

**CMU 100
RS232, FO MM, FO VL
to 2-5x FO VL Star
Coupler
User Manual**

CMU 100 / x.1.6.P.P.P.P.P - 9
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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.

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Copyright

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Explanation of the symbols



Read the instructions!



Device was tested with 2,5 kV or 500 V 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.

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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

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

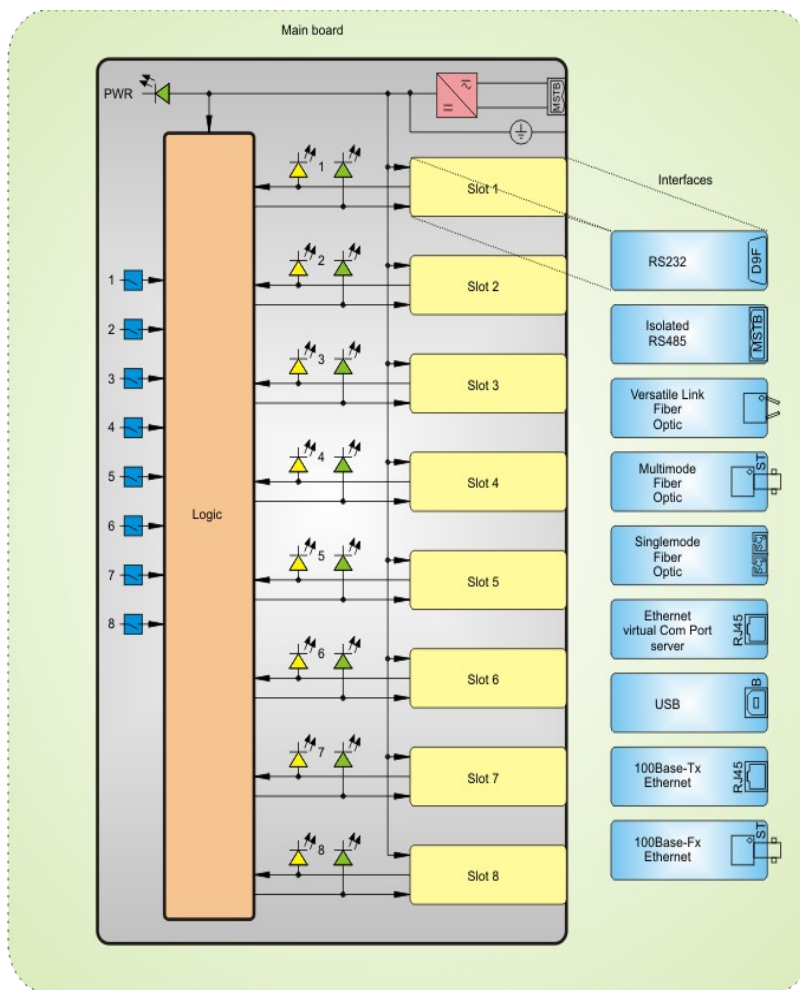
Hardware is based on main board with power supply and port switching logic. On that board, interface boards are attached. CMU 100 can handle up to 8 different interface boards. Currently available interface boards:

- ◆ RS232
- ◆ isolated RS485
- ◆ Multimode Fiber Optic with ST and SMA connectors
- ◆ Singlemode Fiber Optic with ST, FC & SC connectors
- ◆ Versatile Link Fiber Optic 1 mm plastic cable
- ◆ 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, FIBER OPTIC MM & FIBER OPTIC VL TO 2-5x FIBER OPTIC VL STAR COUPLER

3.1 DESCRIPTION

Star coupler is communication device that transfer data from one (master) to more than one (slave) port. Example is when we need access to one device with several PCs. It can also be used when communication from PC to multiple devices is needed.

This device contains one full duplex RS232 interface (master), one 820 nm wave length multimode fiber optic (master), one 660 nm wave length versatile link fiber optic (master) and five versatile link fiber optic (slaves) ports. Data is send from each master port to all slave ports. On the other hand, data from either slave port is send to all three masters port only. Communication speed is up to 40 kbit/s.

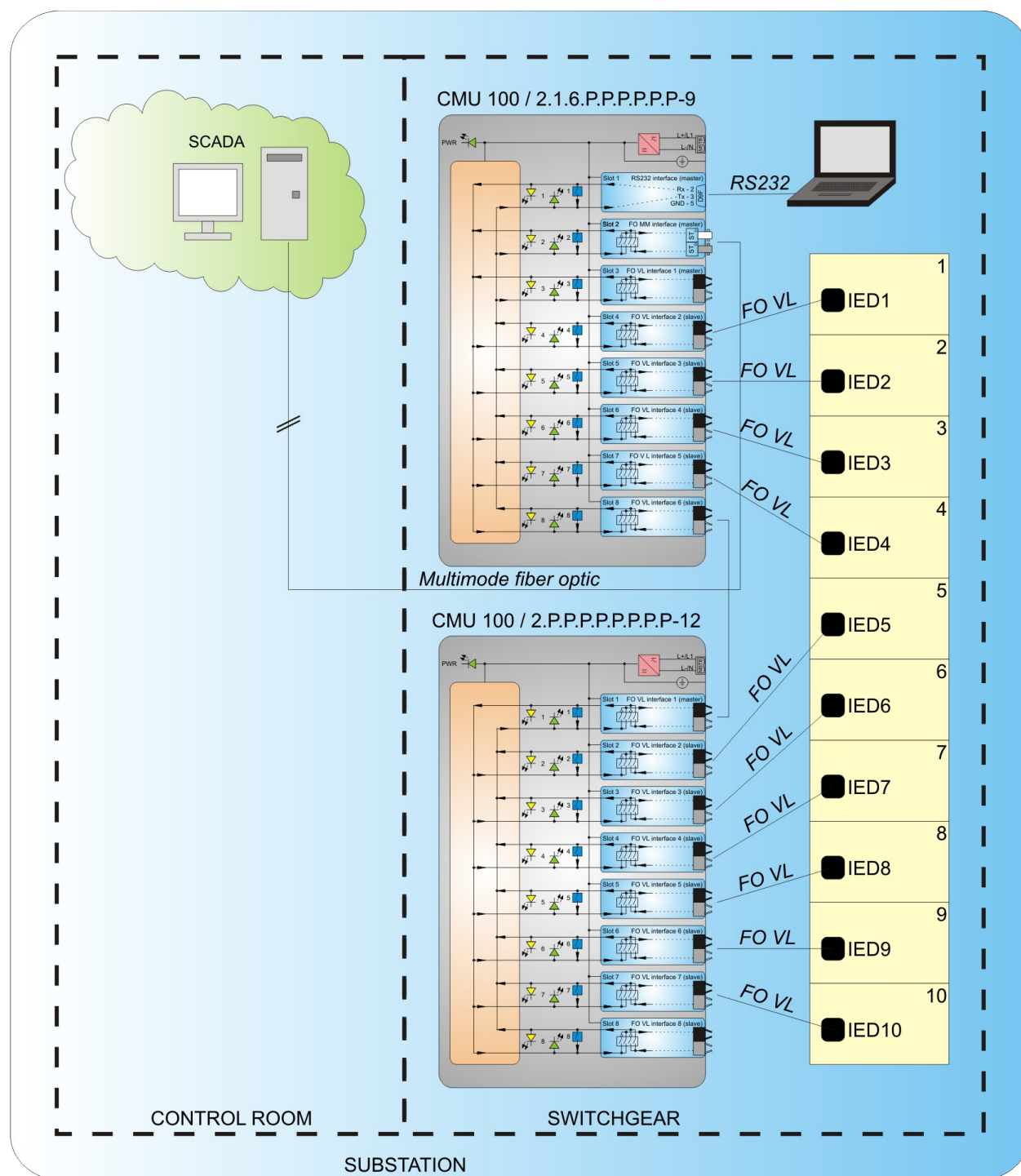
Wide power supply voltage allows connection to all common station batteries. Additionally it can be also connected to standard AC voltages.

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 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.

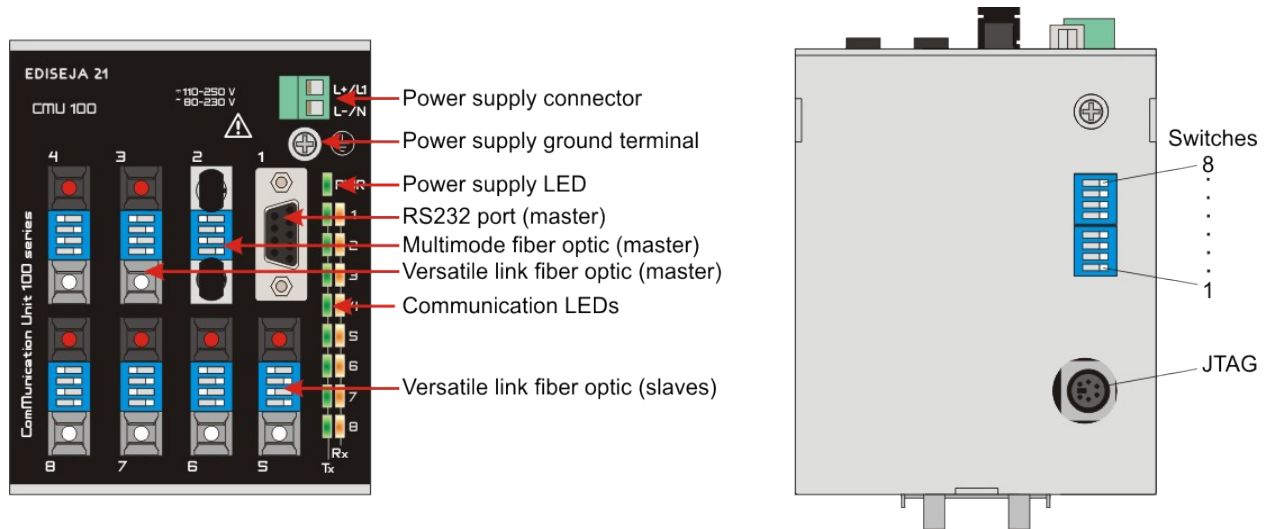
3.2 TYPICAL APPLICATIONS

Typical application is communication with PC with SCADA application, in control room and protection relays, power meters, etc with RS232 interfaces, in switchgear, without electromagnetic disturbances.



Picture 2: Star coupler typical application

3.3 APPEARANCE



Picture 3: Front view (left) & bottom view (right)

3.4 HARDWARE DESCRIPTION

This configuration of device is made from main board (power supply, LEDs, switches and logic switch), one RS232 interface board, one multimode fiber optic and six versatile link fiber optic boards.

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.

On the bottom side of device are switches and JTAG connector which is intended for downloading necessary software. Do not connect anything to that connector.

Additional switches allows echo on each port. Echo can be set on or off for each port.

Switches

Switch	1	2	3	4
Description	Echo port 1	Echo port 2	Echo port 3	Echo port 4
Position OFF	Echo off	Echo off	Echo off	Echo off
Position ON	Echo on	Echo on	Echo on	Echo on
Default position	OFF	OFF	OFF	OFF

Switch	5	6	7	8
Description	Echo port 5	Echo port 6	Echo port 7	Echo port 8

Switch	5	6	7	8
Position OFF	Echo off	Echo off	Echo off	Echo off
Position ON	Echo on	Echo on	Echo on	Echo on
Default position	OFF	OFF	OFF	OFF

Configuration of ports

CMU 100	1	2	3	4	5	6	7	8
x.1.6.P.P.P.P.P	RS232	FO MM	FO VL	FO VL	FO VL	FO VL	FO VL	FO VL
x.1.6.P.P.P.P.P	RS232	FO MM	FO VL	FO VL	FO VL	FO VL	FO VL	
x.1.6.P.P.P.P	RS232	FO MM	FO VL	FO VL	FO VL	FO VL		
x.1.6.P.P.P	RS232	FO MM	FO VL	FO VL	FO VL			

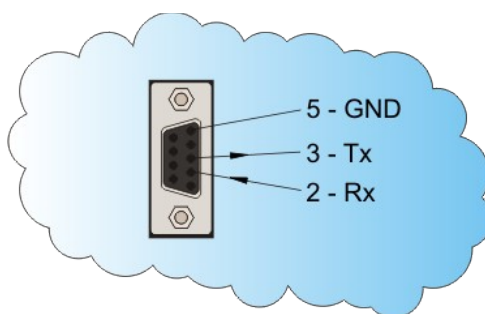
3.4.2 RS232 INTERFACE BOARD

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

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

3.4.3 MULTIMODE FIBER OPTIC INTERFACE BOARD

Description

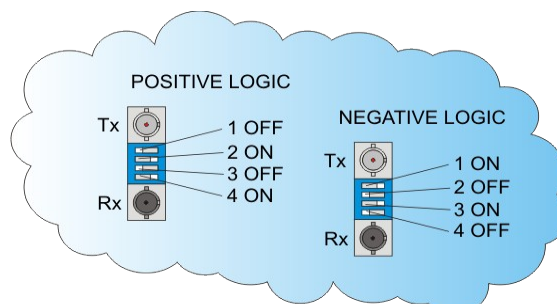
Single, full duplex, multimode, fiber optic port with ST connectors with positive or negative logic.

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 5: Multimode fiber optic interface board appearance

It is recommended that positive logic on fiber optic interfaces is used (light OFF in idle state). In other case, if optic loop on one port is broken, communication with other slave ports, also will not work.

3.4.4 VERSATILE LINK FIBER OPTIC INTERFACE BOARD

Description

Single receiver and transmitter, full duplex, 660 nm wave length, fiber optic port for 1 mm diameter plastic fiber cable, up to 100 distance, with positive or negative logic, up to 40 kbit/s.

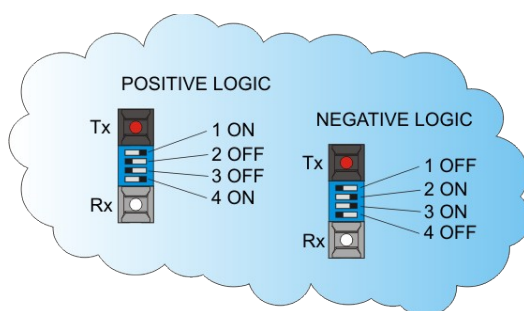
Hardware settings

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For proper functioning of that port, optic logic must be set the same, on both devices that communicates:

Fiber optic logic settings

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

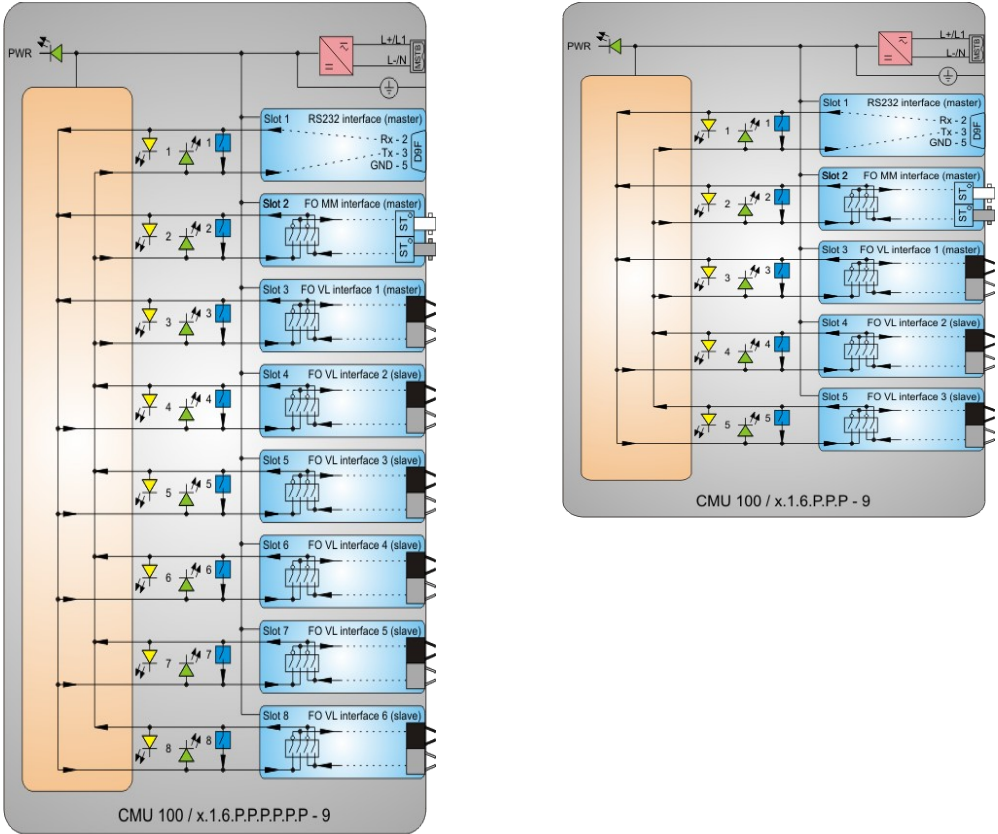


Picture 6: Versatile link fiber optic interface board appearance

Put on dust caps on all unused optical port receivers, otherwise normal light can be interpreted as data and device can work incorrectly!

It is recommended that positive logic on fiber optic interfaces is used (light OFF in idle state). In other case, if optic loop on one port is broken, communication with other slave ports, also will not work.

4 SCHEMATIC



Picture 7: CMU 100 / x.1.6.P.P.P.P.P - 9 schematic (left) & CMU 100 / x.1.6.P.P.P - 9 schematic (right)

5 INSTALLATION

5.1 INSTALLATION



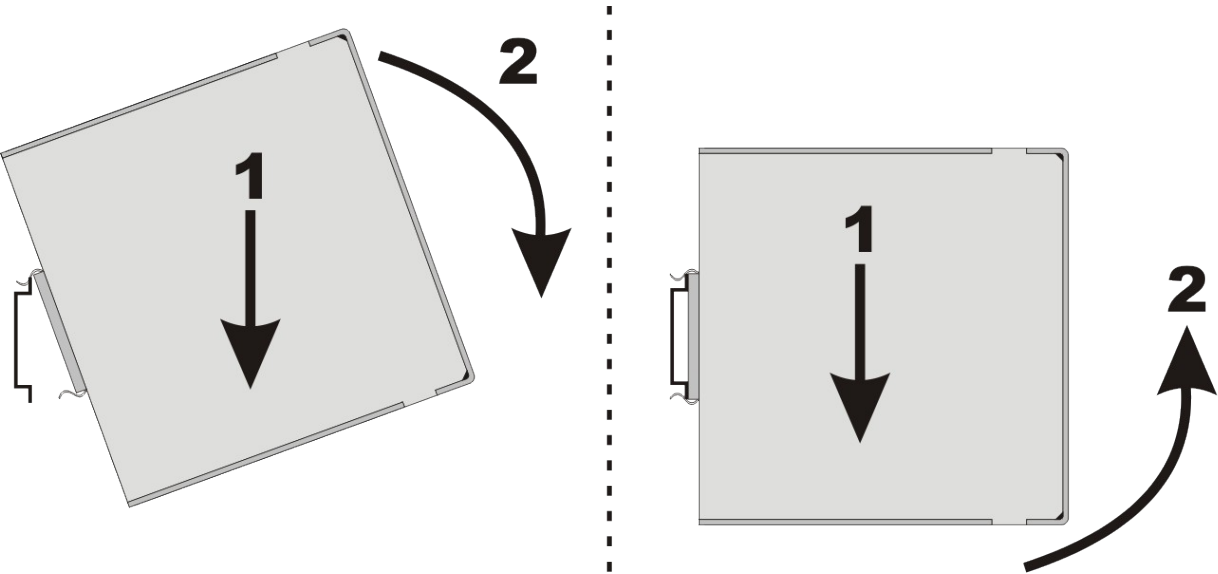
Warning!

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 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 mm² 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.



Picture 8: left. installation, right: deinstallation

6 COMMISSIONING & MAINTENANCE

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.

6.2 MAINTENANCE

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

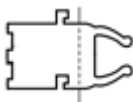
7 TECHNICAL DATA

Power supply			
	Type	CMU 100 / 2.x.x.x...	CMU 100 / 8.x.x.x...
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	80 - 40 mA	160 - 140 mA
	AC	55 mA	340 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 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 HCS

Communication port Multimode Fiber Optic (interface type 6)				
Distance (approx.)	600 m	2000 m	1800 m	
Optical output power	-18 dB			
Reciver sensitivity	-24 dB			
Laser class	I (IEC 60825-1)			
Direction	full duplex			
Speed*	up to 2,048 Mbit/s			
Input	1 receiver (grey connector)			
Output	1 transmitter (white connector)			
Logic	light ON or OFF in idle state set by switch (see table)			
Connector type	ST			

Communication port Versatile Link Fiber Optic (interface type P)	
Type	plastic fiber optic
Wave lenght	660 nm
Fiber size	1 mm diameter plastic optical fiber
Laser class	I (IEC 60825-1) - eye safe
Direction	full duplex
Speed*	up to 40 kbit/s
Input	1 receiver (grey connector)
Output	1 transmitter (black connector)
Logic	light OFF (positive logic) or light ON (negative logic) in idle state, set by manual switch (see table)
Distance	up to 100 m
Connector type	

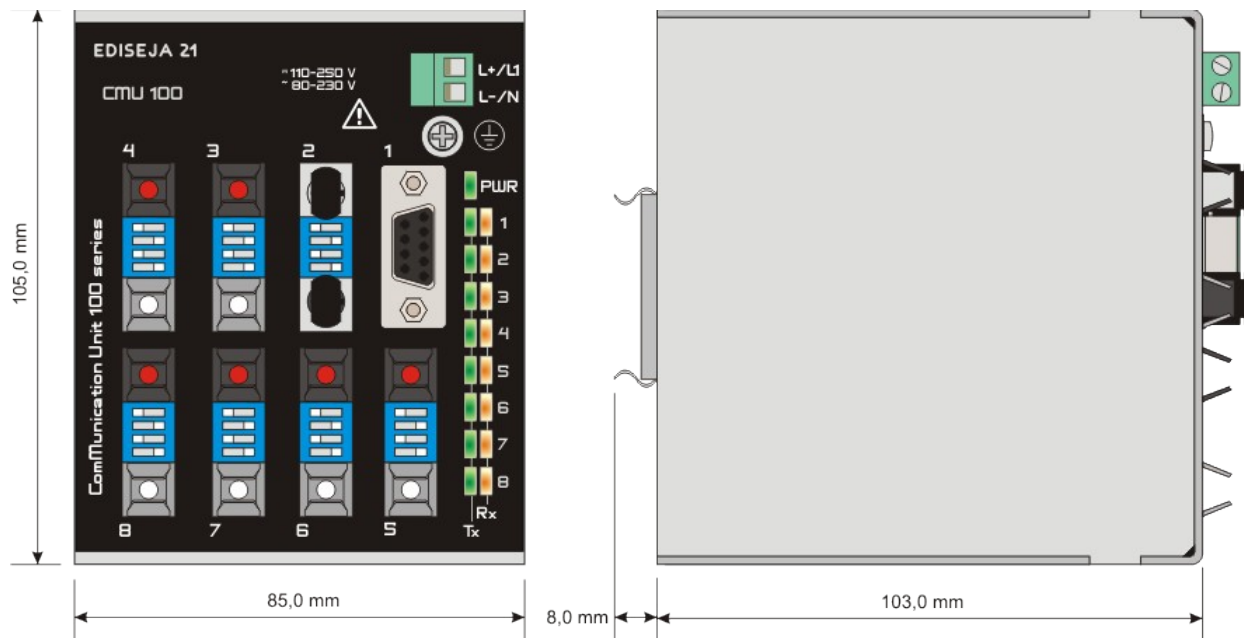
* slowest interface defines device's maximum speed

Other data			
Weight	approx. 0,55 kg		
Dimensions (see picture)	(H)	(D)	(W)
	105 mm	111 mm + connectors	85 mm
Temperature range	0 °C to +55 °C		
Humidity operating	up to 95 % (noncondensing)		
	Material	Al	

TECHNICAL DATA

Other data		
Enclosure	IP	20
Mount type	standard DIN 35 rail (acc. to DIN EN 50022)	
Class	I	
Overvoltage category	II	

8 DIMENSIONS



Picture 9: CMU 100 / x.1.6.P.P.P.P.P - 9 dimensions

CMU 100 /

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

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

Power supply: DC 24 V

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

None leave empty

Function: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	FO VL	versatile link plastic fiber optic, high voltage power supply	CMU 100 / 1.1.P - 0
RS232	ETH	10/100 Mbit/s, virtual com port, high voltage power supply	CMU 100 / 1.1.9 - 0
RS485	FO MM	ST connector, 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	FO VL	Versatile link plastic fiber optic, high voltage power supply	CMU 100 / 1.1.P - 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, ST connector, 2000 m range, high voltage power supply	CMU 100 / 1.E.F - 0
ETH TX	ETH FX	100 Mbit/s, 1310 nm, ST connector, 20 km range, high voltage power supply	CMU 100 / 1.E.G - 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	CMU 100 / 2.9.1.1 - 12

ORDERING

			power supply	
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
	2 x FO VL	RS232 to 2 x versatile link fiber optic	CMU 100 / 2.1.P.P - 12
	3 x FO VL	RS232 to 3 x versatile link fiber optic	CMU 100 / 2.1.P.P.P - 12
	4 x FO VL	RS232 to 4 x versatile link fiber optic	CMU 100 / 2.1.P.P.P.P - 12
	5 x FO VL	RS232 to 5 x versatile link fiber optic	CMU 100 / 2.1.P.P.P.P.P - 12
	6 x FO VL	RS232 to 6 x versatile link fiber optic	CMU 100 / 2.1.P.P.P.P.P.P - 12
	7 x FO VL	RS232 to 7 x versatile link fiber optic	CMU 100 / 2.1.P.P.P.P.P.P.P - 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 x FO 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

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