

EPPE

Power Quality Analysers

Operating Instructions

EPPE PX

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1 EPPE PX



Power quality analyser and fault recorder

EPPE PX is a multi-functional measurement and analysis system for comprehensively monitoring and assessing equipment in electricity supply systems.

It has been specially developed for mobile measurements and installation monitoring. Sensor inputs, direct inputs for current measurement and galvanically isolated voltage inputs make the device extremely flexible to use. The rugged carrying case protects the measuring device even in harsh environmental conditions.

- Power quality analyser according to IEC61000-4-30 class A
- Continuous data recorder
- Event recorder
- RMS fault recorder for detecting and assessing slow processes such as power swings or for generator monitoring
- High-resolution fault recorder for transient processes with sampling rates up to 30 kHz

1.1 Examples of applications

- Power quality analysis
- Power quality monitoring
- Differential current measurement
- Fault analysis
- Measurement of harmonics
- Monitoring and analysis of renewable power systems
- Network optimisation
- Load management
- Monitoring to EN 50160
- Fault location
- Trend recording
- Critical load monitoring
- Consumption measurements, e.g. for load optimisation

1.2 Benefits to the user

- Continuous recording of power system activity. The power system becomes transparent. Sources of disturbances can be identified and potential energy savings revealed
- Detailed event recordings are available shortly after the occurrence of a fault
- The integrated message management features comprehensive notification functions for faults, enabling immediate action to be taken even when more than one department is involved
- Cost reductions result from the early detection of power system disturbances, while detailed information on faults leads to shorter power system downtimes
- Proof of power system faults or of normal system operation and of compliance with quality criteria can be provided at any time
- High-resolution fault recorder functionality for detailed fault analysis
- Sensor inputs, direct inputs for current measurement and galvanically isolated voltage inputs make for flexible measurement tasks
- Measuring device and accessories according to safety class CAT IV

2 About this document



These operating instructions describe how to commission, connect, operate and maintain an EPPE PX power quality analyser.

A separate user manual for the EPPE operating software describes how to operate and control the power quality analyser with a PC.

This user manual is intended for:

- Persons who know how to switch on and off, enable, earth and identify electrical circuits and devices/systems in accordance with the applicable safety standards
- Trained operating personnel in electrical installations

2.1 Other applicable documents

A number of other documents apply in conjunction with these operating instructions. The manufacturer is not liable for damages resulting from failure to comply with information contained in any of these documents.

All documentation pertaining to the commissioning, configuration of settings, operation and maintenance of an EPPE PX power quality analyser also applies.




Other applicable documents for the user:

- User manual for the EPPE operating software


2.2 Validity of the present document

These operating instructions apply only to power quality analysers with the type designation EPPE PX. The type designation and the serial number of the power quality analyser are detailed on the rating plate.

2.3 Warning marks and symbols

Symbol	Explanation
	DANGER This symbol indicates the presence of an immediate risk associated with electric voltage. If this risk is not avoided, death or serious injury may result.
	CAUTION This symbol indicates the presence of a potential risk associated with improper use. If this risk is not avoided, personal injuries or material damage may result.
	NOTE This symbol highlights notes and information.

2.4 Typographical conventions

Symbol	Explanation
	This symbol highlights instructions which require action on the part of the user
1. 2.	Numbered lists are used for actions which must be carried out in the order given
■	This symbol marks the items of a list

3 Basic safety information



CAUTION

The safety information and regulations detailed below must be complied with!
The relevant regulations issued by the appropriate institutions for statutory accident insurance and prevention (professional and trade associations) must be followed.

3.1 General information



DANGER

Failure to comply with safety information, incorrect use of the power quality analyser, or use other than the intended use can endanger property and personnel and result in damage or injury.

These operating instructions must be read and understood in full before the power quality analyser is put into operation. They must be kept for future reference and be made available to anyone who uses the power quality analyser throughout its operational life.

3.2 Qualifications of operating personnel

The power quality analyser is only to be used by qualified personnel in accordance with safety rules and regulations. The statutory provisions and safety regulations for the specific application must also be observed when using the power quality analyser.

The term "qualified personnel" refers to persons who are familiar with the set-up, commissioning and operation of the product and who have appropriate qualifications:

- Training or instruction and authorization to switch on and off, isolate, earth and mark accordingly electrical circuits and devices in accordance with safety standards
- Instruction in accordance with the regulations of the appropriate institutions for statutory accident insurance and prevention (professional and trade associations)
- Safety standards in the care and use of appropriate safety equipment



The EPPE operating software offers the option of managing a list of users and their respective access rights. This makes it possible to give only selected persons access to specific functions of the power quality analyser, see the user manual for the EPPE operating software.

3.3 Intended use

The EPPE PX power quality analyser is manufactured in accordance with the state of the art and recognized safety rules.

However, improper use or use other than the intended use can endanger the life and limb of users or third parties and cause damage to the power quality analyser or other property.

The manufacturer is not liable for consequential damage arising as a result of use other than the intended use. Any claims under the guarantee are void.

No modifications may be made to the power quality analyser other than those which are described in this document or in the other applicable documents.

The EPPE PX power quality analyser may only be used for the applications listed below:

- monitoring and assessment of equipment in electricity supply systems

3.4 Safe operation

If there is any reason to suppose that the power quality analyser cannot be operated without risk, it must be put out of operation immediately and secured against unintended start-up.

This applies if, for example:

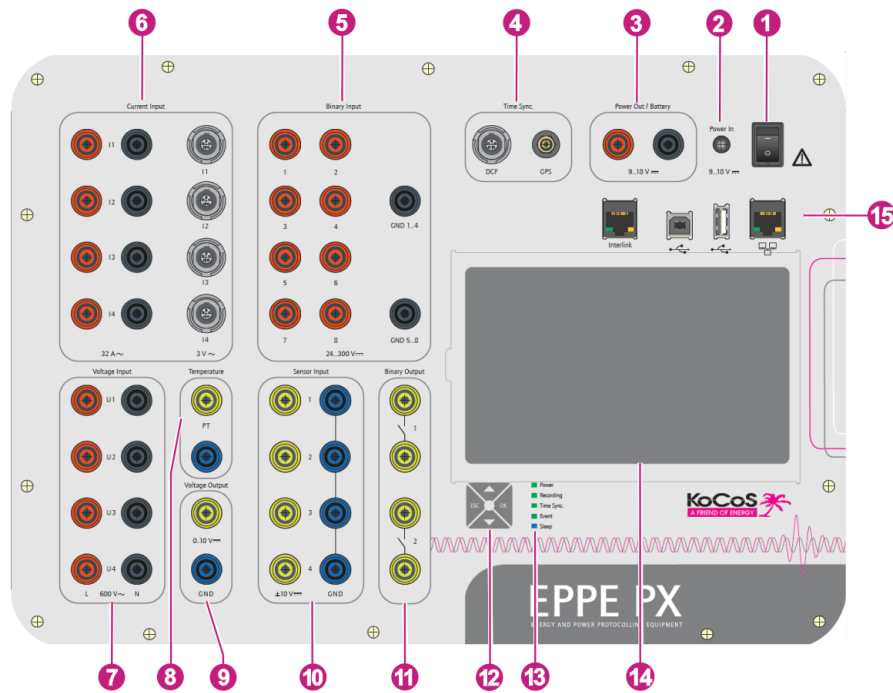
- there is obvious damage to the device or accessories.
- the device or accessories do not work properly although the power supply is intact.
- the device or accessories have been exposed to unfavourable conditions for a significant length of time (e.g. storage at temperature and humidity levels which are beyond the permissible limits without gradual adjustment to the indoor environment, condensation or other similar conditions).
- the device or accessories have been exposed to undue transport stresses even if there is no visible external damage.

3.5 Personal protective equipment

The regulations on personal protective equipment laid down by the company operating the power quality analyser at the installation location apply. No additional protective equipment is required.

4 EPPE PX overview

4.1 Front panel



	1	Power switch	ON/OFF switch for the power supply
	2	Connection for power supply unit	Power supply for the power quality analyser
	3	Supply accessories / battery	Power supply for external sensors, UMTS routers and connection capability for power bank
	4	Time synchronisation module	Time synchronisation interfaces
	5	Binary inputs	8 binary inputs in 2 groups (activation range 24...300 VDC)
	6	Current inputs	4 x U (3 V Ph-N) / 4 x I (32 AAC)
	7	Voltage inputs	4 x U (600 V Ph- N)
	8	Temperature input	1 temperature input
	9	Analog output	1 analog output (0...10 V)
	10	Sensor inputs	4 x U (10 V Ph-N)
	11	Relay outputs	2 potential-free switching outputs for alarm signals
	12	Membrane keypad	Function keys and navigation keys in addition to the touch screen
	13	Status display	Display of status and alarm signals with the option of evaluating fault records directly on the device itself
	14	Colour graphical display with touch screen	Display of device and status information, option of settings parameters and evaluating directly on the device itself
	15	Communication interfaces	Ethernet RJ45, USB A, USB B Interlink interface

5 Commissioning

The power quality analyser may only be put into operation by specialist staff who have received appropriate instruction from the manufacturer.

Proper transport, specialist storage, set-up and commissioning and careful operation, maintenance and servicing are essential in order for this power quality analyser to function perfectly and safely.



CAUTION

Check that the delivery is complete and was not damaged during transport. Do not put the power quality analyser into operation if there is any damage.

5.1 Transport and storage



The following regulations apply for the transport and storage of the power quality analyser:

- Keep upright; avoid strong vibrations and mechanical influences
- Keep the power quality analyser dry
- Protect the power quality analyser from direct sunlight and heat

5.1.1 Unpacking

The device must be unpacked with care. Suitable tools are to be used. The original packaging is to be retained for subsequent transport.

- Open the top of the cardboard box and remove the device together with the inner packaging
- Unfold the inner packaging to loosen the stretch film holding the device in place
- Check the packing list to make sure no items are missing
- Perform a visual inspection to check that the power quality analyser is in perfect condition

5.2 Requirements to be fulfilled by the installation location

- Impermissible environmental conditions may result in damage to the power quality analyser and jeopardize safe operation
- Ensure environmental conditions conform to the technical data specified in the appendix
- Avoid air pollution
- Avoid high levels of air humidity
- The power quality analyser is not protected against the ingress of moisture. For this reason it may only be used indoors in dry conditions. Damp and wetness can damage the system and cause dangerous short circuits
- When the power quality analyser is moved from a cold environment into a warm one, condensation can be a source of danger. Earthing instructions must be observed!



DANGER

Gases may ignite as a result of sparking which may occur while connecting or operating the power quality analyser.

Do not use the power quality analyser in environments with explosive gases, vapours or dust.

5.3 Setting up the measuring device

EPPE PX is a portable device which can be placed on any even ground which offers sufficient stability during measurements. To prevent a build-up of heat, it is important to ensure that the measuring instrument is far enough away from other devices and electrical installations.

CAUTION



- The power quality analyser may only be installed by qualified electrical technicians
- The operating instructions for the EPPE PX must be read in full before the device is installed and must be followed
- The relevant regulations issued by the appropriate institutions for statutory accident insurance and prevention (professional and trade associations) must be followed

5.3.1 Environment

The environmental conditions specified in the chapter titled **Technical Data** must be adhered to at all times.

5.4 Connection to power supply



DANGER

- Incorrect connection to the power supply can cause death or injury from electric shock!

CAUTION



- Operating the power quality analyser with an incorrect power supply voltage may damage it and leads to loss of the guarantee
- Before powering the power quality analyser, ensure that the voltage and the frequency of the power supply are consistent with the information on the rating plate
- The cables for the supply voltage must be suitable for the voltages used
- The cables should be protected with an appropriate fuse

5.4.1 Connecting to the power supply

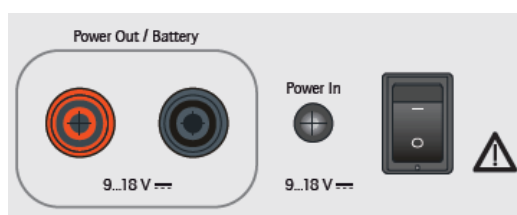


Fig.: Power supply connection

Use the external power supply unit provided to connect the power supply to the **Power In** socket.

The permissible voltage range is detailed on the rating plate on the back panel.

External power supply unit:

100-240 VAC (100-350 VDC), 47...63 Hz

The internal operating voltage of the device is 9-18 VDC. This allows the device to be operated with a battery or power bank via the separate **Power Out/Battery** terminal.

When the supply voltage is connected, the device can be switched on and off with a separate switch.



CAUTION

The supply voltage must not be picked off from medium- or high-voltage transformers. Switching operations on the primary side (HV, MV) can lead to short-term overvoltages which could damage the external power supply unit or the supply voltage input of the device.

5.4.2 Emergency power supply

EPPE is equipped with a maintenance-free internal emergency power supply which temporarily maintains the functionality of the device in case of power failure. During this time EPPE can complete the recordings which are currently underway, save all data reliably and shut down in a controlled way.



DANGER

Because of the internal emergency power supply, the device is not immediately de-energized when disconnected from the power supply. Only when the status display **Power** is no longer lit up, is the device de-energized! The device can be switched off in advance using the power switch.

6 Status display

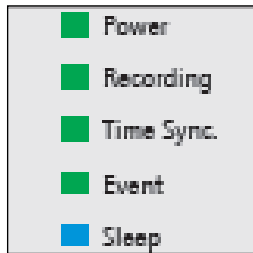


Fig.: Status display

Light-emitting diodes located on the front panel indicate the operating status of the measuring instrument.

LED	Name	Description
1	Power	<ul style="list-style-type: none"> ■ Lights up when the device is switched on and the supply voltage is applied ■ Flashes when EPPE is operated via the internal emergency power supply
2	Recording	<ul style="list-style-type: none"> ■ Lights up when the device is actively recording measurement data
3	Time Sync	<ul style="list-style-type: none"> ■ Lights up when the selected time synchronisation mode is functioning correctly, flashes during synchronisation ■ Does not light up when synchronisation was not successful
4	Event	<ul style="list-style-type: none"> ■ Lights up when new fault records or events are available which have not yet been read out ■ Goes out once data transmission has been completed successfully or once the data in the device has been deleted
5	Sleep	<ul style="list-style-type: none"> ■ Lights up when the screen saver is activated

7 Operation

These operating instructions describe the basic operation and configuration of the EPPE PX using the integrated touch screen and the function keys.

Functions such as automated operation, report creation and message management are executed with the EPPE operating software. The operating software is described in the separate user manual.

7.1 Touch screen



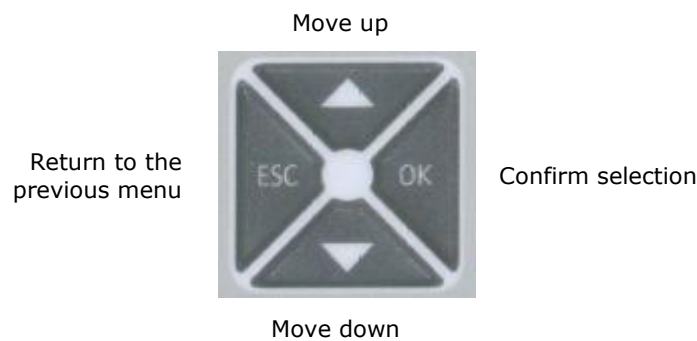
Fig.: Start screen and function keys

Using the built-in touch screen, it is possible to carry out all basic tasks connected with operation and settings.

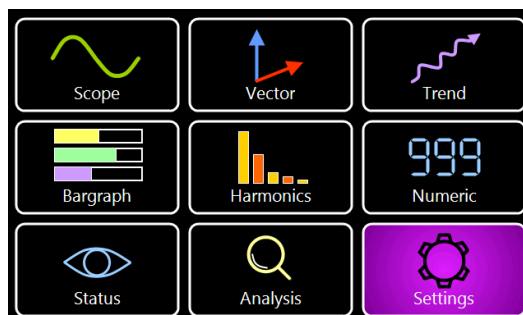
All functions and measured value displays can be selected directly from the main menu. All important measured values and status information can be seen at a glance.

7.2 Function keys

Alternatively, the device can also be operated with the aid of the function keys.

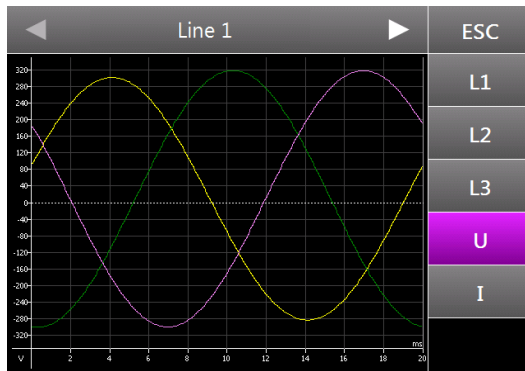


7.3 Main menu



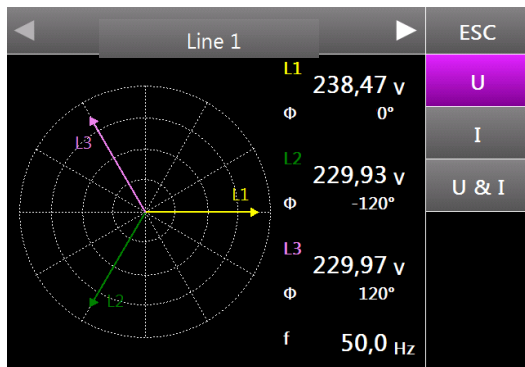
- Select the menus by tapping the corresponding button

7.4 Scope



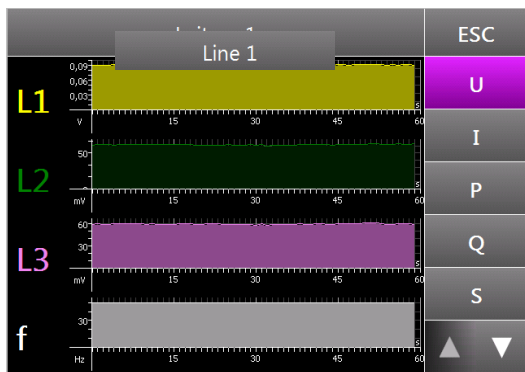
- Shows the signal characteristic of the voltages and currents
- Time period 20 ms (1 period at 50 Hz)
- The display automatically zooms in on the optimum area

7.5 Vector



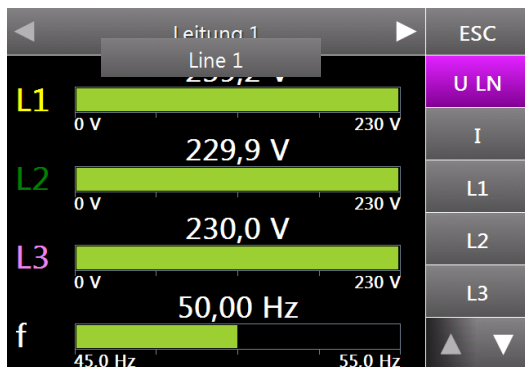
- Shows the voltage and current values as a vector diagram
- Additional numerical display
- Numerical display of the phase displacement

7.6 Trend



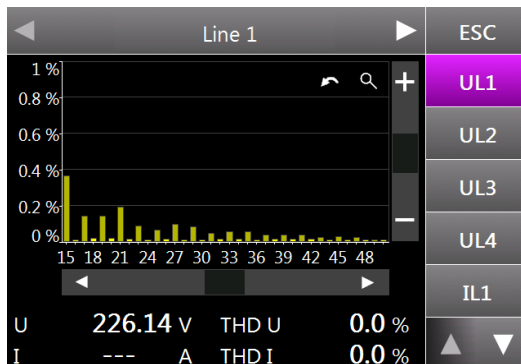
- Displays the rms voltages and rms currents as a trend

7.7 Bar graph



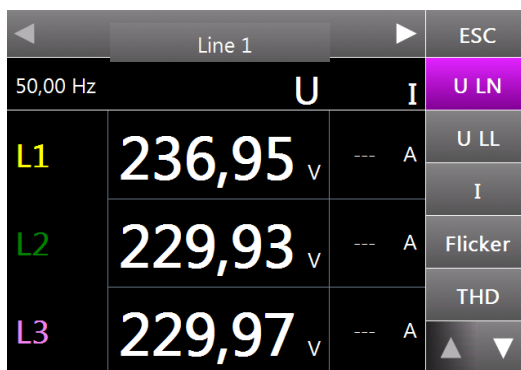
- Displays the voltage, current, power, energy, frequency and sensor values in the form of a bar chart and as numerical values
- Swipe or tap the arrow buttons in order to scroll the selection bar

7.8 Harmonics



- Percentage display of harmonics in relation to the rms value of the fundamental wave in the form of a bar chart
- Swipe up or down in order to scroll the selection bar
- Activate/deactivate the zoom function by tapping the magnifier

7.9 Numerical



- Numerical display of measurement values, such as voltages, currents, flicker, THD, cos φ, power values, energy values etc.
- Display/hide L4 (N) by swiping across the display area in a horizontal direction
- Swipe up or down in order to scroll the selection bar

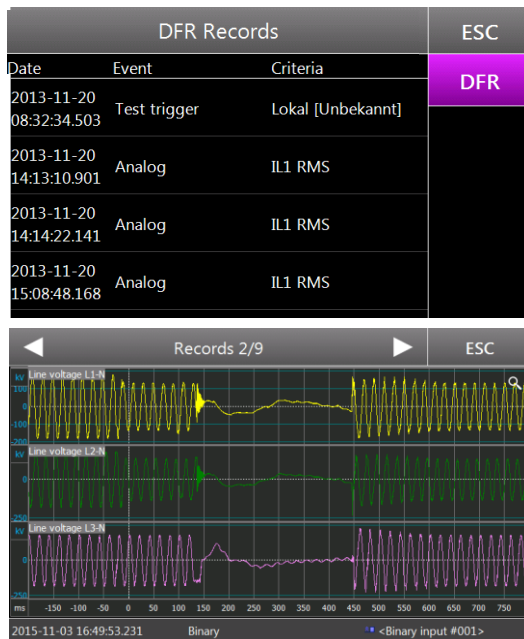
7.10 Status

Ch.	State	Name	
01	○	<Binary output #01>	ESC
02	○	<Binary output #02>	Info
03	○	<Binary output #03>	Bin In
04	○	<Binary output #04>	Bin Out
05	○	<Binary output #05>	Version
06	○	<Binary output #06>	
07	○	<Binary output #07>	
08	○	<Binary output #08>	

Display of general status information:

- State of the binary inputs and relay outputs
- Information on time synchronisation
- Status information on the measuring instruments
- General device information (firmware etc.)

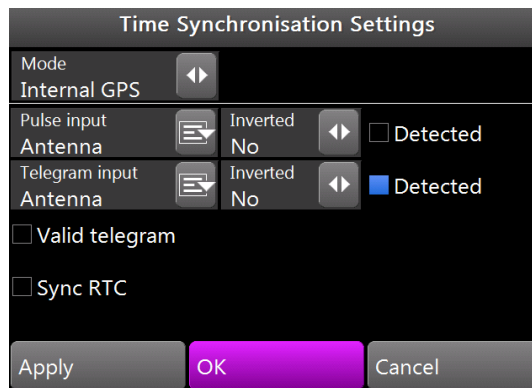
7.11 Analysis



- Displays the current fault records saved in the device with date, time, trigger criterion, event
- Option of displaying fault records allowing on-site analysis
- Information about PQ limit value violations with date, time and duration of the violation

7.12 Settings

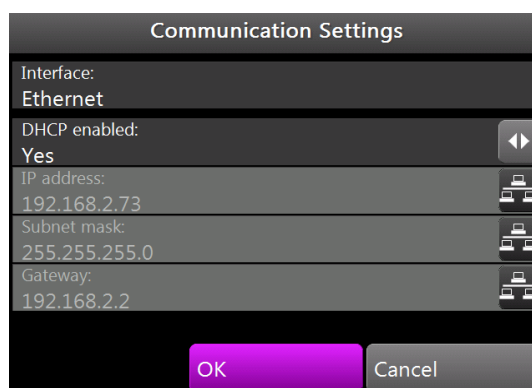
7.12.1 Time synchronization



System time settings and their synchronisation can be made here. For more information, see the section of these operating instructions titled **Time synchronisation/Set the mode**.

The settings can also be made in the operating software. For more information, see the manual for the EPPE operating software.

7.12.2 Communication



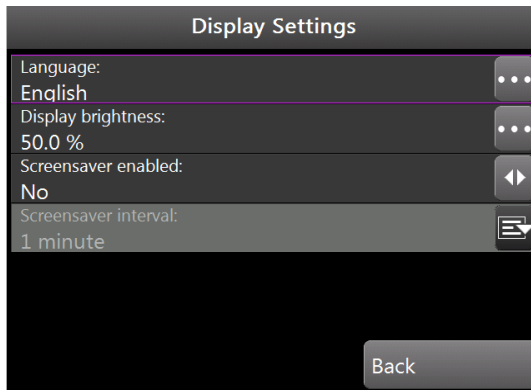
Communications settings

The parameters for the communication interfaces can be set here. For more detailed information, see the section titled **Communication interfaces**.



The description of how to use the IEC 60870-5-103 communication protocol can be found in the user manual for the EPPE operating software.

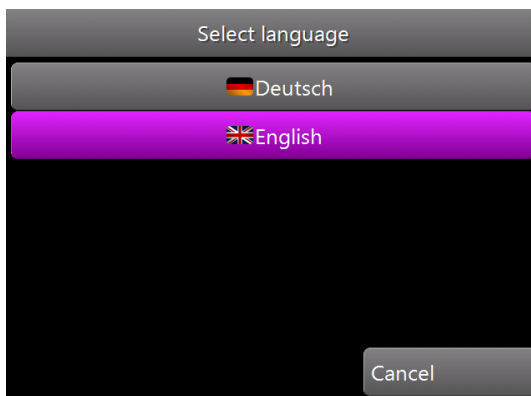
7.12.3 Display



Display settings

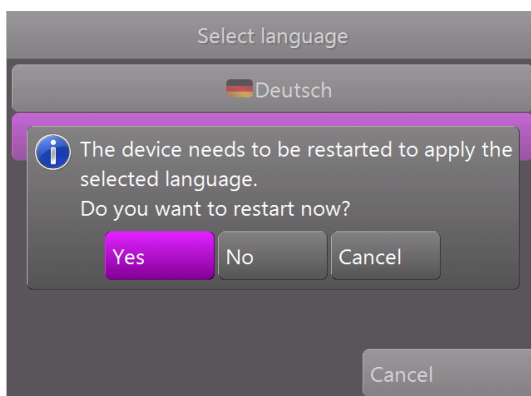
The following settings can be made for the display:

- Language
- Brightness
- Screen saver



Select a language

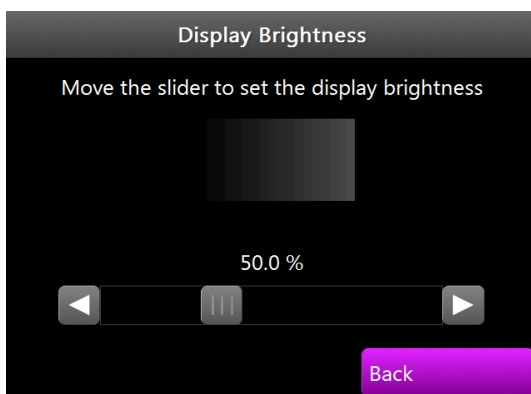
- Select a language by tapping the screen



The user is automatically requested to restart the device

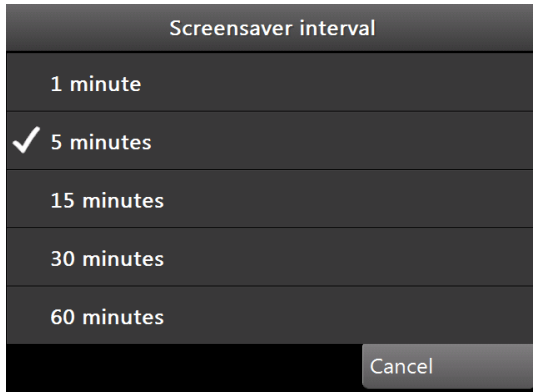
- Confirm request

The next time the device is restarted, the selected language is displayed.



Screen brightness

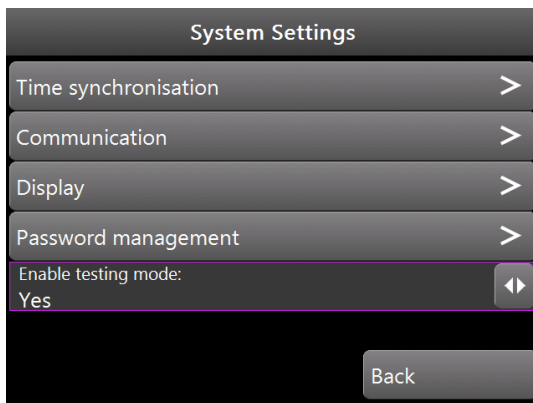
- Use the slider to set the screen brightness



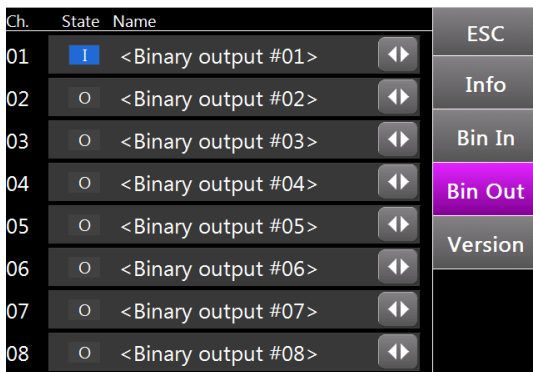
Screen saver interval

- Tap the screen to set the time required to elapse before the screen saver is activated

7.12.4 Test mode



In the test mode, the binary outputs can be switched manually in the **Status/Bin Out** menu, for functional tests during commissioning, for example.



8 Measurement signals



CAUTION

The measurement signals (voltages, currents, binary signals) may only be connected to the measuring instrument when it is absolutely certain that the defined measuring ranges will not be exceeded.

8.1 Analog inputs

Because of the absolutely linear frequency response, all the analog inputs provide excellent accuracy across the entire frequency range.

Rated values and transformation ratios of transformers are set in the operating software. For more information, consult the separate user manual.

EPPE PX provides the following analog inputs:

- 4 voltage inputs (600 V Ph-N)
- 4 direct inputs for current measurement (32 AAC)
- 4 current sensor inputs (3 VAC)

8.1.1 Voltage inputs and direct inputs for current measurement

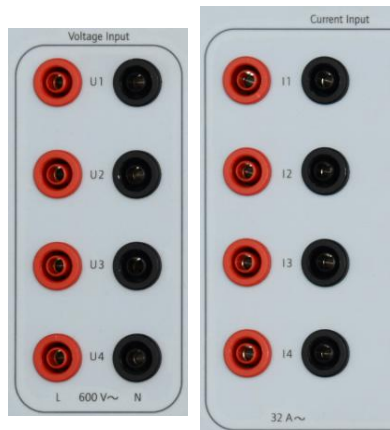


Fig.: 4 voltage and 4 current inputs

4 voltage and 4 current inputs with complete galvanic isolation for direct connection to instrument and protection transformers, for example.

Main applications:

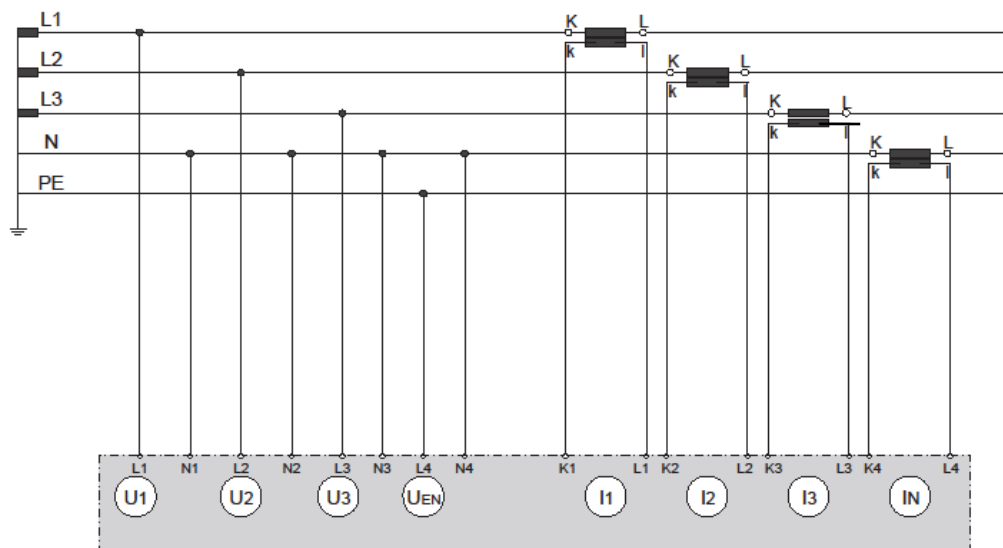
- Voltage measurement
- Direct current measurement
- Monitoring one power system

Measuring ranges:

- 600 VAC / ± 848 VDC
- 32 AAC (500 AAC for max. 1 s)

Connection example

Measuring 4 voltages and 4 currents via direct inputs for current measurement



8.1.2 Voltage inputs and current sensor inputs

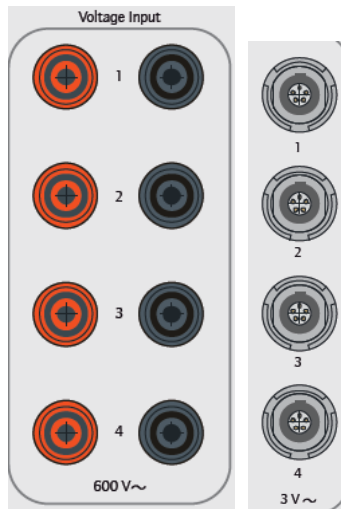


Fig.: 4 voltage and 4 current sensor inputs

- 4 voltage and 4 current sensor inputs

Main applications:

- Voltage measurement
- Current measurement via current sensors
- Monitoring one power system

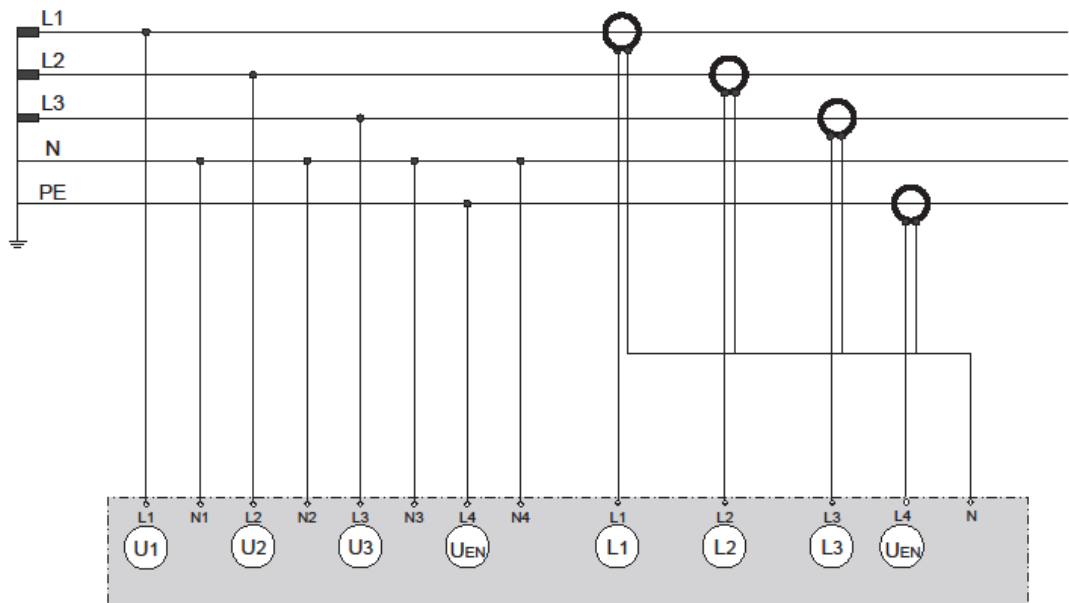
Measuring ranges:

- 600 VAC / ± 848 VDC
- Current dependent on the current clamp in use (e.g. 3/30/300/3000 A)

The transformation ratio of the current clamp is set in the analog channel configuration of the operating software.

Connection example

Measuring via current sensors



8.2 Sensor inputs

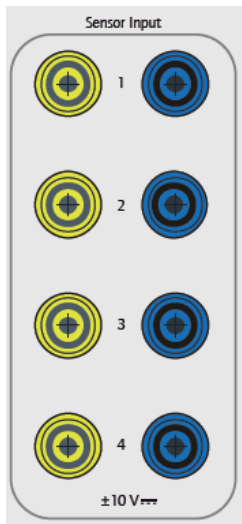


Fig.: Sensor inputs



Fig.: Temperature input



Fig.: Analog output

In addition, EPPE PX features 4 analog inputs, 1 temperature input and 1 analog output for monitoring the environmental conditions.

Measuring ranges:

4 analog inputs (sampling rate 10 KHz)

Measuring range can be selected:

- 10 V (sensor technology)
- 20 mA (optional external module)

1 temperature input (sampling rate 100 Hz)

- Pt1000
- Measuring range - 20 ... 80°C

1 analog output (process output)

Output signal can be selected:

- 0...10 V

Rated values, transformation ratios of transformers and the transformation ratios of the sensors are set in the operating software.

Main applications:

- Voltage measurement
- Differential current measurement
- Monitoring installations via sensor technology
- Temperature measurement

8.3 Binary inputs and outputs

EPPE PX is equipped with 8 binary inputs and 2 relay outputs.

Binary inputs

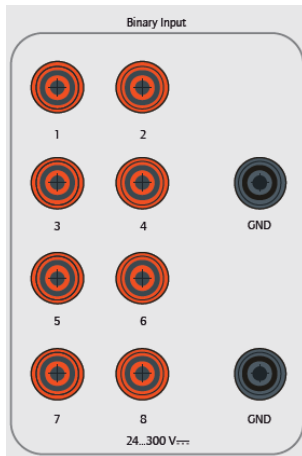


Fig.: Binary inputs

8 inputs for binary status signals with galvanic isolation. The inputs are divided into 2 groups of 4 channels. Each group has a common reference point.

The special input circuitry of the binary inputs is designed for operation with voltages between 24 and 300 V. Signal misidentifications due to transients which can be caused by switching operations, for example, are effectively eliminated.

Features:

- 8 binary inputs in 2 groups of 4 channels
- Response threshold: 24 to 300 VDC
- Resolution: 0.1 ms

In general the binary inputs are potential-free (dry). This means that an external d.c. voltage must be applied to control the inputs.

The binary inputs are extended range inputs which can be reliably activated with a voltage between 24 VDC and 300 VDC. Correct polarity is important. However, incorrect polarity will not destroy the inputs.

To reliably suppress false tripping by electromagnetic interference, for example, the inputs are constructed in such a way that a current of approx. 4 mA is required in order to activate them.



Because of the way they are constructed, it is possible that the response threshold of the binary inputs may lie below 24 VDC.

Binary outputs



Fig.: Binary outputs

EPPE PX features 2 relay outputs for status or alarm signalization:

- 2 potential-free relay contacts

The relays can be connected as normally open (NO) contacts.

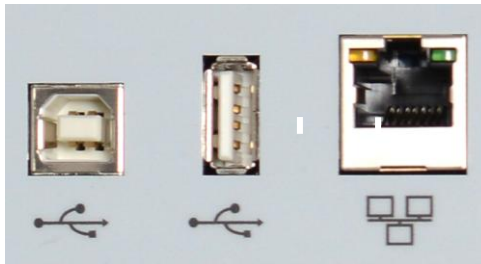
The function allocation of the relays can be edited in the device configuration. User-definable messages, such as messages to be issued in the case of limit value violations, can also be set there.

Switching capacity:

Binary Output 1-2 (electromechanical):

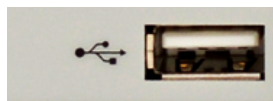
- Max. 220 VDC, 2 AAC, max. 60 W

9 Communication interfaces



Various interfaces are available for configuring and operating the measuring instrument and for reading out the recorded data.

9.1 USB interfaces



USB-A

Active USB interface especially for data transmission via USB storage media, for example for firmware updates or for reading out the measurement data saved in the device.

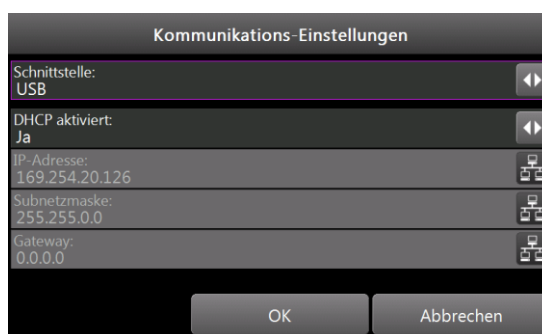


USB-B

Passive USB interface for the communication with a PC.

The maximum cable length for the USB connection is 5 m. If longer cables are necessary, a USB hub or an active USB cable must be used as an extension.

9.1.1 Setting the USB interface



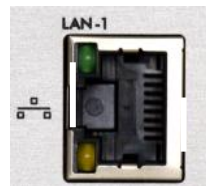
- Use the USB cable to connect the measuring instrument and the PC
- Call up the **Settings/Communication** menu
- Select the **USB** interface



If **USB** is not displayed in the menu, no active USB connection between PC and measuring instrument is available or the driver is installed incorrectly.

- Start the EPPE software
- Enter the displayed IP address in the software under **Add device**

9.2 Ethernet interface

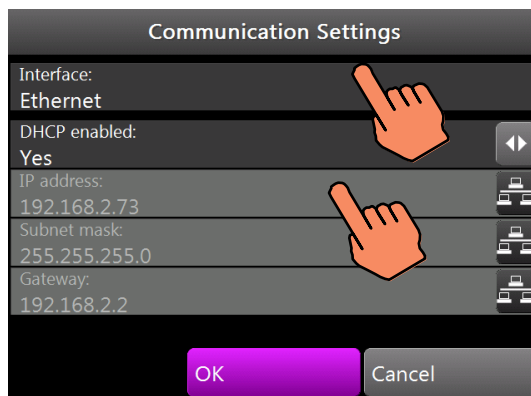


Ethernet interface

The Ethernet interface complies with the IEEE802.3/802.3u/802.3x standards and is RJ45, 10/100 Base T(X), autosensing.

It is recommended that shielded CAT 5 cables be used for connection. The maximum cable length is 100 m.

9.2.1 Setting the Ethernet interface



- Call up the **Settings/Communication** menu
- Select the **Network** interface

DHCP activated:

The power quality analyser is automatically integrated in the connected network.

DHCP deactivated:

The connection parameters must be entered manually.



- Tap the text boxes for the **IP address**, **subnet mask form** or **gateway**

The input keyboard is opened.

9.3 KoCoS Interlink interface

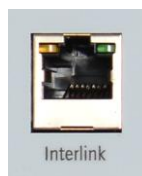


Fig.:Interlink interface

A number of EPPE PX devices can be connected together using the KoCoS-Interlink interface. The interface transfers signals which are used for time synchronisation between the measuring instruments and for passing on selective trigger information.



The KoCoS-Interlink interface is used for time synchronisation and cross-triggering only. It does not provide data communication channels.

10 Time synchronization



The synchronisation interfaces allow exact time synchronisation to various time standards. To provide optimum flexibility, EPPE PX is equipped with various inputs for external time signals as well as a built-in GPS receiver. The desired synchronisation interface can be selected by means of the control panel in the **Settings/Time synchronisation** menu. For more information, see the section of these operating instructions titled **Set the mode**.

10.1 Internal GPS receiver



The module can be equipped with an optional internal GPS receiver. The GPS antenna is connected via the SMA antenna input.

Fig.: GPS antenna connection



Depending on the strength of the satellite signal, it can take up to 40 minutes before valid time information is available when EPPE PX is put into operation with the GPS antenna for the first time in a new location.

10.2 Electrical synchronisation input for DCF 77



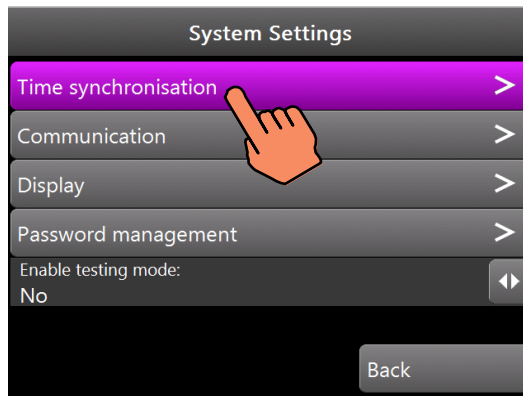
Fig.: DFC 77 connection

DCF signal

EPPE can be synchronised with the DCF 77 time signal.

The DCF 77 signal or the optional DCF 77 antenna is connected to the 4-pole DCF input.

10.3 Set the mode



System time settings and their synchronisation can be made in the **Settings/Time synchronisation** menu.

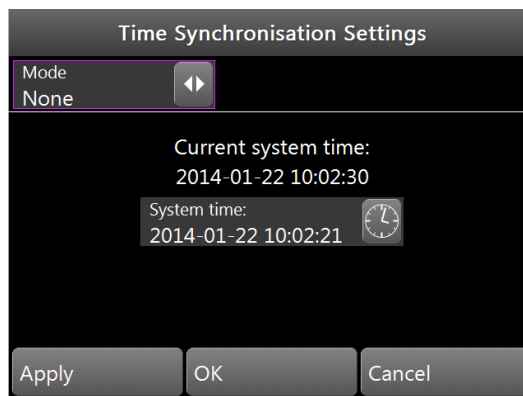
The settings can also be made in the operating software. For more information, see the manual for the EPPE operating software.

Mode

The inputs and parameters for time telegram and seconds pulse can be selected and checked here.

- Use the double-headed arrow button to set the desired synchronisation mode

10.3.1 No time synchronisation



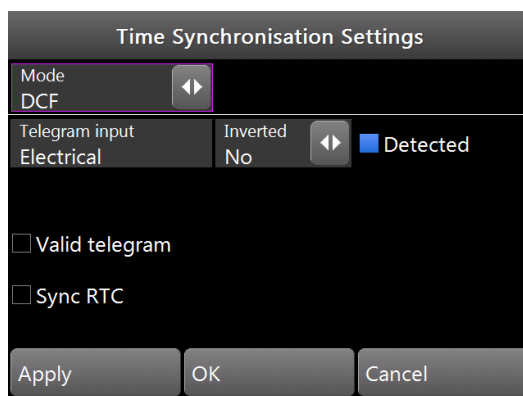
Mode None

If no time synchronisation is activated, the current system time is displayed.

Setting the system time

- Tap the **System time** box
- Tap the value which is to be set and use the function keys F2/F3 to set the required value

10.3.2 Internal GPS



Mode GPS

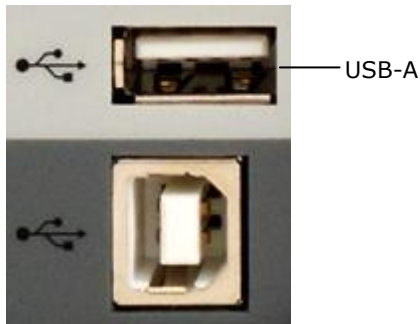
The inputs and parameters for time telegram and seconds pulse can be selected and checked here.

Status indication

The status indications show whether the selected signals are detected, the telegram is valid and the RTC is synchronous.

11 Servicing

11.1 Firmware update



The firmware update can be carried out via the USB interface with a USB flash drive:

- Insert the USB flash drive with the necessary data into the interface
- Switch off the device and wait until the **Power** LED goes out
- Switch on the device again

The firmware update is carried out automatically.

When installation is complete, the message **Done** appears.

- Remove the USB flash drive
- Switch the device off and on once more

The new firmware is active.



The firmware update can also be carried out in the device dialog/maintenance of the EPPE software.

12 Maintenance



Before any maintenance work is carried out, the device must be switched off and the connection to the power supply must be interrupted!

12.1 Cleaning

Only use a dry linen cloth to clean the power quality analyser. If it is very dirty, the cloth may be dampened slightly.



- Do not use any cleaning agents which contain solvents
- Do not allow any moisture to get inside the power quality analyser

12.2 Repairs



Repairs may only be carried out by authorized personnel after consultation with KoCoS Messtechnik AG and only using original spare parts.

12.3 Calibration

Changes in the amplification and/or offset of the measurement inputs and control outputs may take place over time as the components of the power quality analyser age.



We recommend that the calibration of the device be checked every 5 years.

Calibration can either be carried out in the KoCoS Messtechnik AG calibration laboratory or on site using the internal calibration function.

Please note that the accuracy of the calibration depends on the accuracy of the measuring devices which are used. If the necessary measuring devices are not available, the device should be calibrated by the manufacturer.

The adjustment of the power quality analyser is software controlled and is described in the separate user manual for the operating software.

13 Guarantee conditions

KoCoS Messtechnik AG guarantees that this product will function correctly for two years from the date of the invoice. During this period defective devices are repaired free of charge; alternatively, defective devices, or certain components of such devices, are replaced.

If a defect occurs, the device can be sent in for repair after consultation with the service department of KoCoS Messtechnik AG. For devices which have been repaired, the guarantee is still valid for the rest of the remaining guarantee period and for at least 90 days after the repair for those parts affected by the repair.

This guarantee does not cover:

- Defects resulting from unauthorized modifications or attempts to make repairs carried out by persons not authorized to do so.
- Defects arising from improper use, e.g. through overvoltage
- Mechanical damage caused by external influences
- Fuses and other materials subject to wear

No guarantee is undertaken for the suitability of EPPE PX for a specific application.

KoCoS Messtechnik AG is not liable for indirect, direct, especial or consequential damage stemming from the use of this product.

13.1 Calibration confirmation

This device has been tested and calibrated in accordance with the published technical data.

Calibration is carried out using measuring instruments which are compared and set in accordance with certified measurement standards at regular and suitable intervals.

14 Technical data

General description	EPPE PX is a portable, high-precision power quality analyser with integrated fault recorder in a rugged carrying case. Sensor inputs, direct inputs for current measurement and galvanically isolated voltage inputs make the device extremely flexible to use.		
	Multi-processor system	Digital signal processor (DSP), 32 bit, 330 MHz for processing signals and processes in real time Communication processor, Dual Core 32 bit, 1 GHz for mass data storage, simultaneous data communication using different interfaces, web server functionality and stand-alone operation	
	User controls and displays	5 status LEDs for trigger and status display 7" colour graphical display with touch screen and 4 function keys	
	Data memory	2 GB flash RAM for measurement data 512 MB flash RAM for firmware	
	Calibration	Software-controlled calibration Recommended calibration cycle: check every 5 years	
	Operating software	EPPE operating software for Windows 7, 8.1, 10 (32 and 64 bit)	
Function overview	Recording functions	Power quality analyser, class A Continuous data recording Event data recording Digital fault recorder, sampling rate from 100 Hz...30 kHz RMS fault recorder, sampling rate from 1 Hz...120 Hz Sensor recording Energy meter Logical functions	
	Standards for measurement and analysis	IEC 61000-4-30 class A IEC 61000-4-7 harmonics and interharmonics IEC 61000-4-15 flicker EN 50160, IEEE 519, IEEE 1159	
Analog inputs	General information	Resolution	16 bit
		Sampling frequency	200 kHz per channel (physical)
		Accuracy	0.05% of range
		Protection	Galvanic isolation, Ph-PE > 2.5 kV RMS
		Safety class	600 V CAT III; 300 V CAT IV
	Voltage inputs	Number	4
		Measuring range	600 VAC/±848 VDC
		Impedance	6.6 MΩ
		Frequency range	DC...10 kHz
	Current inputs	Number	4
		Measuring range	32 AAC
		Impedance	≤0.1 mΩ
		Overload	100 AAC for max. 3 s 500 AAC for max. 1 s
		Frequency range	10 Hz...3.2 kHz
	Current sensor inputs	Number	4
		Measuring range	3 V
		Frequency range	DC...10 kHz
	Measurement connections	4 mm safety sockets and multi-pole system sockets	

Sensor inputs		Number	4, sampling frequency 10 kHz
		Accuracy	0.05 %
		Measuring range	7.07 VAC / +- 10 VDC Optional: 4...20 mA (adapter)
Temperature input		Number	1, sampling frequency 100 Hz
		Sensor type	Pt1000
		Measuring range	-20°C...80°C
Analog output		Number	1
		Output range	0...10 VDC
Binary inputs		Number	8 (2 groups with separate reference points)
		Activation range	24...300 VDC (wide-range inputs)
		Resolution	0.1 ms
		Protection	Transient protection, polarity protection, galvanic isolation up to 3.75 kV
Binary outputs	Relays	Number	2, configurable for status and alarm signals
		Contact type	Potential-free relay contact as NO contact
		Switching capacity	Max. 220 VDC, 2 ADC, 60 W resistive load
Time synchronisation	Standard equipment	Internal real-time clock	Accuracy 2.5 ppm without external time synchronisation
		NTP/SNTP	Synchronisation over Ethernet network
		Interlink interface	Master-slave time synchronisation between several EPPE devices
		GPS receiver	Internal GPS receiver with SMA antenna connection
		DCF 77 input	DCF 77 pulse telegram input for connection to the KoCoS DCF antenna module
Interfaces	Standard equipment	Data communication	1 x 10/100 Mbit Ethernet (RJ 45) 1 x USB-A, 1 x USB-B
		Interlink interface	Interface for networking a number of EPPE devices, enables cross-triggering and master-slave time synchronisation
Power supply		External power supply	100...240 VAC (100...350 VDC), 47...63 Hz
		Operating voltage	9...18 VDC
		Wattage	Max. 25 VA
		Emergency power supply	Internal, maintenance-free back-up for at least 8 s
	Device connection	Output voltage	9...18 VDC (power supply: sensors, UMTS router, etc.)
Complete system	Mechanical properties	Weight	5.8 kg
		Housing	Carrying case made of polycarbonate, waterproof
		Protection	IP 65 (closed)
		Dimensions	424 x 340 x 173 mm (B x H x T)
	Environment	Storage temperature	-20...70°C
		Operating temperature	-5...50°C, minimum switch-on temperature 0 °C
		Relative humidity	5...90%, non-condensing
	Generic standards	Safety	EN 61010-1, 300 V CAT IV, 600 V CAT III
		EMC emissions	EN 61000-6-4 (replaces EN 50081-2)
		Susceptibility	EN 61000-6-2 (replaces EN 50082-2)