail                                                                         | Type                   |
|--------|---------|---------|--------------------------------------------------------------------------------|------------------------|
| RS232  | RS485   | FO MM   | 19200-115200 bit/s, high voltage power supply                                  | CMU 100 / 2.1.5.6 - 12 |
| RS232  | FO MM   | FO SM   | high voltage power supply                                                      | CMU 100 / 2.1.6.S - 12 |
| FO MM  | RS232   | RS485   | 19200-115200 bit/s, high voltage power supply                                  | CMU 100 / 2.6.1.5 - 12 |
| ETH    | RS232   | RS232   | 10/100 Mbit/s, virtual com port, high voltage power supply                     | CMU 100 / 2.9.1.1 - 12 |
| ETH    | RS232   | RS485   | 10/100 Mbit/s, virtual com port, 19200-115200 bit/s, high voltage power supply | CMU 100 / 2.9.1.5 - 12 |
| ETH    | RS485   | FO MM   | 10/100 Mbit/s, virtual com port, 19200-115200 bit/s, high voltage power supply | CMU 100 / 2.9.5.6 - 12 |
| FO SM  | RS232   | RS232   | 20 km, high voltage power supply                                               | CMU 100 / 2.1.1.S - 12 |
| FO SM  | RS232   | RS485   | 20 km, 19200-115200 bit/s, high voltage power supply                           | CMU 100 / 2.1.5.S - 12 |

## ORDERING

| <b>FO SM</b>                             | <b>FO MM</b>     | <b>FO MM</b>                              | 20 km, up to 2,048 Mbit/s, high voltage power supply | <b>CMU 100 / 2.6.6.S - 12</b> |
|------------------------------------------|------------------|-------------------------------------------|------------------------------------------------------|-------------------------------|
| Star couplers, high voltage power supply |                  |                                           |                                                      |                               |
| Master(s)                                | Slaves           | Detail                                    | Type                                                 |                               |
| <b>RS232</b>                             | <b>2 x RS232</b> | RS232 to 2 x RS232                        | CMU 100 / 2.1.1.1 - 12                               |                               |
|                                          | <b>3 x RS232</b> | RS232 to 3 x RS232                        | CMU 100 / 2.1.1.1.1 - 12                             |                               |
|                                          | <b>4 x RS232</b> | RS232 to 4 x RS232                        | CMU 100 / 2.1.1.1.1.1 - 12                           |                               |
|                                          | <b>5 x RS232</b> | RS232 to 5 x RS232                        | CMU 100 / 2.1.1.1.1.1.1 - 12                         |                               |
|                                          | <b>6 x RS232</b> | RS232 to 6 x RS232                        | CMU 100 / 2.1.1.1.1.1.1.1 - 12                       |                               |
|                                          | <b>7 x RS232</b> | RS232 to 7 x RS232                        | CMU 100 / 2.1.1.1.1.1.1.1.1 - 12                     |                               |
|                                          | <b>2 x FO MM</b> | RS232 to 2 x multimode fiber optic        | CMU 100 / 2.1.6.6 - 12                               |                               |
|                                          | <b>3 x FO MM</b> | RS232 to 3 x multimode fiber optic        | CMU 100 / 2.1.6.6.6 - 12                             |                               |
|                                          | <b>4 x FO MM</b> | RS232 to 4 x multimode fiber optic        | CMU 100 / 2.1.6.6.6.6 - 12                           |                               |
|                                          | <b>5 x FO MM</b> | RS232 to 5 x multimode fiber optic        | CMU 100 / 2.1.6.6.6.6.6 - 12                         |                               |
|                                          | <b>6 x FO MM</b> | RS232 to 6 x multimode fiber optic        | CMU 100 / 2.1.6.6.6.6.6.6 - 12                       |                               |
|                                          | <b>7 x FO MM</b> | RS232 to 7 x multimode fiber optic        | CMU 100 / 2.1.6.6.6.6.6.6.6 - 12                     |                               |
| <b>RS485</b>                             | <b>2 x RS232</b> | RS485 to 2 x RS232                        | CMU 100 / 2.5.1.1 - 12                               |                               |
|                                          | <b>3 x RS232</b> | RS485 to 3 x RS232                        | CMU 100 / 2.5.1.1.1 - 12                             |                               |
|                                          | <b>4 x RS232</b> | RS485 to 4 x RS232                        | CMU 100 / 2.5.1.1.1.1 - 12                           |                               |
|                                          | <b>5 x RS232</b> | RS485 to 5 x RS232                        | CMU 100 / 2.5.1.1.1.1.1 - 12                         |                               |
|                                          | <b>6 x RS232</b> | RS485 to 6 x RS232                        | CMU 100 / 2.5.1.1.1.1.1.1 - 12                       |                               |
|                                          | <b>7 x RS232</b> | RS485 to 7 x RS232                        | CMU 100 / 2.5.1.1.1.1.1.1.1 - 12                     |                               |
|                                          | <b>2 x FO MM</b> | RS485 to 2 x multimode fiber optic        | CMU 100 / 2.5.6.6 - 12                               |                               |
|                                          | <b>3 x FO MM</b> | RS485 to 3 x multimode fiber optic        | CMU 100 / 2.5.6.6.6 - 12                             |                               |
|                                          | <b>4 x FO MM</b> | RS485 to 4 x multimode fiber optic        | CMU 100 / 2.5.6.6.6.6 - 12                           |                               |
|                                          | <b>5 x FO MM</b> | RS485 to 5 x multimode fiber optic        | CMU 100 / 2.5.6.6.6.6.6 - 12                         |                               |
|                                          | <b>6 x FO MM</b> | RS485 to 6 x multimode fiber optic        | CMU 100 / 2.5.6.6.6.6.6.6 - 12                       |                               |
|                                          | <b>7 x FO MM</b> | RS485 to 7 x multimode fiber optic        | CMU 100 / 2.5.6.6.6.6.6.6.6 - 12                     |                               |
| <b>FO MM</b>                             | <b>2 x RS232</b> | Multimode fiber optic to 2 x RS232        | CMU 100 / 2.6.1.1 - 12                               |                               |
|                                          | <b>3 x RS232</b> | Multimode fiber optic to 3 x RS232        | CMU 100 / 2.6.1.1.1 - 12                             |                               |
|                                          | <b>4 x RS232</b> | Multimode fiber optic to 4 x RS232        | CMU 100 / 2.6.1.1.1.1 - 12                           |                               |
|                                          | <b>5 x RS232</b> | Multimode fiber optic to 5 x RS232        | CMU 100 / 2.6.1.1.1.1.1 - 12                         |                               |
|                                          | <b>6 x RS232</b> | Multimode fiber optic to 6 x RS232        | CMU 100 / 2.6.1.1.1.1.1.1 - 12                       |                               |
|                                          | <b>7 x RS232</b> | Multimode fiber optic to 7 x RS232        | CMU 100 / 2.6.1.1.1.1.1.1.1 - 12                     |                               |
|                                          | <b>2 x FO MM</b> | Multimode fiber optic to 2 x multimode FO | CMU 100 / 2.6.6.6 - 12                               |                               |
|                                          | <b>3 x FO MM</b> | Multimode fiber optic to 3 x multimode FO | CMU 100 / 2.6.6.6.6 - 12                             |                               |
|                                          | <b>4 x FO MM</b> | Multimode fiber optic to 4 x multimode FO | CMU 100 / 2.6.6.6.6.6 - 12                           |                               |
|                                          | <b>5 x FO MM</b> | Multimode fiber optic to 5 x multimode FO | CMU 100 / 2.6.6.6.6.6.6 - 12                         |                               |
|                                          |                  |                                           |                                                      |                               |

|                         |                  |                                                                                                              |                                        |
|-------------------------|------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------|
|                         | <b>6 x FO MM</b> | Multimode fiber optic to 6 x multimode FO                                                                    | <b>CMU 100 / 2.6.6.6.6.6.6 - 12</b>    |
|                         | <b>7 x FO MM</b> | Multimode fiber optic to 7 x multimode FO                                                                    | <b>CMU 100 / 2.6.6.6.6.6.6.6 - 12</b>  |
| <b>Master(s)</b>        | <b>Slaves</b>    | <b>Detail</b>                                                                                                | <b>Type</b>                            |
| <b>RS232,<br/>RS485</b> | <b>6 x FO MM</b> | 8 channel star coupler RS232 & RS485 to 6 x multimode fiber optic, high voltage power supply                 | <b>CMU 100 / 2.1.5.6.6.6.6.6 - 5</b>   |
| <b>RS232,<br/>FO MM</b> | <b>6 x FO MM</b> | 8 channel star coupler RS232 & multimode fiber optic to 6 x multimode fiber optic, high voltage power supply | <b>CMU 100 / 2.1.6.6.6.6.6.6 - 5</b>   |
| <b>4 xFO MM</b>         | <b>4x RS232</b>  | 4 channel converter multimode fiber optic to RS232, high voltage power supply                                | <b>CMU 100 / 2.6.6.6.6.1.1.1.1 - 7</b> |

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