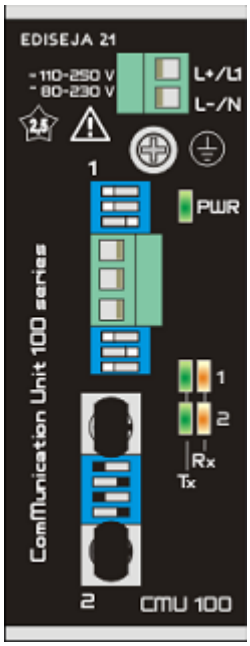
EDISEJA 21

CMU 100
RS485 to Multimode Fiber Optic Converter
User Manual

CMU 100 / 1.5.6 - 0
CMU 100 / 1.M.6 - 0
CMU 100 / 1.L.6 - 0
CMU 100 / 7.5.6 - 0
CMU 100 / 7.M.6 - 0
CMU 100 / 7.L.6 - 0



Company:	Device:	Document:	Code:	Version:	Date:
Ediseja 21	CMU 100 / 1.5.6 - 0	User manual	CMUMU156	V4	05.11.2014

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.
Drenov Gric 175
1360 Vrhnika
Slovenia – EU

Tel: ++386 (1) 75 05 275

Email: grega.flander@ediseja21.com

www.ediseja21.com

Copyright

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

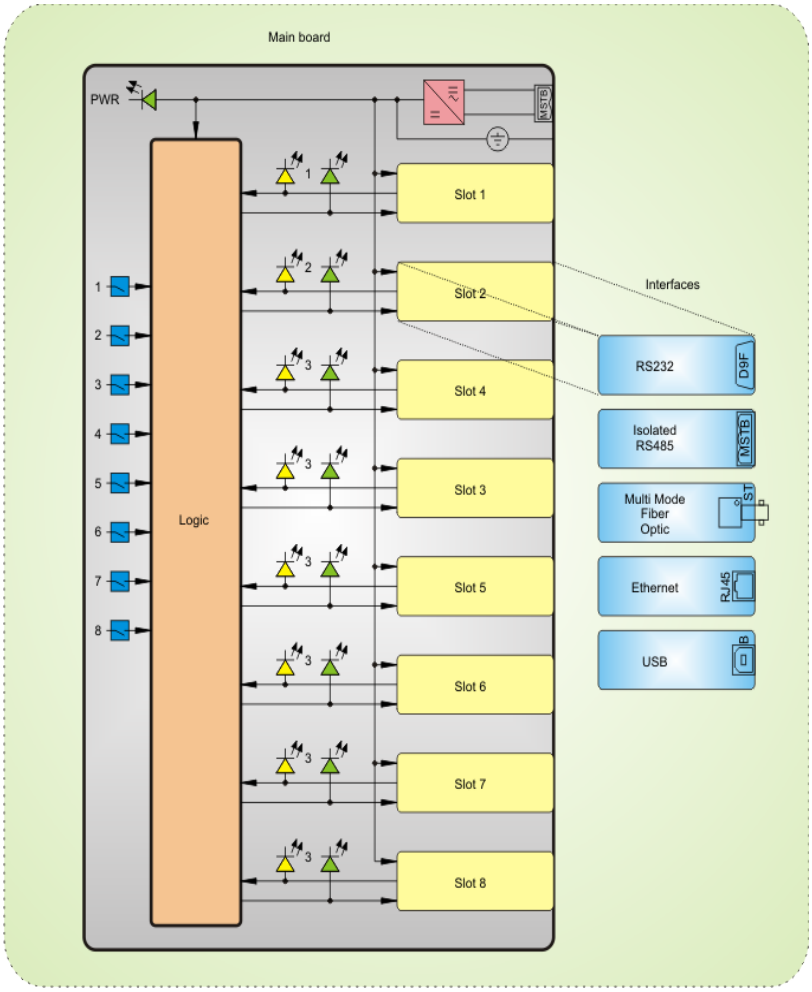
Hardware is based on main board with power supply and port switching logic. On that board, interface boards are attached. CMU 100 can handle up to 8 different interface boards. Currently available interface boards:

- RS232
- isolated RS485
- Multimode Fiber Optic ST and SMA connectors
- 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 RS485 TO MULTIMODE FIBER OPTIC CONVERTER

3.1 DESCRIPTION

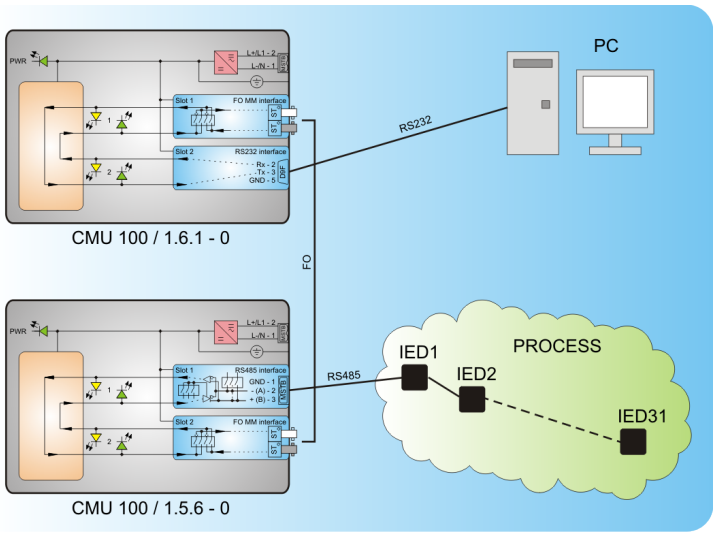
This device allows communication between two devices with different communication interfaces. It contains half duplex RS485 and full duplex 820 nm wave lenght multimode fiber optic interface. Data is send from RS485 to fiber optic and vice versa.

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.

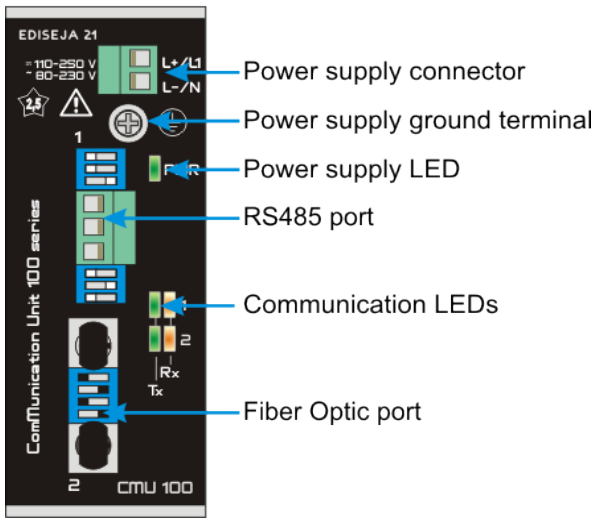
Fiber optic communication allows longer distances between devices without electromagnetic disturbances. Fiber optic logic can be set to positive or negative logic for transmitter and receiver separatedly. They can be set by DIP switch at the front side of the communication interface.

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, switches and logic switch), one RS485 interface board and one multimode fiber optic interface board.

3.4.1 MAIN BOARD

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	RS485	FO MM

3.4.2 RS485 INTERFACE BOARD

Description

Single, galvanically isolated, half duplex, RS485 port with Phoenix 3 pin screw connector, with automatic switch to receive after end of transmission and with additional terminating and stabilizating resistors.

Hardware settings

For proper functioning of that board some settings must be done:

- RS485 bus termination and stabilisation
- baud rate

RS485 bus termination and stabilisation

TERMINATION

At high transmission rates or long distance, RS485 bus termination is necessary.

The termination on RS485 bus must be set on both ends of the RS485 bus.

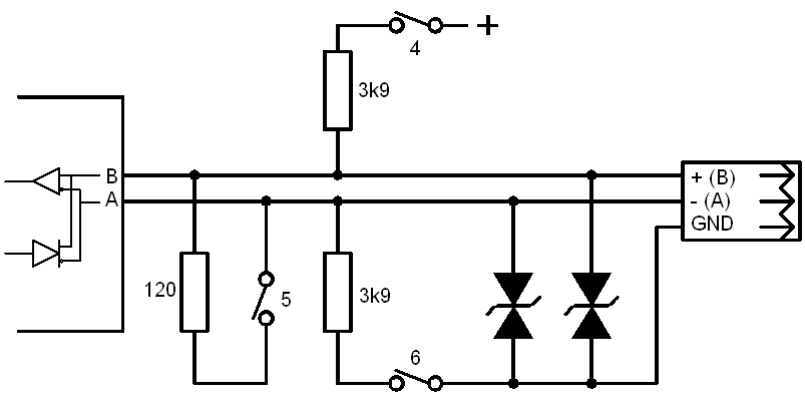
STABILISATION

Some device, to work properly, demands that RS485 must always be in known and valid state. That is, when + (positive) pin is more than 200 mV positive than – (negative) pin. Pins + and – are sometimes marked as A and B. In case that no device on RS485 bus is transmitting or in case of short circuit, there is no voltage difference between those pins and some device do not work correctly.

On this port board so called „true fail-safe“ RS485 chip is used so board works correctly without stabilisation at invalid RS485 bus state. But still switches for stabilisation are provided on port board. **The stabilization on RS485 bus may be set on one device only!**

Switches at the lower side of connector:

Switch	4	5	6
Description	RS485 stabilisation	RS485 termination	RS485 stabilisation



Picture 4: RS485 BUS schematic

Switches at the upper side of connector:

BAUD rate

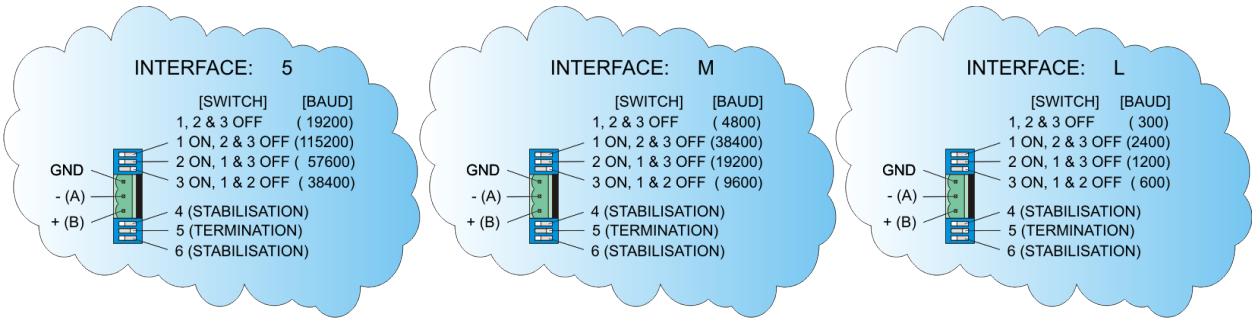
BAUD rate			Switch		
Interface 5	**Interface M**	**Interface L**	**1**	**2**	**3**
19200	**4800**	**300**	OFF	OFF	OFF
38400	**9600**	**600**	OFF	OFF	ON
57600	**19200**	**1200**	OFF	ON	OFF
115200	**38400**	**2400**	ON	OFF	OFF

BAUD rate setting 19k2 (bps) is valid for all standard communication protocols, that do not request special timings. If special protocols (small request-respond time required) are used please note it in order.

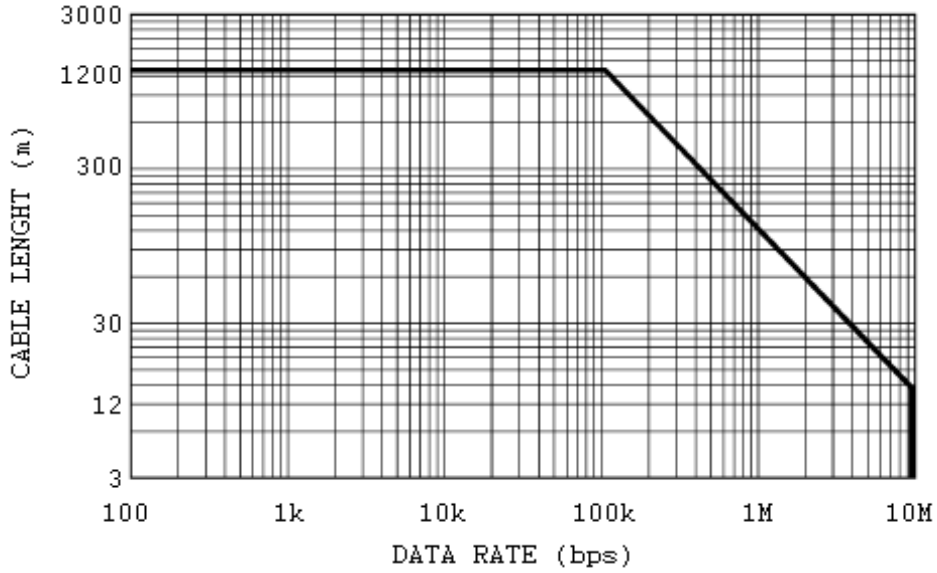
NOTE! If there are problems with communication, try using higher speed setting. Some manufacturer have different markings for B and A line. Try to switch A and B wires. See http://en.wikipedia.org/wiki/RS-485 for detailed information.

Connector pin table

MSTB	1	2	3
Description	GND	- (A)	+ (B)



Picture 5: RS485 interface board appearance with switch settings



Picture 6: Data rate vs cable lenght

3.4.3 MULTIMODE FIBER OPTIC INTERFACE BOARD

Description

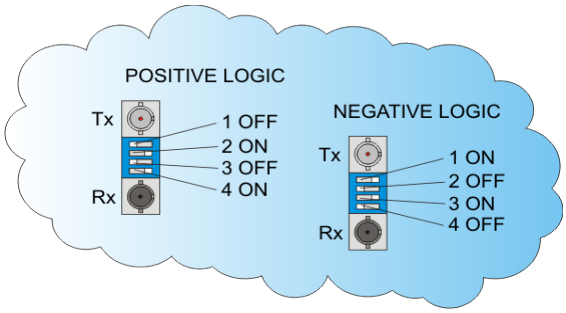
Single, full duplex, multimode, fiber optic port with ST connectors with positive or negative logic.

Hardware settings

For proper functioning of that board, optic logic must be set:

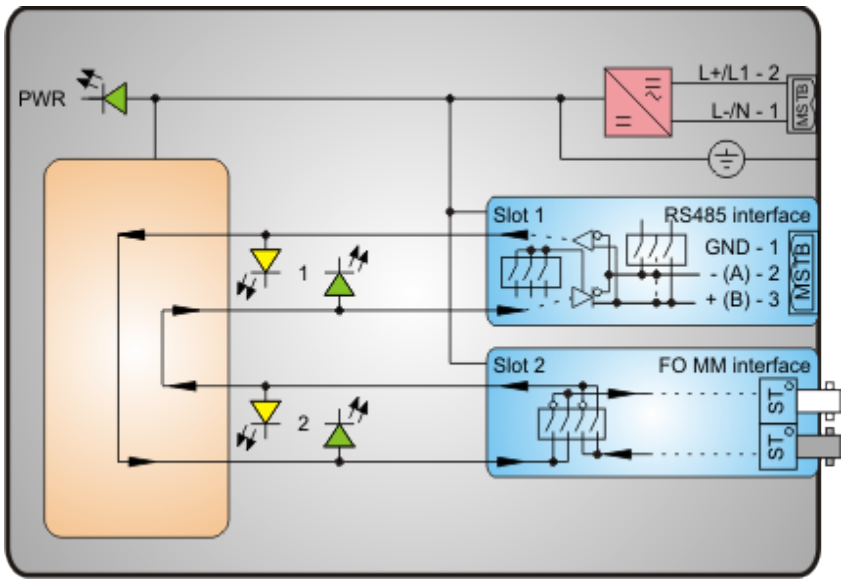
Fiber optic logic settings

Switch SW1	Light in idle state	1	2	3	4
Positive logic	**OFF**	OFF	ON	OFF	ON
Negative logic	**ON**	ON	OFF	ON	OFF



Picture 7: Multimode fiber optic interface board appearance

4 SCHEMATIC



Picture 8: General diagram

5 INSTALLATION

5.1 INSTALLATION

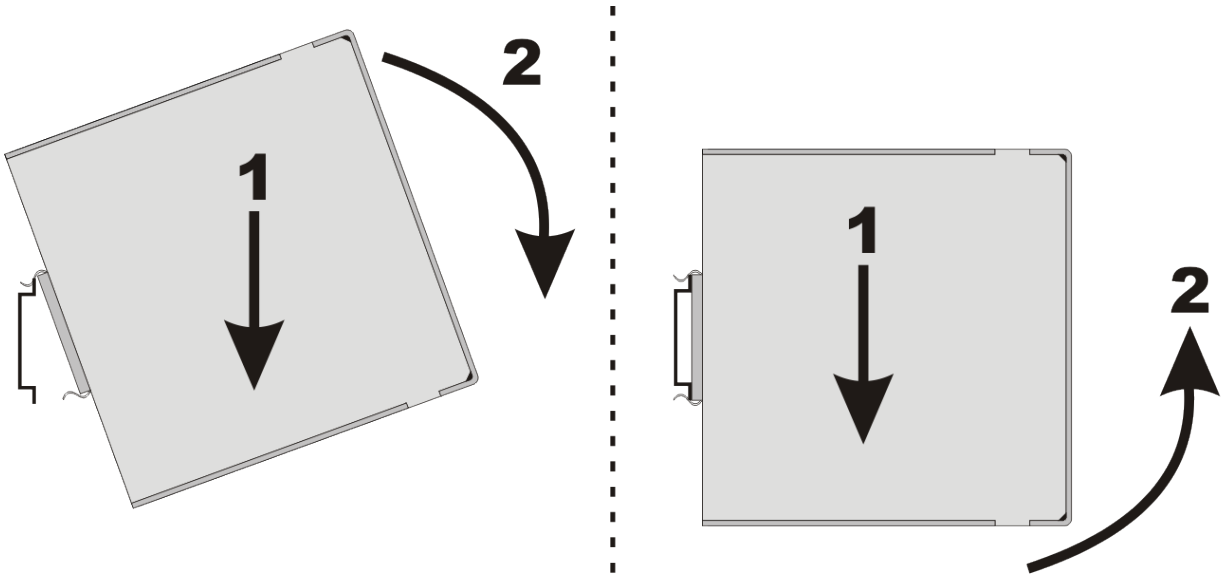
Warning!

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 9: 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			
		Type 1	Type 7
Rated voltage	DC	110 - 250 V	48 - 60 V
	AC	230 V	48 V
Permissible voltage range	DC	88 - 300 V	38 - 72 V
	AC	70 - 264 V	30 - 50 V
Input current	DC	21 - 9 mA	39 - 35 mA
	AC	21 mA	62 mA
Fuse (internal)	2 A T		
Power supply indicator	green LED marked PWR		
Voltage dips	20 ms		
Connector type	screw type „MSTB“ Phoenix 2pin		
Wire crossection	0,5 – 2,5 mm^2		

Communication port RS485 (interface type 5, M & L)		
Type	RS485	
Direction	half duplex	
Speed	Interface type 5	19200 - 115200 BAUD
	Interface type M	4800 - 38400 BAUD
	Interface type L	300 - 2400 BAUD
Number of ports	1	
Distance	up to 1200 m	
Isolation	1000 V DC	
Connector type	„MSTB“ Phoenix 3pin	
Termination	120 Ohm	
Max number of devices on BUS	32	

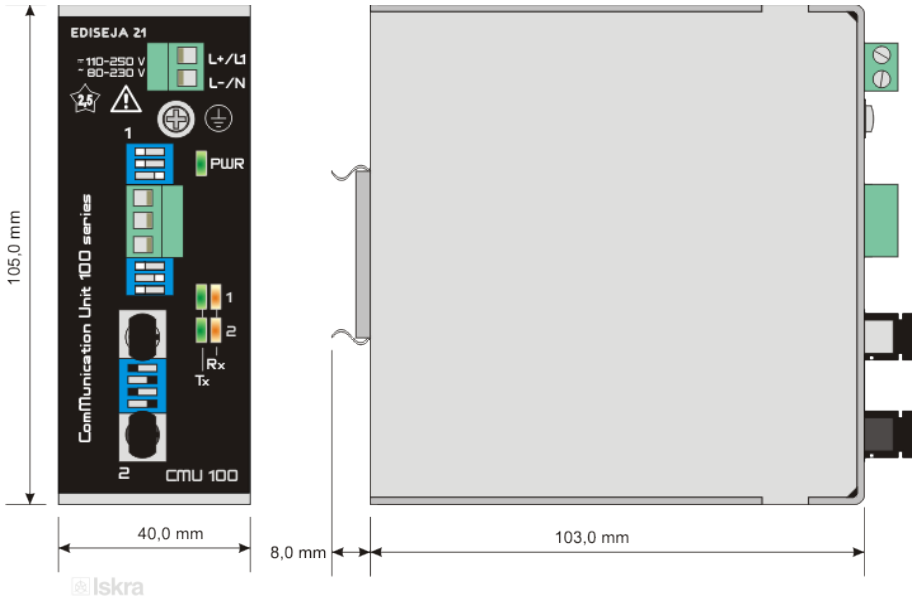
Communication port Multimode Fiber Optic (interface type 6)	
Type	multimode fiber optic
Wave lenght	820 nm
Fiber size	50/125 µm, 62,5/125 µm, 100/140 µm, 200 µm
Optical output power	-18 dB

Communication port Multimode Fiber Optic (interface type 6)	
Reciver sensitivity	-24 dB
Laser class	I (IEC 60825-1)
Direction	full duplex
Speed	up to 230 k BAUD
Input	1 receiver (grey connector)
Output	1 transmitter (white connector)
Logic	light ON or OFF in idle state set by switch (see table)
Number of ports	1
Distance	up to 500 m
Connector type	ST

* slowest interface defines device's maximum speed

Device			
Weight	0,31 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		
Communication indicator	Receiveing	yellow LED marked Rx	
	Tranmitting	green LED marked Tx	

8 DIMENSIONS



Picture 10: Dimensions

9 ORDERING

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

Mother Board + Enclosure + :

Power supply: 88 - 350 V DC or 70 - 264 V AC
2 ports converters (no echo possible, mark Function as 0) 1
2 to 8 ports converters, star couplers, ... (echo possible) 2

Power supply: 38 - 72 V DC or 30 - 50 V AC
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 & 4 ports - 55 mm, 5 & 8 ports - 85 mm)

Interfaces:

None ..... leave empty or 0
RS232 nonisolated, Rx & Tx support 1
RS232 nonisolated, Rx & Tx support (custom made: LDU version with rectifiers) C
RS485 isolated, half duplex (19200 - 115200 baud) 5
RS485 isolated, half duplex (38400 - 4800 baud) ..... M
RS485 isolated, half duplex (300 - 2400 baud) L
Multimode (820 nm) fiber optic with STconnector 6
Multimode (820 nm) fiber optic with SMA connector 7
USB (one virtual com port) 8
Ethernet (one virtual com port) 9

Function:

Converter (when Mother Board marked as 1, 5 or 7 is used) 0
3 port star coupler / communication node with echo's possible 2
4 x 2 port converter (4 independent channels (converters)) 7
8 port node 8
8 port star coupler (1 master, 4 to 7 slaves) 12
8 port star coupler (1 master, 4 to 6 slaves, 1 listener) 14

Software Version:

Software version ..... leave empty

Examples:
CMU 100 / 2.1.5.6.7 - 2 or **CMU 100 / 2.1.5.6.7.0.0.0.0 - 2** is
star coupler / communication node with
- high voltage power supply and
- 4 interfaces
1. interface is RS232 master port,
2. interface is RS485 slave port,
3. interface is fiber optic with ST connectors slave port and
4. interface is fiber optic with SMA connectors slave port.

Most common devices:
CMU 100 / 1.6.1 - 0 - *1 ch converter multimode fiber optic to RS232, high voltage power supply*
CMU 100 / 1.5.1 - 0 - *1 ch converter RS485 to RS232, 19k2-115k BAUD, high voltage power supply*
CMU 100 / 1.5.6 - 0 - *1 ch converter RS485 to multimode fiber optic, high voltage power supply*

CMU 100 / 2.1.1.1 - 2 - *3 channel star coupler RS232 to 2 x RS232, high voltage power supply*
CMU 100 / 2.1.6.6 - 2 - *3 channel star coupler RS232 to 2 x multimode fiber optic, high voltage power supply*

CMU 100 / 2.6.6.6.6.1.1.1.1 - 7 - *4 channel converter multimode fiber optic to RS232, high voltage power supply*
CMU 100 / 2.5.5.5.5.6.6.6.6 - 7 - *4 channel converter RS485 to multimode fiber optic, high voltage power supply*

CMU 100 / 2.5.6.6.6.6.6.6.6 - 12 - *8 port star coupler RS485 to 7 x multimode fiber optic, high voltage power supply.*
CMU 100 / 2.6.6.6.6.6.6.6.6 - 12 - *8 port star coupler multimode fiber optic to 7 x multimode fiber optic, high voltage power supply*

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)

Contact:

Ediseja 21, razvoj elektronskih naprav, d.o.o.
Drenov Gric 175
1360 Vrhnika
Slovenia – EU

Tel: ++386 (1) 75 05 275
grega.flander@ediseja21.com
www.ediseja21.com