EDISEJA 21

# CMU 100
# RS232 to Singlemode Fiber Optic Converter
# User Manual

## CMU 100 / 1.1.S - 0
## CMU 100 / 7.1.S - 0
## CMU 100 / 1.1.T - 0
## CMU 100 / 7.1.T - 0
## CMU 100 / 1.1.U - 0
## CMU 100 / 7.1.U - 0


| *Company:* | *Device:* | *Document:* | *Code:* | *Date:* |
|---|---|---|---|---|
| Ediseja 21 | CMU 100 / 1.1.S - 0 | User manual | CMUMU11S | 01.09.2019 |

# Content

# 1 PREFACE

**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.

**Contact**

If you have any questions or comments related to this product please contact us on:
Ediseja 21 d.o.o.
Stegne 21C
1000 Ljubljana
Slovenia – EU

Tel: 00 386 51 643 411, 051 643 411
Email: grega.flander@ediseja21.com
www.ediseja21.com

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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.

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

## 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.

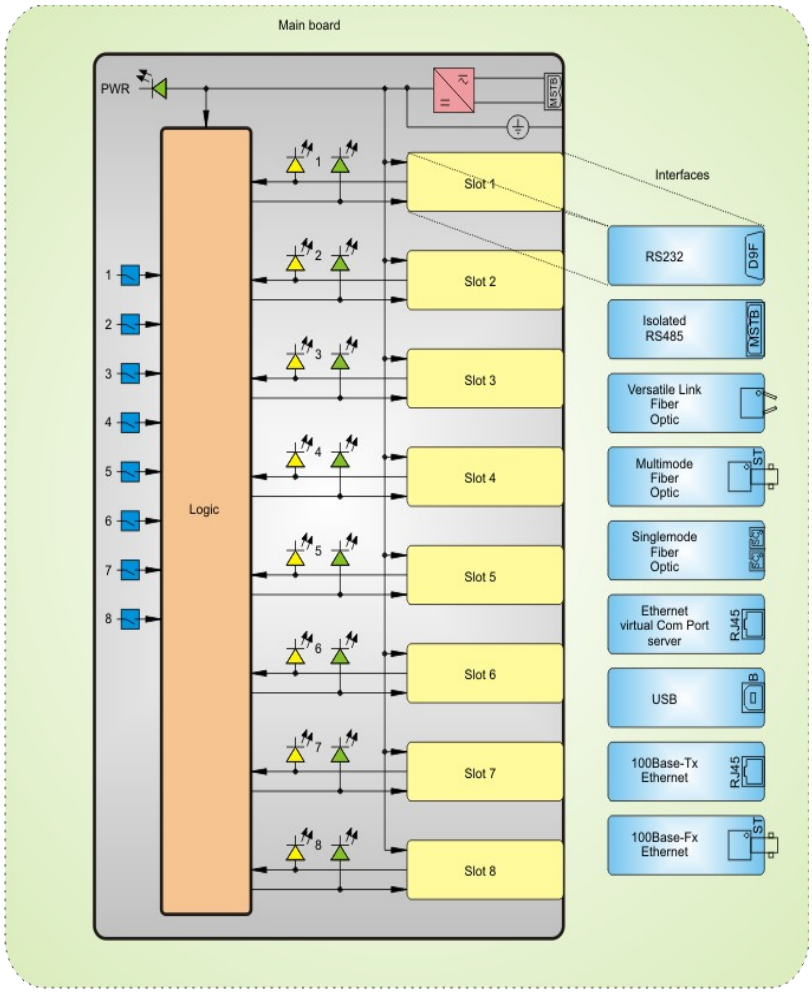
### 2.1.2 HARDWARE

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.



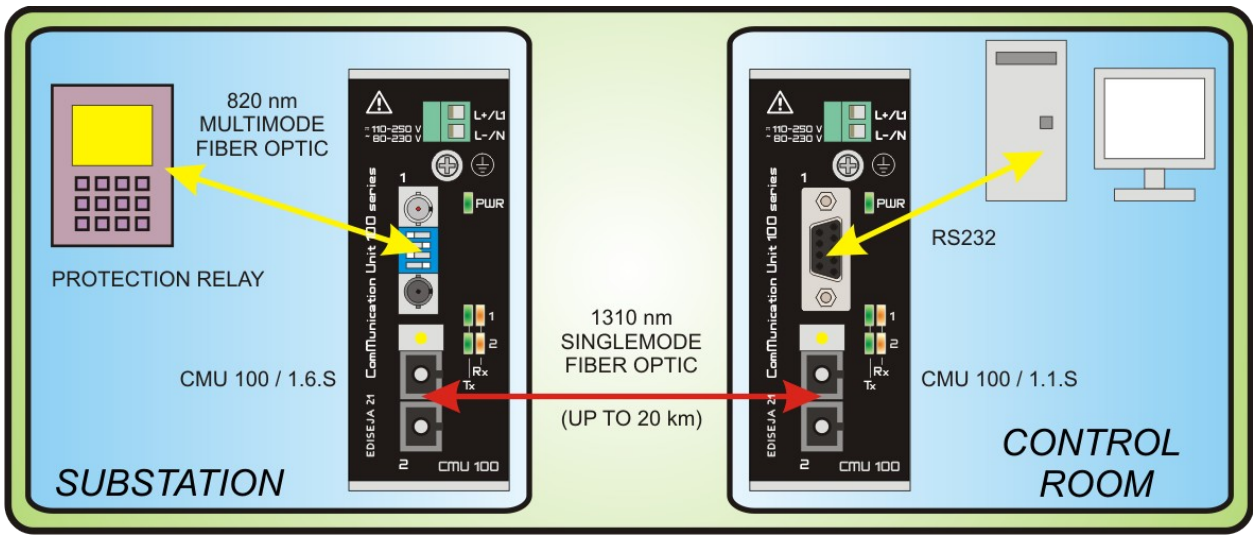

*Picture 1: CMU 100 system general diagram*

# 3 RS232 TO SINGLEMODE FIBER OPTIC CONVERTER

## 3.1 DESCRIPTION

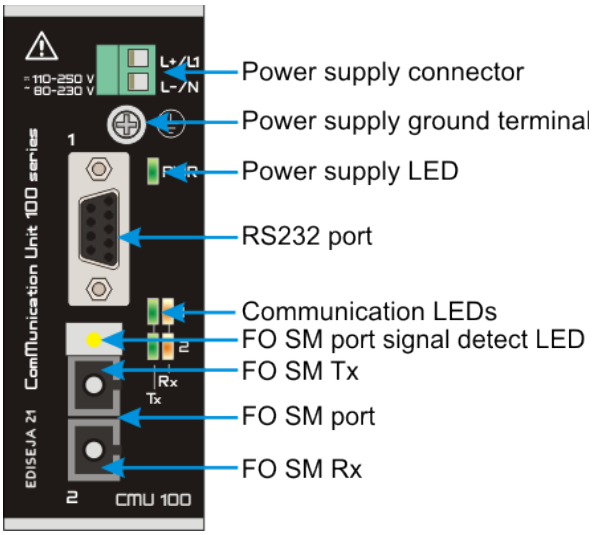
This device allows communication between two devices with different communication interfaces. It contains one RS232 and one 1310 nm wave lenght singlemode fiber optic interface. Data is send from multimode fiber optic to singlemode fiber optic and vice versa simultaneously. Device allows data speed up to 230 kbit/s. Singlemode interface range is approximately 20 km.
Wide power supply voltage allows connection to all common station batteries. Additionaly 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 transfer.
Fiber optic communication allows longer distances between devices without electromagnetic disturbances.

## 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 singlemode fiber optic interface board.

### 3.4.1 MAIN BOARD

Power LED indicates that device is turned on. The right LEDs of one port shows activity on receive (Rx) line and the left one shows activity on transmit (Tx) line.

**Ports Configuration**

| Port | 1 | 2 |
|---|---|---|
| **Interface** | RS232 | FO SM |

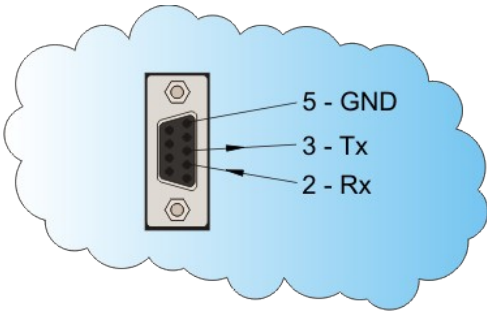
### 3.4.2 RS232 INTERFACE BOARD

**Description**

Single, nonisolated, full duplex, RS232 port with DB9 female connector. Supported Rx, Tx and GND pins.

**Connector pin table**

| DB9 F | 2 | 3 | 5 |
|---|---|---|---|
| Description | RX | TX | GND |
| Direction | IN | OUT | - |




*Picture 4: DB9 Female connector*

**Cable for connection to PC**

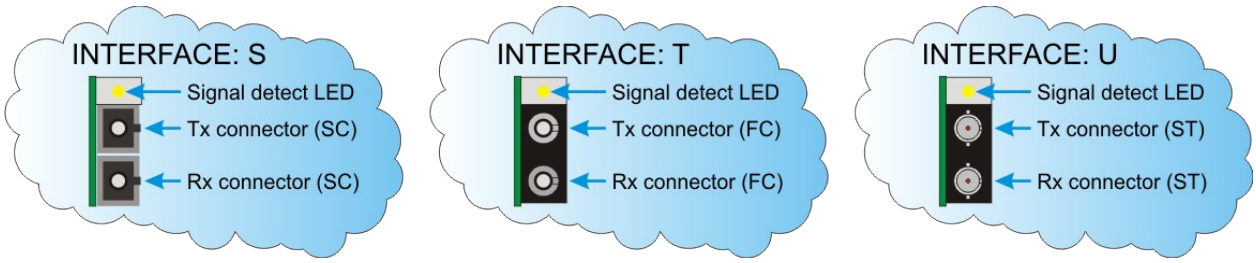
| CMU 100 | | Direction | PC | |
|---|---|---|---|---|
| DB9 M pin | Signal | | Signal | DB9 F pin |
| 2 | RX | <------- | TX | 3 |
| 3 | TX | -------> | RX | 2 |
| 5 | GND | <-------> | GND | 5 |

### 3.4.3 SINGLEMODE FIBER OPTIC INTERFACE BOARD

**Description**

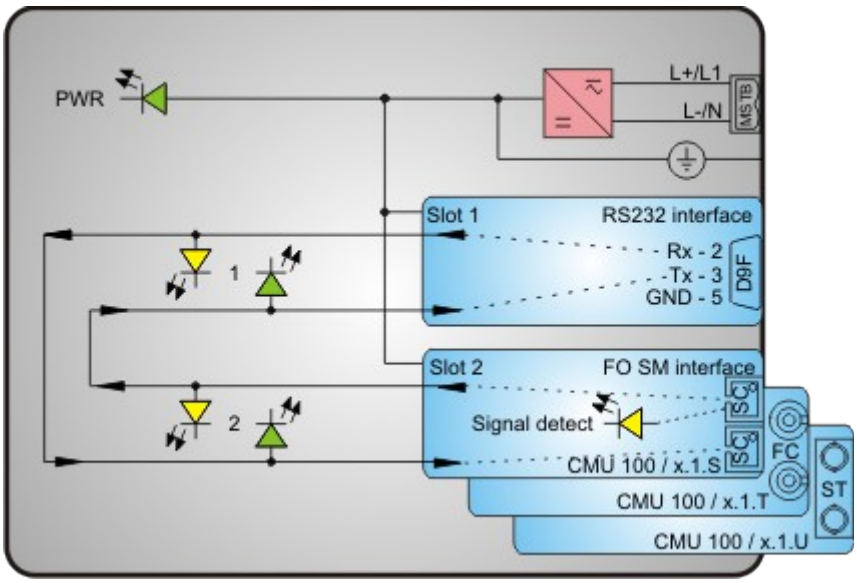
Full duplex, singlemode, 1310 nm, up to 2,048 Mbit/s fiber optic port with SC connectors (interface S), FC connectors (interface T) or ST connectors (interface U). This interface allows transmission up to 20 km. Signal detect LED is activated, when receiver receives enough light signal from transmitter from another end of the fiber cable.

**Warning!**
**Radiation emitted by single mode laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.**




*Picture 5: Singlemode fiber optic interface board appearance*

# 4 SCHEMATIC




*Picture 6: General diagram*

# 5 INSTALLATION

## 5.1 INSTALLATION

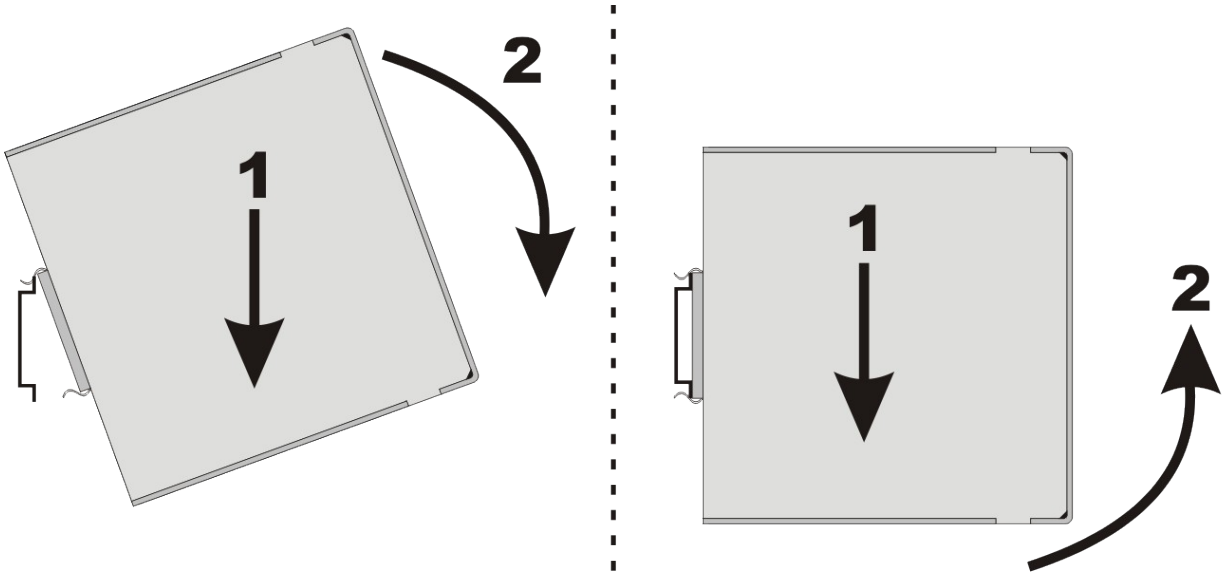
**Warning!**

**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.**

**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 admisible 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 $mm^2$ 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 7: left. installation, right: deinstallation*

# 6 COMMISSIONING & MAINTENACE

## 6.1 COMMISSIONING

**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 | 20 - 10 mA | 55 - 47 mA |
| | AC | 18 mA | 85 mA |
| **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 $mm^2$ | |
| | type | single or stranded wire | |
| | voltage rating | 500 V | |
| | colour | see valid standard | |
| **Ground wire** | crossection | Cu, 2,5 $mm^2$ | |
| | colour | see valid standard | |

| Communication port RS232 (interface type 1) | |
|---|---|
| **Type** | RS232 |
| **Direction** | full duplex |
| **Speed*** | up to 230 kbit/s |
| **Distance** | up to 15 m |
| **Isolation** | none; (GND earthed) |
| **Connector type** | DB9 female |
| **Lines in** | 1 (Rx) |
| **Lines out** | 1 (Tx) |

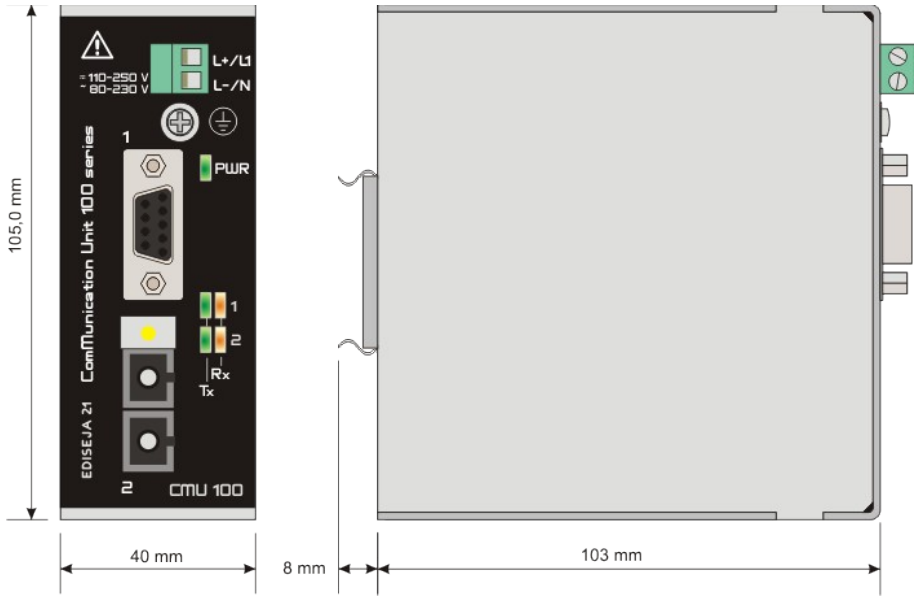
| Communication port Singlemode Fiber Optic (interface type S, T & U) | |
|---|---|
| **Type** | singlemode fiber optic |
| **Wave lenght** | 1310 nm |
| **Fiber size** | 8-9/125 µm |

| Communication port Singlemode Fiber Optic (interface type S, T & U) | | |
|---|---|---|
| **Optical output power** | -7 to 0 dBm | |
| **Reciver sensitivity** | -18 dBm | |
| **Receiver overload** | -7 dBm | |
| **Laser class** | I (IEC 60825-1) | |
| **Direction** | full duplex | |
| **Speed*** | up to 2,048 Mbps | |
| **Input** | 1 receiver | |
| **Output** | 1 transmitter | |
| **Distance** | up to 20 km | |
| **Connector type** | CMU 100 / x.x.**S** | SC |
| | CMU 100 / x.x.**T** | FC |
| | CMU 100 / x.x.**U** | ST |

* slowest interface defines device's maximum speed

| Other data | | | |
|---|---|---|---|
| **Weight** | approx. 0,3 kg | | |
| **Dimensions (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 8: Dimensions*

# 9 ORDERING

**ORDERING NUMBER:** **CMU 100 /** □ . □ . □ . □ . □ . □ . □ . □ . □ . □ - □ . □

**Mother Board + Enclosure + :**

Power supply: DC 110 - 250 V or AC 230 V
2 ports converters (no echo possible, mark Function as 0) ..... 1
2 to 8 ports converters, star couplers, ... (echo possible) ..... 2

Power supply: DC 48 - 60 V or AC 48 V
2 ports converters (no echo possible, mark Function as 0) ..... 7
2 to 8 ports converters, star couplers, ... (echo possible) ..... 8

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

**Interfaces:** (up to 8 ports; if more than 8 ports are needed see CMU 200 devices)

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

**Function:**

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:**

Software version ..... leave empty

**Additional accessories (order if needed):**

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

**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** |

| | | | | |
|---|---|---|---|---|
| FO SM | FO MM | FO MM | *20 km, up to 2,048 Mbit/s, high voltage power supply* | **CMU 100 / 2.6.6.S - 12** |

Star couplers, high voltage power supply

| Master(s) | Slaves | Detail | Type |
|---|---|---|---|
| RS232 | 2 x RS232 | *RS232 to 2 x RS232* | **CMU 100 / 2.1.1.1 - 12** |
| | 3 x RS232 | *RS232 to 3 x RS232* | **CMU 100 / 2.1.1.1.1 - 12** |
| | 4 x RS232 | *RS232 to 4 x RS232* | **CMU 100 / 2.1.1.1.1.1 - 12** |
| | 5 x RS232 | *RS232 to 5 x RS232* | **CMU 100 / 2.1.1.1.1.1.1 - 12** |
| | 6 x RS232 | *RS232 to 6 x RS232* | **CMU 100 / 2.1.1.1.1.1.1.1 - 12** |
| | 7 x RS232 | *RS232 to 7 x RS232* | **CMU 100 / 2.1.1.1.1.1.1.1.1 - 12** |
| | 2 x FO MM | *RS232 to 2 x multimode fiber optic* | **CMU 100 / 2.1.6.6 - 12** |
| | 3 x FO MM | *RS232 to 3 x multimode fiber optic* | **CMU 100 / 2.1.6.6.6 - 12** |
| | 4 x FO MM | *RS232 to 4 x multimode fiber optic* | **CMU 100 / 2.1.6.6.6.6 - 12** |
| | 5 x FO MM | *RS232 to 5 x multimode fiber optic* | **CMU 100 / 2.1.6.6.6.6.6 - 12** |
| | 6 x FO MM | *RS232 to 6 x multimode fiber optic* | **CMU 100 / 2.1.6.6.6.6.6.6 - 12** |
| | 7 x FO MM | *RS232 to 7 x multimode fiber optic* | **CMU 100 / 2.1.6.6.6.6.6.6.6 - 12** |
| RS485 | 2 x RS232 | *RS485 to 2 x RS232* | **CMU 100 / 2.5.1.1 - 12** |
| | 3 x RS232 | *RS485 to 3 x RS232* | **CMU 100 / 2.5.1.1.1 - 12** |
| | 4 x RS232 | *RS485 to 4 x RS232* | **CMU 100 / 2.5.1.1.1.1 - 12** |
| | 5 x RS232 | *RS485 to 5 x RS232* | **CMU 100 / 2.5.1.1.1.1.1 - 12** |
| | 6 x RS232 | *RS485 to 6 x RS232* | **CMU 100 / 2.5.1.1.1.1.1.1 - 12** |
| | 7 x RS232 | *RS485 to 7 x RS232* | **CMU 100 / 2.5.1.1.1.1.1.1.1 - 12** |
| | 2 x FO MM | *RS485 to 2 x multimode fiber optic* | **CMU 100 / 2.5.6.6 - 12** |
| | 3 x FO MM | *RS485 to 3 x multimode fiber optic* | **CMU 100 / 2.5.6.6.6 - 12** |
| | 4 x FO MM | *RS485 to 4 x multimode fiber optic* | **CMU 100 / 2.5.6.6.6.6 - 12** |
| | 5 x FO MM | *RS485 to 5 x multimode fiber optic* | **CMU 100 / 2.5.6.6.6.6.6 - 12** |
| | 6 x FO MM | *RS485 to 6 x multimode fiber optic* | **CMU 100 / 2.5.6.6.6.6.6.6 - 12** |
| | 7 x FO MM | *RS485 to 7 x multimode fiber optic* | **CMU 100 / 2.5.6.6.6.6.6.6.6 - 12** |
| FO MM | 2 x RS232 | *Multimode fiber optic to 2 x RS232* | **CMU 100 / 2.6.1.1 - 12** |
| | 3 x RS232 | *Multimode fiber optic to 3 x RS232* | **CMU 100 / 2.6.1.1.1 - 12** |
| | 4 x RS232 | *Multimode fiber optic to 4 x RS232* | **CMU 100 / 2.6.1.1.1.1 - 12** |
| | 5 x RS232 | *Multimode fiber optic to 5 x RS232* | **CMU 100 / 2.6.1.1.1.1.1 - 12** |
| | 6 x RS232 | *Multimode fiber optic to 6 x RS232* | **CMU 100 / 2.6.1.1.1.1.1.1 - 12** |
| | 7 x RS232 | *Multimode fiber optic to 7 x RS232* | **CMU 100 / 2.6.1.1.1.1.1.1.1 - 12** |
| | 2 x FO MM | *Multimode fiber optic to 2 x multimode FO* | **CMU 100 / 2.6.6.6 - 12** |
| | 3 x FO MM | *Multimode fiber optic to 3 x multimode FO* | **CMU 100 / 2.6.6.6.6 - 12** |
| | 4 x FO MM | *Multimode fiber optic to 4 x multimode FO* | **CMU 100 / 2.6.6.6.6.6 - 12** |
| | 5 x FO MM | *Multimode fiber optic to 5 x multimode FO* | **CMU 100 / 2.6.6.6.6.6.6 - 12** |

| | | | |
|---|---|---|---|
| | 6 x FO MM | *Multimode fiber optic to 6 x multimode FO* | **CMU 100 / 2.6.6.6.6.6.6.6 - 12** |
| | 7 x FO MM | *Multimode fiber optic to 7 x multimode FO* | **CMU 100 / 2.6.6.6.6.6.6.6.6 - 12** |
| **Master(s)** | **Slaves** | **Detail** | **Type** |
| RS232, RS485 | 6 x FO MM | *8 channel star coupler RS232 & RS485 to 6 x multimode fiber optic, high voltage power supply* | **CMU 100 / 2.1.5.6.6.6.6.6.6 - 5** |
| RS232, FO MM | 6 x FO MM | *8 channel star coupler RS232 & multimode fiber optic to 6 x multimode fiber optic, high voltage power supply* | **CMU 100 / 2.1.6.6.6.6.6.6.6 - 5** |
| 4 xFO MM | 4x RS232 | *4 channel converter multimode fiber optic to RS232, high voltage power supply* | **CMU 100 / 2.6.6.6.6.1.1.1.1 - 7** |

**Contact:**

**Ediseja 21, razvoj elektronskih naprav, d.o.o.**
Stegne 21C
1000 Ljubljana
Slovenia – EU

Tel: 00 386 51 643 411, 051 643 411
grega.flander@ediseja21.com
**www.ediseja21.com**