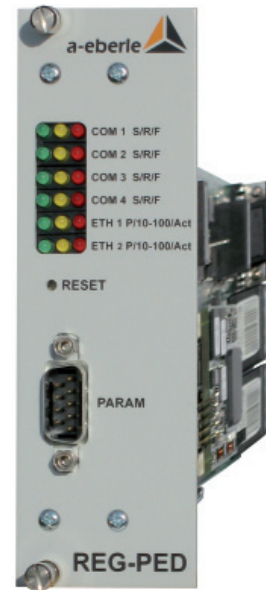


# Central station coupling-module

## REG-PED

\* as 19" rack version



### Application

Working as a coupling-device with control centres or with central units, the REG-PED operates with all telecontrol protocols.

### Features

- boots itself after power-on
- coordinates the telegram traffic between one or more substation units and WT- and/or modem-connections to central stations or substations
- checks automatically and continuously the memory of the device
- controls the watchdog
- parameters can be set online at any time
- adjustable to any telecontrol protocol
- multiple choices for connection such as fibre optics, RS 485, RS 232

### Specification

The REG-PED board is equipped with an 32Bit PowerQuicc - processor PPC885 and represents an independant computer, with an address-range of 1 GByte.

The CPU runs at a speed of 133 MHZ. The board has a maximum capacity of 2 RAM modules with 128 MB in total memory as working memory.

Depending on the kind of the module the storage capacity for saving of special system device data as well as for the specific remote control protocol structure are up to 64 MB flash memory.

All 16 hardware-timers are required for the realtime operating system used. One timer is used for the system cycle. All of the prozessor-included UART - modules turn the 5 asynchronous V.24-interfaces. 3 of these interfaces have their own baudrate timers.

The PARAM interface is able to work from 1200 up to 115200 baud and the other serial interfaces 1-4 from 300 Bd. up to 115200 baud. For serial coupling in pulse-width-modulation (pulse-duration-m.) 100 Bd. up to bis 2400 Bd. are available.

All interfaces can be used either in PWM- or in PCM (pulse-code-m.) -mode or as control lines for modem serving up to 4 coupling partners can be served.

Despite the functions running by different software branches on REG-PED, there are general functions in order to protect the REG-PED module against malfunctions. These functions are implemented by hardware supplements and by software parts.

## Interfaces

The REG-PED module offers the following interfaces for communication with parametrizing PC and for connection with serial communication partners depending on mounting version:

- 2x10/100Mbit Ethernet RJ45 or fibre optic (ST)
- 5 serial interfaces
- 2/4 of those serial interface to PCM or PWM coupling partners
- 2/3 of those serial interfaces RS485
- up to 4 serial fibre optic interfaces (optional)
- 3 COM interfaces have transmitters and receivers with galvanically isolation by optocouplers
- all COM ports are able to work in V.24 mode

Interfaces for serial communication are connected via rackmount or SUB-D connector. They include control lines, data lines and the requested power supply potentials. With the help of parameter-driven onboard functionalities you can adjust the inversion of the specific signals. The status of each channel is shown on the 3 LEDs on the front panel for showing sending activity (green), receive activity (yellow) and error condition (red).

## Socket Connections on the front

On the left hand side of front panel you see a 9pin-Sub-D-socket. This is used for 1 serial COM port in order to supply e.g. settings data. Via this connection you can easily do the settings of REG-PED online at any time.

## General Functions

Beside the functions, running by different software applications, there are main functions protecting against malfunctions of the device. These functions are implemented by hardware and software-routines:

## Reset

There are four possibilities to trigger a reset on a REG-PED.

A proper restart of REG-PED is guaranteed in each case:

- by pressing "RESET" on the front panel
- Watchdog runs up
- reconnection and return of power supply
- Reset by monitoring software module

## Watchdog

Watchdog is a hardware-supplement to monitor the smooth process of the software. It consists of a timer that has to be triggered continuously by a background software program. Lack of retriggering leads to a hardware-reset.

The correct status of watchdog is displayed by a red LED on the front panel near the Reset-button.

## Contact positions for COMs and power

### A) DIN-C-Connector

Pin	d	b	z
2	COM1 TxD	COM1 RTS	COM1 RxD
4	COM1 CTS	COM1 485-P	COM1 485-N
6	COM2 TxD	COM2 RxD	COM2 GND
8	COM4 TxD	COM4 RTS	COM4 RxD
10	COM4 CTS	COM4 485-P	COM4 485-N
12	COM4 GND	COM1 GND	COM3 GND
14	COM3 TxD	COM3 RTS	COM3 RxD
16	COM3 CTS	COM3 485-P	COM3 485-N
28			P
30		N	
32	PE		

### B) Sub-D-Connector

Pin	Signal	Pin	Signal
1	COM1 485-P	4	COM1 485-N
2	COM1 RxD	5	COM1 GND
3	COM1 TxD	7	COM1 RTS
4	COM1 485-N	8	COM1 CTS

COM1 is paralelly available at a SUB-D-Connector. N.B.:COM1 may only be connected at one time via DIN-F-Connector or via SUB-D-Connector.

**Technical Data**

**Processor** MPC885  
 Processor Technology CMOS  
 Memory 16-128 MB SDRAM  
 Operating system realtime-UNIX

**Serial Interfaces** 5  
 Input-resistance 1000 Ω  
 Output-resistance 120 Ω  
 Input voltage ±3...12V

**Power supply TK885** +5 V ±10% 0,6 A max.

Reference conditions during operation in a 19" rack

temperature: -10...+55C  
 relative humidity: max. 85% at 25°C  
 Storage:  
 temperature: -25...+65C  
 relative humidity: max. 80% at 25°C

**Parametrizing TK885**

A generated file is transferred via serial RS232 or Ethernet interface from a standard PC into REG-PED. Data is kept in flash memory. Settings can be done via web server of REG-PED, too.

**Applied rules and standards**

EN 55011: 1991 und EN 50082-2: 1995 DIN 40050  
 EN 50178 / VDE 0160 / 11.94  
 ICE 1010/EN61010 (VDE 0411)  
 ICE 255-4  
 ICE 529  
 VDE0110 / IEC 664-1  
 VDE0106 Teil 100

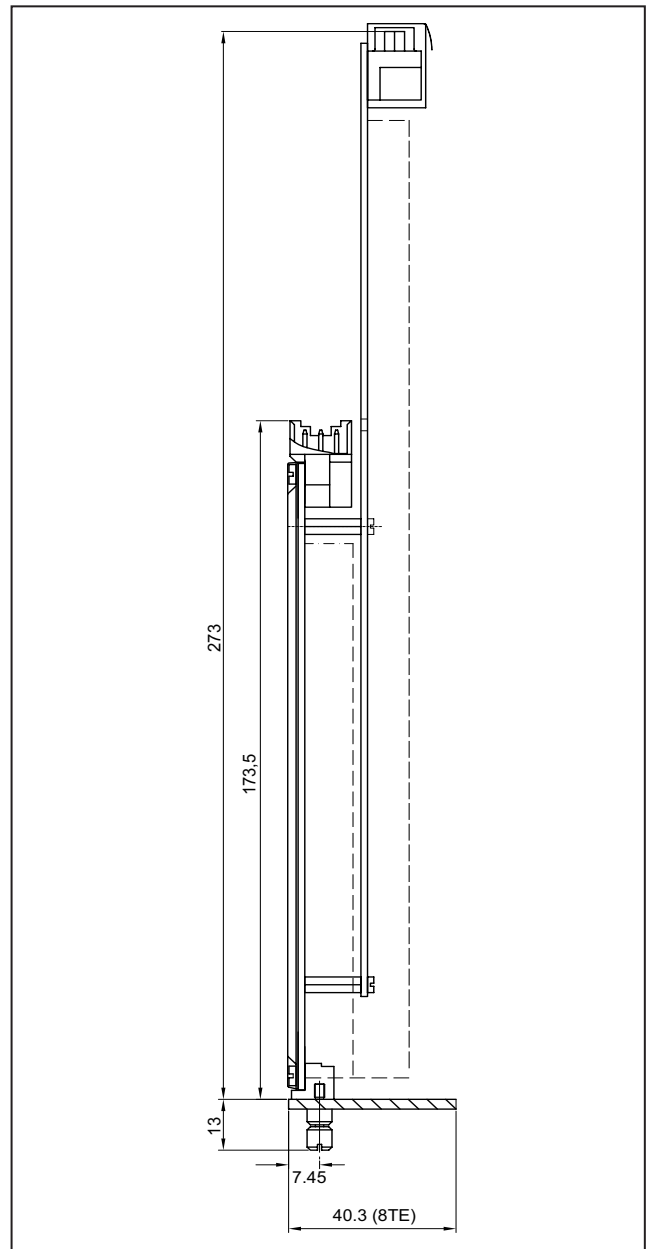


**Mechanical construction**

Front Panel ALU, RAL 7035  
 height, width 3U, 6T  
 (129 mm, 71 mm)  
 weight ≤ 0,4 kg

**Protection class**  
 plug in device IP 00  
 terminal block IP 00

**Mounting**  
 according DIN 41494 Part 5  
 connector block DIN 41612



Picture 1 Dimensions plug-in module

**Data programming cable**

Cable has to be shielded and may not be longer than 1.5m.

PC-Sub-D-Connector	meaning	REG-PED Sub-D-Connecotr 9 pin
1	n.a.	-
2	TXD SMC1	3
3	RXD SMC1	2
4	n.a.	-
5	GND	5
6	n.a.	-
7	n.a.	-
8	n.a.	-
9	n.a.	-

**Electric security**

Protection class 1  
 Grade of pollution 2  
 Overvoltage category, rated insulation voltage

Name	Over-voltage	max. Overvoltage
Serial interfaces	II	300 V front
Serial interfaces	II	350 V back

Transient voltage strength Immunity 5 kV, 1,2/50 ms, 0,5 Ws

Electrostatic discharge Airload 8 kV  
 Contactload 4 kV

Electromagnetic fields 80 MHz...1000 MHz 10 V/m  
 900 MHz ± 5 MHz 10 V/m pulsemodulated

Rapid transient disturbance quantities (Bursts)

Power supply AC 230 V, 2 kV

Contacted RF-disturbance factors 0,15 MHz...80 MHz

$U_{eff} = 10 V$

50 Hz-magnetic field 30 A / m

Disturbance emission Group 1  
 limit class A

**Electrical Connection**

Terminal screws with selflocking protection; clip on connector block

**RS485-Processing**

In order to terminate the RS485-bus you can activate a termination resistor by soldering according short circuits depending on used mainboard type.

**Fibre-optic connectors for COM 1 - 4**

All connectors have SMA/ST-standard-size. The wavelength is at 660/850nm and is ready for glass and plastic fibre-optics.

**Jumpersettings fibre-optic board**

Jumper	meaning
X5-1	receiver invert
X6-1	transmitter invert

**Operating modes**

The telecontrol board REG-PED has got no jumpers on board. In order to switch between the operating modes RS485 and RS232 (fibre optic mode is done via RS232 mode and additional piggy back module) a software parameter has to be set accordingly.

**Commissioning of the board**

For commissioning purposes a quick guide and an elaborately user manual with parameterizing guide is coming with the board and also downloadable on our home page. The parameterizing is done via web browser or a Windows-based application.

**Fields of application**

The telecontrol board REG-PED processes the following telecontrol protocols together with eberle devices:

- IEC 60870-5-101
- IEC 60870-5-103
- IEC 60870-5-104
- IEC 61850
- DNP 3.0
- Routers:
  - IEC 60870-5-101 to IEC 60870-5-104
  - IEC 60870-5-103 to IEC 60870-5-101
  - IEC 61850 to IEC 60870-5-104
- Modbus RTU
- Other protocols on demand

The telecontrol connection can be made via RS232, RS485 and fibre optics.

Settings are done via web browser or a Windows-based application, which is divided in two main sections:

- common part where only baud rate and device name or address have to entered and
- advanced part where specialist may adjust specifics.

This implies timeouts etc. and other protocol specifics as well as modification possibilities of the telecontrol profiles.

Example picture of mounting in 19"-rack:

**Ethernet connection**

The REG-PED is available with either RJ45 or fiber optic (ST) connectors. The RJ45 connector provides Ethernet at 10 or 100 MBit (autoswitching) whereas the fiber connectors are only available at 100 MBit speed.

**You can order the board with**

- 2 RJ45 or
- 1 RJ45 and 1 ST or
- 2 ST connectors.

REG-PED		only 3 different baud rates in total available						
Mnemonic: <b>REG-PE Duo</b>		FEC1	FEC2	SMC1	SMC2	SCC1	SCC2	SCC3
Base: <b>MPC885</b>				1)	1)		1)2)	
10/100MBit	RJ45	x	x					
	Optical (ST-type, onboard)	x	x					
1200-115200bd	RS232			x	x	x	x	x
	RS485					x		x
	Optical (ST or SMA-type): FTR2!				x	x	x	x
19" rack	Front side			x				
	Back side	x	x		x	x	x	x
wall mount rack (REG-DA)	Inside	x	x	x		x	x	x

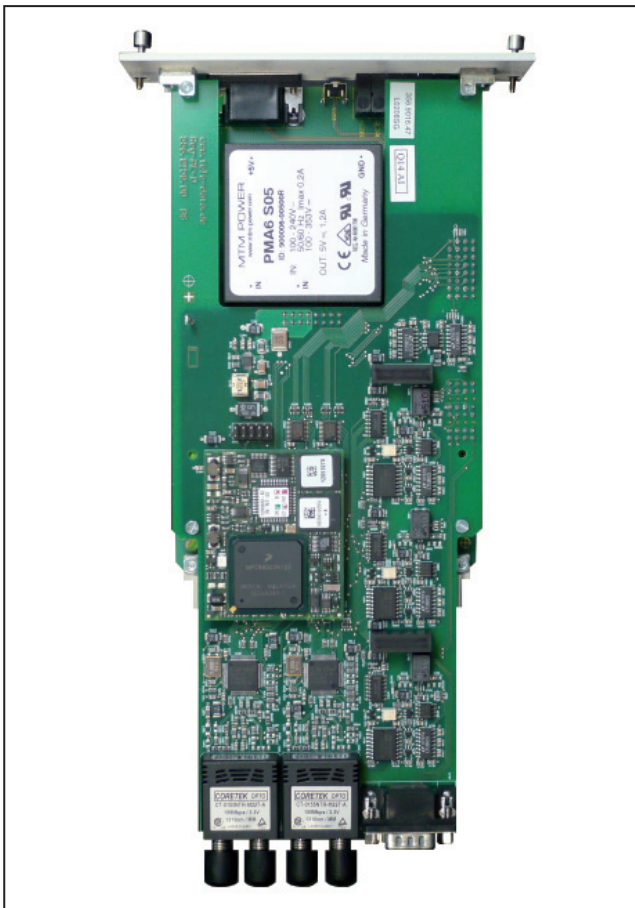
**FEC= Fast Ethernet Connector**

**SMC/SCC= Serial COM Ports**

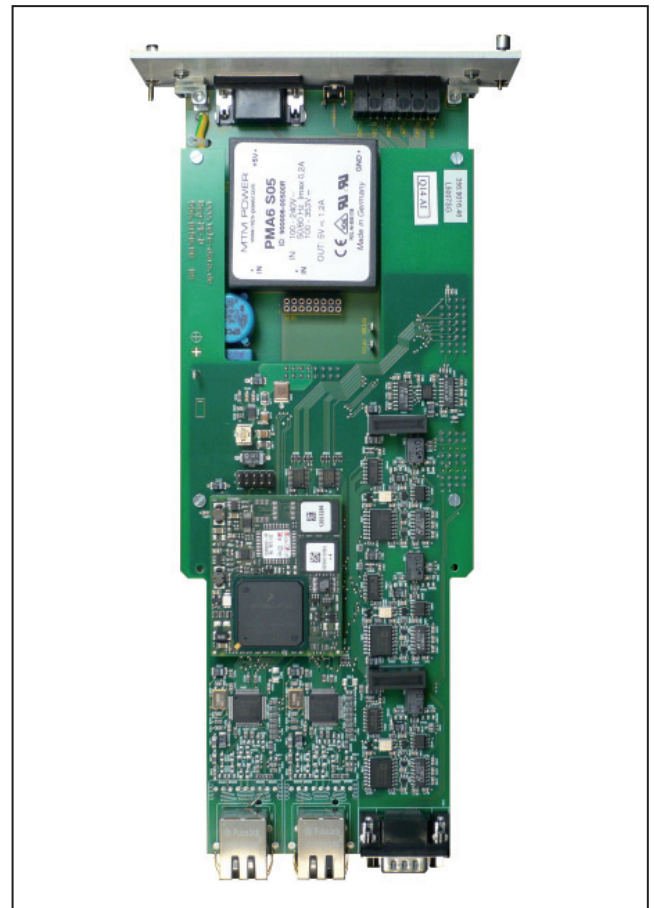
1) without hw-handshaking signals

2) normally used for connected eberle-device

**Note:** All kinds of REG-PE come without power-supply, whereas REG-PED comes always with power-supply.



Picture 2: Fibre optic (ST) version



Picture 3: Electrical (RJ45) version

**Example Applications:****A) Com Server****a) Com Server Only Application**

Up to 4 COM ports serve both Ethernet connections assumed that the 2 Ethernet addresses are of different name spaces, e.g. IP address of Port 1 is 192.168.1.214 and IP address of Port 2 is 10.0.0.215.

**b) Mixed Application**

Any IEC protocol can be served at the same time working as com server to a device by prioritizing IEC protocol before com server functionality.

**B) Dedicated Protocol Application****a) Working as Telecontrol Board for eberle devices**

Starting with IEC 60870-5-103 or 104 as telecontrol protocol for the substation connection of eberle devices you can easlily update later to IEC 61850 by firmware update, no hardware change needed.

**b) Working as Protcol Router**

- IEC 60870-5-101 to IEC 60870-5-104  
Up to 4 COM ports may be used to connect the Router to IEC 60870-5-101 lines of several substations to multiple control centres via IEC 60870-5-104. The needed settings for this application reduces to enter addresses and baudrate.

- IEC 60870-5-103 to IEC 60870-5-101

With the help of the fibre optic star couplers of eberle you may connect up to 8 IEC 103 devices to one COM port of REG-PED board and route information to another COM port with EC 101 protocol

- IEC 61850 to IEC 60870-5-104  
One Ethernet Port may be connected to IEC 61850 and the other Ethernet port to IEC 60870-5-101 or both protocols may be operated at the same Ethernet port.

**C) Mixed Ethernet operation**

If you order one Ethernet port with electrical RJ45 connector and the other Ethernet port with fibre optic connector you are free in choosing connector type. Even contemporary use of both ports is possible.



**Order details**

**Only one code of the same capital letter is possible**

- When the capital letter is followed by number 9, further details are necessary
- The code can be omitted when the capital letter is followed by zero
- An X code e.g. XP1 cannot be combined freely with other codes

CHARACTERISTIC		CODE	
<p><b>Protocol Interface Unit</b> (8TE, 3HE)                      for connection of the automatic voltage controller system REGSys to SCADA systems                      with Power PC MPC 885, 16MB flash, 32MB RAM                      with 2 COMs incl. parametrization tool WinConfig                      REG-PED can also be used as a COM-Server</p> <p><i>Please note: REG-PED could also be used as data concentrator (...103 ==&gt; ..101) or as a Router: (...101 =&gt;...104 or IEC61850 server =&gt;...103 client)</i></p>		REG-PED	
<b>Design</b>	1plug-in unit installation with other REGSys-components	B1 B9	
<b>Power Supply</b>	AC 85V...110V...264V / DC 100V...220V...280V DC 18V...60V...72V	H0 H2	
<b>Type of application</b>	as Com-Server only with 4 x RS 232 and 3 x RS485 and RJ 45 cont. with feature group "G"  for connection of one REG-D for connection of combinations of REG-D/DP, EOR-D, PQI-D, CPR-D etc.  <i>Note: L9 can only be used in combination with Z02, Z31, Z92</i>	L0  L1 L9	
<b>Type of connection</b>	RS 232 cont. with feature Z01..Z23 RS 485; two-wire operation only cont. with feature Z01..Z23 1 x FO glass with ST connection for Z01 Z23 cont. with feature group "V"	D1  D2  D3	
9,6 to 19,2 kBit/s			
100 MBit/s	2 x RJ 45 cont. with feature Z31, Z92 2 x FO glass with ST connection cont. with feature Z31, Z92 1 x RJ 45 and 1 x FO glass with ST connection cont. with feature Z31, Z92 combinations of D1 to D6	D4  D5  D6  D9	

CHARACTERISTIC		CODE	
FO version	<b>Fibre optic; connection with FSMA</b> glass (wavelength 800...900 nm, distance < 2000 m) plastic (wavelength 620...680 nm, distance < 50 m) two or three fibre optic connections on demand	V13	
		V15	
		V90	
	<b>Fibre optic; connection with ST</b> glass (wavelength 800...900 nm, distance < 2000 m) plastic (wavelength 620...680 nm, distance < 50 m) two or three fibre optic connections on demand	V17	
		V19	
		V91	
Protocol	9,6 to 19,2 kBit/s	IEC 60870-5-103	Z01
		IEC 60870-5-101	Z02
		DNP 3.0 MODBUS RTU	Z20 Z23
	100 MBit/s	IEC61850	Z31
		IEC 60870-5-104	Z92
		<i>Please note: In case of IEC 60870-5-104 please specify the target SCADA system. Additionally please note that with Z92 COM- Server function is not available!</i>	
Operating manual:	German	G1	
	English	G2	

ACCESSORIES	KENNUNG
Parametrization tool running on REG-PED HW meant for remote control of REG-D/DA and PAN-D <i>Please note: It is available in combination with IEC 61850</i>	<b>WebREG</b>

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