

Network Analyzer / Transient Recorder

Model PQ-Box 200

- ▶ **Fault detection**
- ▶ **Evaluation of voltage quality according to EN50160 and IEC61000-2-2 (2-4)**
- ▶ **FFT Analysis to 20kHz**
- ▶ **Load analysies; energy measurements**
- ▶ **Transient analysies to 4 MHz**
- ▶ **Ripple control signal analysis**
- ▶ **Software for PQ-Box 100 & 150 & 200**



1. Application

The PQ-Box 200 is a high-performance, portable network-analyzer, power meter and transient recorder. User-friendliness was one of the main objectives of the device development.

The PQ-Box 200 has been developed for mobile operation (degree of protection IP65); it is applicable for measurements in public networks (CAT IV) as well as for measurements in industrial environment up to 690V measurement voltage.

The PQ-Box 200 meets 100% of the demands of the IEC 61000-4-30 Ed. 3 standard for a class-A device:

Parameter	Class
Accuracy of voltage measurement	A
Determination of time intervals	A
Marking of measured values at events	A
Harmonics, interharmonics	A
Flicker	A
Frequency	A
Voltage asymmetry	A
Event recording	A
Time synchronization	A

Its compact dimension enables the device to be installed in small-sized spaces and switchgear cabinets. The non-conductive housing of the box allows the direct use in the immediate vicinity of current carrying conductors. Through the application-specific setting of trigger conditions, the device is very easy to handle.

In order to quickly identify the cause of a grid disturbance, the PQ-Box 200 is equipped with a large number of trigger options.

An USB 2.0 interface and a TCP/IP interface are available for a quick data transfer.

In the case of a supply interruption the integrated UPS continues the operation up to 4 hours.

2. Measurement functions

The PQ-Box 200 is optionally available with Transient measuring circuit board.

▶ **PQ-Box 200**

- Power Analysis
- Data Logger
- Fault Detection
- Online data
- Programmable Trigger for oscilloscope- recorder
- Programmable Trigger for 10ms RMS recorder
- Automatic adjustment of the trigger to the measurement signal
- Standard reports in accordance with EN50160, IEC61000-2-2/-2-4 for public and industrial networks

▶ **Optional “Transient measuring circuit board” (T1)**

- Programmable sampling frequency of the transient circuit board (200kHz, 500kHz, 1MHz, 2MHz, 4MHz).
- Upgradeable

- Measurement range of transient voltage is: $\pm 5 \text{ kV}$

▶ **Optional “Ripple control recorder” (R1)**

- Ripple control telegram of voltage and current

We take care of it.

Measurement / Functions		
PQ-Box 200		
Automatic event detection and evaluation standards for: EN50160 (2011) / IEC61000-2-2 / IEC61000-2-12 / IEC61000-2-4 (Class 1; 2; 3) / NRS048 / IEEE519 / IEC61000-4-30 Ed. 3 class A / IEC61000-4-7 / IEC61000-4-15		
Continuous recording with user defined interval of >2,700 parameters including::		
Voltage: min. max. average		
Current: min. max. average		
Power: P, Q, S, PF, cos phi, sin phi, tan phi		
Distortion power D		
Energy: P, Q, P+, P-, Q+, Q-		
Flicker (Pst, Plt) (IEC61000-4-15)		
Unbalanced voltage, current		
Voltage harmonics according to EN 61000-4-30 Class A		up to 50 th
Voltage harmonics 200Hz frequency bands (IEC61000-4-7)		2 kHz up to 9 kHz
Current harmonics		up to 50 th
Current harmonics 200Hz frequency bands (IEC61000-4-7)		2kHz up to 9kHz
Phase-angle of voltage and current harmonics		up to 50 th
THD voltage, current; PWHD, PHC		
FFT calculation of voltages and currents		DC up to 20kHz
Ripple control signal		
Frequency		
15/30 min interval – P, Q, S, D, cos phi, sin phi ...		
Online mode for direct reading:		
Oscilloscope recorder		40.96 kHz
3D power triangle for active, reactive, apparent power and distortion power		
Voltage, current harmonics		DC up to 20kHz
Interharmonics (U, I)		DC up to 20kHz
Direction of harmonics & phase angle of harmonics		
Triggerfunctions		
Manual trigger – trigger button		
RMS level trigger (U, I)		
RMS jump trigger (U, I)		
Phase shift trigger		
Envelope trigger		
Automatic trigger		
Trigger on binary input (0 – 250V AC/DC range with 10V threshold)		
Option ripple signal voltage recorder		– Option R1 100 Hz to 3 kHz
Transient recorder (200kHz; 500kHz; 1MHz; 2MHz; 4MHz)		– Option T1 NEW: 4 MHz

3. Design

Suitable for extreme measurement conditions:

- Extremely robust mechanical construction.
- Protection class IP65.
- No moving parts (fans, hard drive).
- Storage can be extended by SD card from the user with up to 32 GB (permitting several years recording).
- Internal UPS bridges the power up to 4 hours

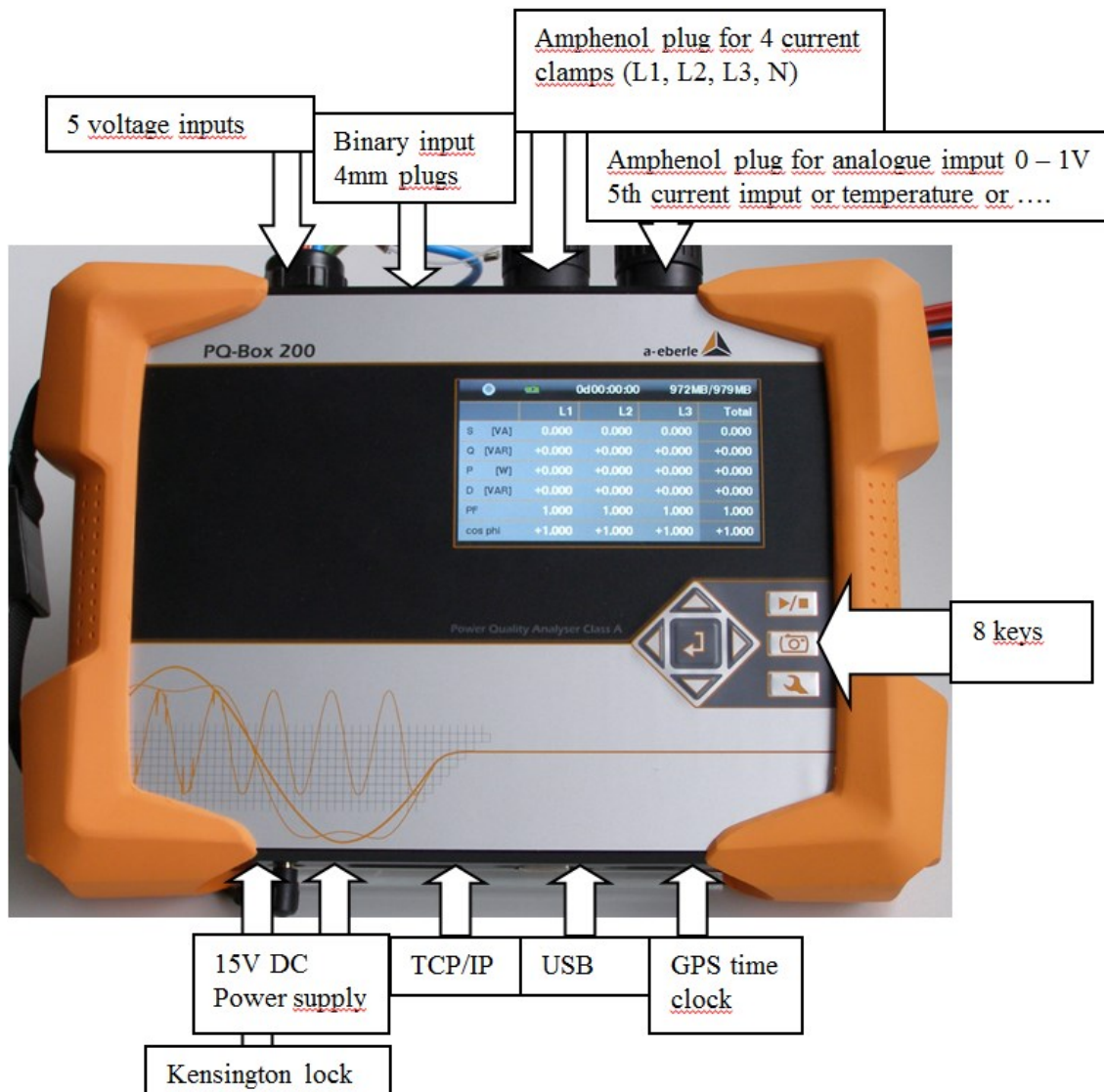
3.1 Evaluating measured data

Recorded data is transferred to the analyzing-PC via a high-speed USB interface or TCP/IP interface. Powerful, yet easy to use analysis software is included in delivery and can be installed on any number of PCs.

The software provides a wide range of analysis options such as load analyses or the detection of the cause of a grid disturbance. Reports according to EN50160/IEC61000-2-2 (2-4) are automatically generated and comprehensive online-functions are available.

Updates of the analysis software can be downloaded via Internet free of charge. The same software supports both PQ Box 100 and Box 200. (32 and 64 bit Windows XP & Windows 7 currently supported).

3.2 Device Connections



We take care of it.

3.3 Color display

The display of the device provides information about the correct connection of measuring cables and current clamps and indicates online-data of voltage, current, THD and power. Red readings warn of possible incorrect connection of the device. The number of occurred events as well as the recorded time period are shown on the display. In order to prevent tampering with the meter by strangers, a keypad lock can be turned on.

Aufnahme  0d 12:50:45 890 Mb / 796 Mb				
	L1	L2	L3	Total
U	222,45 V	241,12 V	231,12 V	1,25 V
I	125,25 A	102,54 A	125,24 A	23,12 A
				Total
P	21,425 kW	-21,145 kW	22,145 kW	65,452 kW
Phi	25,145 °	65,658 °	68,658 °	
F	50,458 Hz			

Aufnahme  0d 12:50:45 890 Mb / 796 Mb				
Rekorder				Anzahl
Oszilloskoprekorder				54
RMS Rekorder				125
Rundsteuersignale				14
PQ Ereignisse				458
Transiente Ereignisse				25

3.4 Push buttons

Using the Start/Stop-button the measurement is started or stopped. Any number of measurements can be recorded consecutively, without the need to read out prior recorded data.

The button “manual trigger” enables a “snapshot” of the measured system to be taken with the oscilloscope event recorder and 10ms RMS recorder.

By “scrolling”, a number of measurement data is indicated on the display. So the correct connection of the device can be tested.

The button “setup” allows the user to modify, for example, configurations for current- or voltage transformer, the measuring interval or the nominal voltage, directly at the PQ-Box 200, without need for connected PC.

3.5 Time synchronization

While the units feature high accuracy clocks (Class A), where required, the time of different PQ-Box devices can be synchronized via their GPS/DCF77 interface.

3.6 Binary input

One digital input for an external trigger signal is available via two 4mm sockets. This starts Oscilloscope recorders 10ms RMS recorder or Transient recorder. AC/DC signals up to 230 V may be applied with the recorder being set to trigger by a rising or falling edge. The switching threshold is set at 10 V.

3.7 Analog input

An analog input 1 V (AC/DC) is designed for connection of external sensors such as a 5th Clamp for PE flows, a DC current probe or a temperature sensor. The measured signal is freely scalable with the evaluation software and the measurement units can be set arbitrarily.

3.8 Data memory

The meter is equipped with a micro-SD card of 4 GB and can use micro-SD memory cards up to 32Gbyte. While 4 GB of memory is sufficient for several months of recording per EN 50160 procedures, the additional memory capability provides for longer term measurements, or for special high speed recording application. The additional SD card can be changed easily by the operator, providing another method for data to be taken from site.

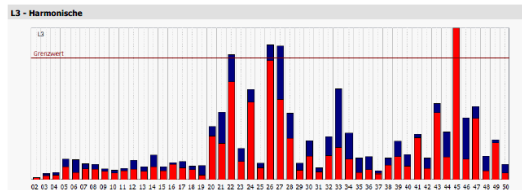
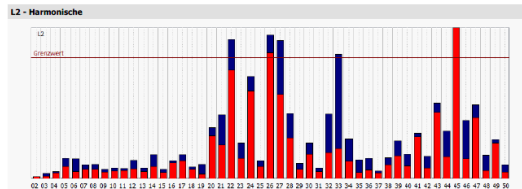
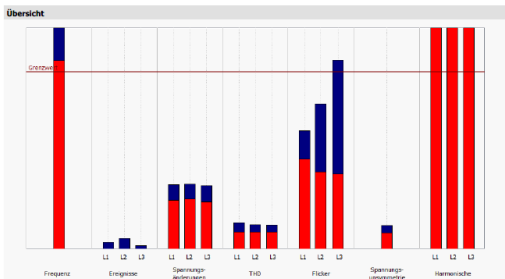
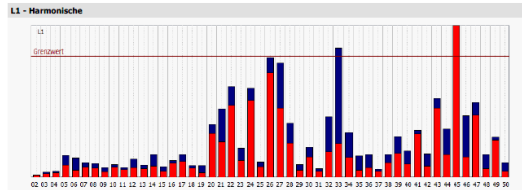
Multiple recording sessions can be recorded consecutively without having to transfer the data to a PC at the end of each recording. At the beginning of a new measurement the free memory is automatically split to reserve space for long-time measurement values and space for event records. The PQ-Box 200 manages the available memory automatically and intelligently.

3.9 EN 50160/IEC 61000-2-2 Evaluation

- Overview of the power quality statistic.
- Bar chart provides automatic summary of relevant metrics.
- Automated reporting in accordance with EN50160 / IEC61000-2-2 / -2-12 (public networks), IEC61000-2-4 (industrial networks), NRS048, or your own defined limits.
- Company logo in the report and as well as main text fields can be customized.

	Auswertung nach EN50160/IEC61000-2-2	29.03.2012 Seite 1/5
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Firma	Fuhrländer	Ab 18.05. 21:31 UTC Anlagenstillstand
Abteilung	In Anlage FL 625	wg. Windmangel
Rückwirkung Harmonische		
Kunde	Fuhrländer Aktiengesellschaft	025699660
Adresse	56177 Waspöndshain	Grund: Wiederholte Zerstörung von Elektronik Komponenten
Contact:		SW-Version: 1.6.13
Spannungssystem:	4 Leitbr-Netz	 Seriennummer Gerät: 1109-119
Nennspannung L-L / L-N:	693V / 400V	Messintervall: 600s
Frequenz:	50Hz	Rundsteuerfrequenz: 168Hz
Messung Beginn:	16.05.2011 09:29:13	Messung Ende: 24.05.2011 07:50:00
Messdauer:	78 22h 20m 47s	Anzahl Messintervalle: 1142
Firmware:	1.130	DSP-Version: 1.233



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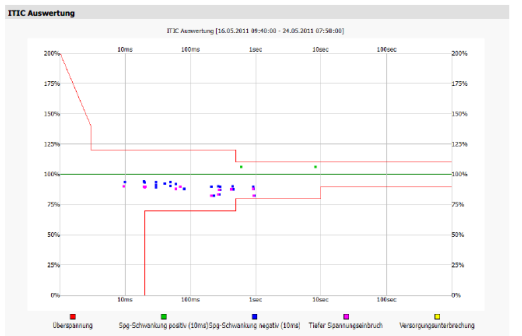
	Auswertung nach EN50160/IEC61000-2-2	29.03.2012 Seite 4/5
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THD	Grenzwert	L1 - 95.00%	L1 - Max	L2 - 95.00%	L2 - Max	L3 - 95.00%	L3 - Max
1	0.0000	0.7050	1.1981	0.2096	1.1159	0.7050	1.0959
2	2.0000	0.0366	0.0412	0.0324	0.0371	0.0327	0.0394
3	5.0000	0.1427	0.2186	0.1102	0.2071	0.1608	0.2228
4	1.0000	0.0388	0.0501	0.0466	0.0505	0.0388	0.0544
5	6.0000	0.6123	1.0847	0.6993	1.0553	0.6063	0.9833
6	0.5000	0.0295	0.0799	0.0295	0.0823	0.0267	0.0812
7	5.0000	0.4527	0.6109	0.3881	0.5600	0.4319	0.6263
8	0.5000	0.0390	0.0578	0.0379	0.0587	0.0393	0.0622
9	1.5000	0.0704	0.1196	0.0843	0.1132	0.0961	0.1295
10	0.5000	0.0423	0.0534	0.0327	0.0429	0.0250	0.0351
11	3.5000	0.2192	0.2857	0.2318	0.2889	0.2354	0.3151
12	0.5000	0.0400	0.0760	0.0397	0.0770	0.0399	0.0785
13	3.0000	0.3173	0.3968	0.3181	0.3608	0.3209	0.3908
14	0.5000	0.0471	0.0946	0.0517	0.0987	0.0506	0.0993
15	0.5000	0.0250	0.0439	0.0250	0.0373	0.0340	0.0360
16	0.5000	0.0598	0.0694	0.0645	0.0725	0.0648	0.0662
17	2.0000	0.2594	0.3812	0.2957	0.4002	0.1878	0.2866
18	0.5000	0.0371	0.0485	0.0381	0.0494	0.0390	0.0520
19	1.5000	0.0947	0.1463	0.0995	0.1746	0.0977	0.1672
20	0.5000	0.1822	0.2202	0.1766	0.2104	0.1782	0.2177
21	0.5000	0.1484	0.2830	0.1398	0.2648	0.1469	0.2761
22	0.5000	0.2861	0.3781	0.4498	0.5795	0.4026	0.5146
23	1.5000	0.2075	0.3596	0.2555	0.4447	0.2136	0.3795
24	0.5000	0.3196	0.3705	0.3635	0.4226	0.3182	0.3720
25	1.5000	0.1312	0.1903	0.1510	0.2194	0.1370	0.1983
26	0.3000	0.3033	0.3478	0.3550	0.4171	0.3424	0.3882
27	0.3000	0.1152	0.1888	0.1396	0.2207	0.1320	0.2202
28	0.3400	0.0960	0.1517	0.1142	0.1831	0.1142	0.1857
29	1.0000	0.0640	0.1126	0.0787	0.1340	0.0705	0.1403
30	0.3300	0.0552	0.0827	0.0663	0.0980	0.0630	0.1051
31	0.9700	0.0509	0.0710	0.0591	0.0840	0.0561	0.0893
32	0.3300	0.0700	0.1660	0.0714	0.1770	0.0638	0.1159
33	0.2000	0.0599	0.2127	0.0497	0.2059	0.0527	0.1495
34	0.3200	0.0522	0.1188	0.0456	0.1053	0.0529	0.1211
35	0.8300	0.0494	0.1464	0.0430	0.1312	0.0447	0.1432
36	0.3200	0.0261	0.0612	0.0231	0.0543	0.0245	0.0595
37	0.7700	0.0388	0.0535	0.0343	0.0473	0.0367	0.0513
38	0.3200	0.0395	0.0602	0.0362	0.0554	0.0364	0.0548
39	0.2000	0.0400	0.0675	0.0382	0.0627	0.0374	0.0623
40	0.3100	0.0337	0.0679	0.0322	0.0635	0.0333	0.0628
41	0.6700	0.2416	0.2601	0.2334	0.2518	0.2293	0.2503
42	0.3100	0.0283	0.0597	0.0270	0.0578	0.0272	0.0529
43	0.4300	0.3611	0.4134	0.3468	0.3941	0.3466	0.3949
44	0.3100	0.0584	0.1239	0.0566	0.1217	0.0561	0.1208
45	0.2300	0.3716	0.4553	0.3267	0.4062	0.3666	0.4345
46	0.3000	0.0508	0.1527	0.0489	0.1442	0.0498	0.1516
47	0.5500	0.2841	0.3408	0.2797	0.3358	0.2764	0.3289
48	0.3000	0.0215	0.0575	0.0205	0.0577	0.0206	0.0573
49	0.5200	0.1613	0.1735	0.1546	0.1680	0.1555	0.1698
50	0.3000	0.0150	0.0363	0.0159	0.0337	0.0155	0.0361

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PQ-Ereignisse	
Frequenzabweichung:	305 Rundsterversignale (3sec): 0
Überspannung:	0 Langsame Spannungsabweichung: 0
Spg-Schwankung positiv (10ms):	3 Überschreitung Langzeitflicker: 6
Spg-Schwankung negativ (10ms):	22 Überschreitung Unsymmetrie: 0
Tiefer Spannungseinbruch:	12 Überschreitung THD: 0
Versorgungsunterbrechung:	0 Überschreitung Harmonische: 1470

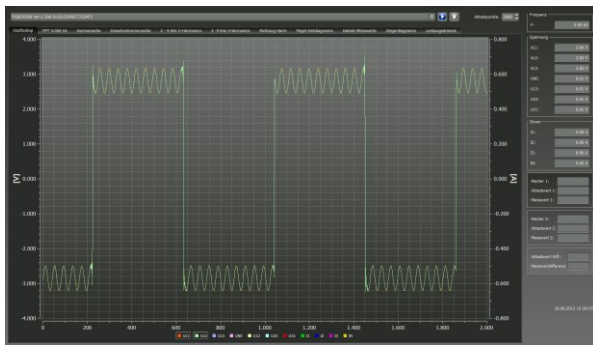


Ereignis-Matrix						
Restspannung u[%]						
90 ... 80	10 ... 200	200 ... 500	Dauer [ms]	500 ... 1000	1000 ... 5000	5000 ... 60000
80 ... 70	0	10	5	0	0	0
70 ... 40	0	0	0	0	0	0
40 ... 5	0	0	0	0	0	0
5 ... 0	0	0	0	0	0	0
Einbruch Spannung u[%]						
... 120	10 ... 500	Dauer [ms]	500 ... 5000			
120 ... 110	0	0	0	0		

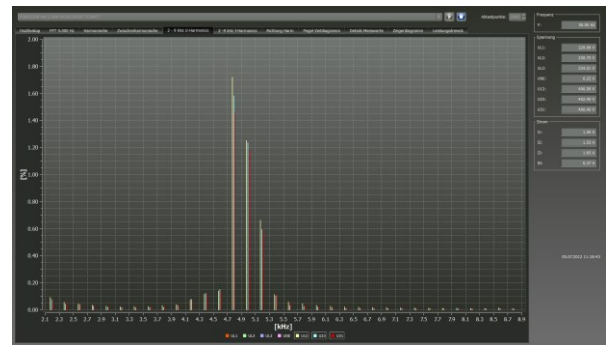
Auswertung nach EN50160/IEC61000-2-2 Seite 5/5

We take care of it.

3.10 Online analysis software



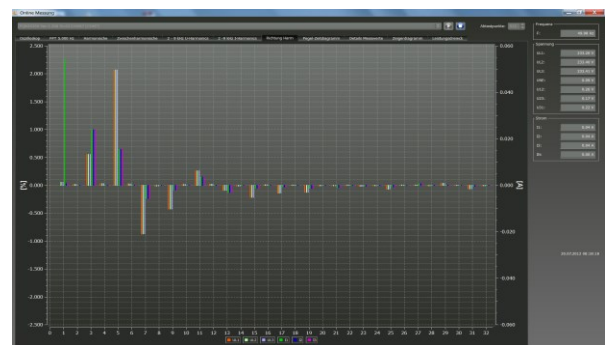
Online oscilloscope with 40,96 kHz



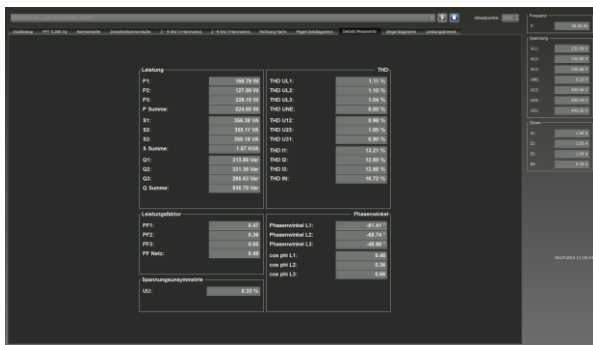
Online harmonics (voltage and current up to 9 kHz)



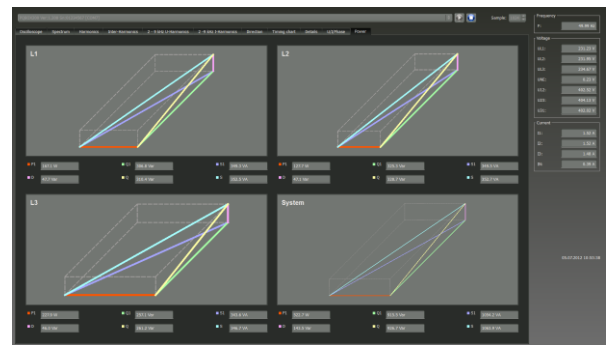
Online time level diagram



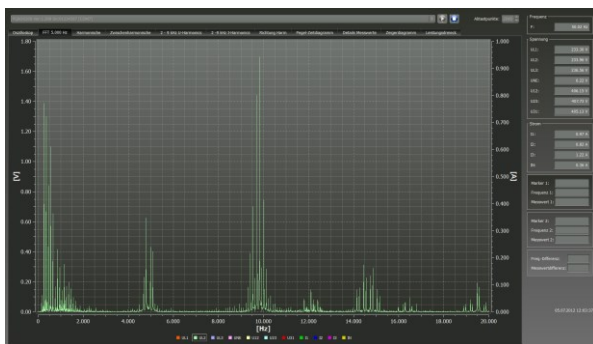
Direction and phase angle of harmonics



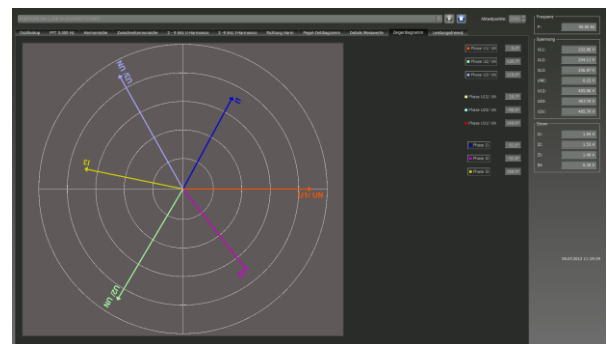
Online measured-values table



Online power-cube



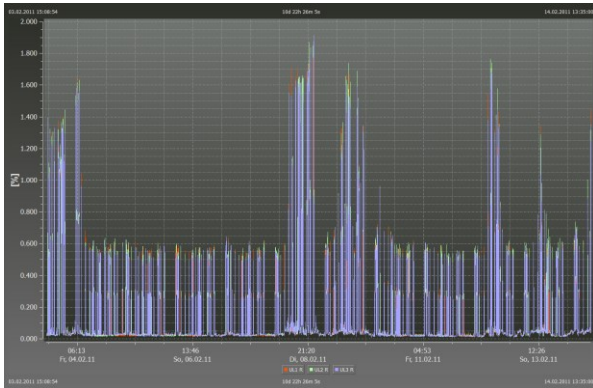
FFT-Analysis DC up to 20 kHz



Online phasor-diagram

3.11 Analysis of ripple control signals

- Recording an adjustable frequency of 100Hz to 3kHz.
- Review of ripple control signals (amplitude, pulse pattern)
- ripple control signal levels are measured with permanent records.
- The pulse recorder is suitable for evaluation of the ripple control pulse pattern.



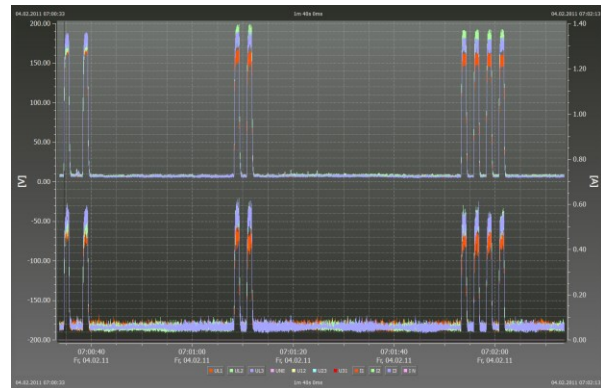
Ripple control level over a few days

Ripple control signal - trigger (Option)

In addition to the ripple control level measurement, using this function it is possible to trigger to a ripple control frequency. The complete message is displayed and disturbances in the signal form can be analyzed.

The following parameters can be set:

- Triggering threshold
- Length of recording
- Ripple control frequency
- Bandwidth of the filter curve



Ripple control telegram of voltage and current

3.12 Trigger functions

- Comprehensive trigger functions.
- Programmable trigger limits.
- Programmable recorders (cyclic data, oscilloscope-recorder, 10ms RMS recorder, recording & pre/post time).
- Automatic trigger selectable.
- Cross trigger function: The transient recorder triggers the oscilloscope and RMS recorder at the same time

The automatic trigger provides an optional but automatic intervention to each trigger condition and adjusts the trigger level to the actual network condition. Therefore, an operating error of setting the trigger level too sensitive and recording to much data is impossible)

3.13 Transient circuit board (Option)

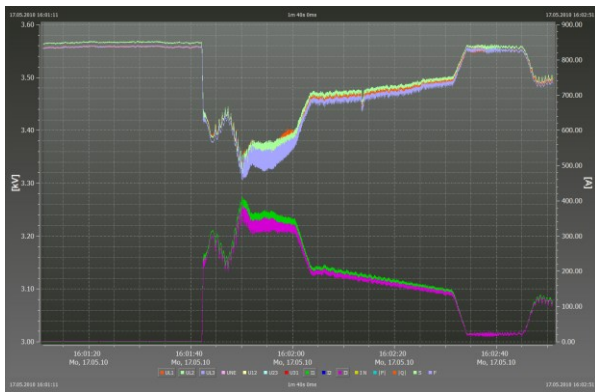
The Transient circuit board can either run at 200kHz, 500kHz, 1MHz; 2MHz or 4Mhz sampling rate. The measuring range for transient voltages is + / - 5 kV. Four voltage channels are recorded.

The Transient circuit board allows high speed transients to be capture with high speed and resolution.

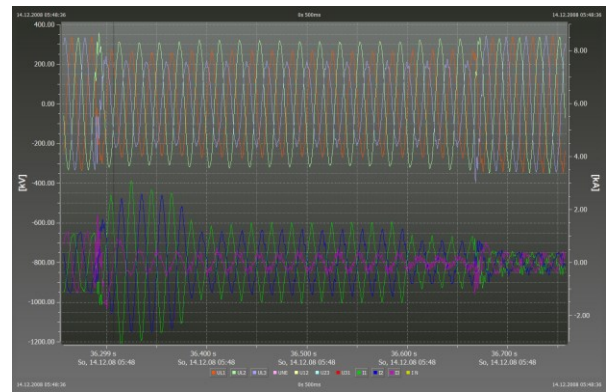
The record length of the transient can be set between 32ms and 320ms.

We take care of it.

3.14 Fault records captured with Oscilloscope and 10ms RMS recorders

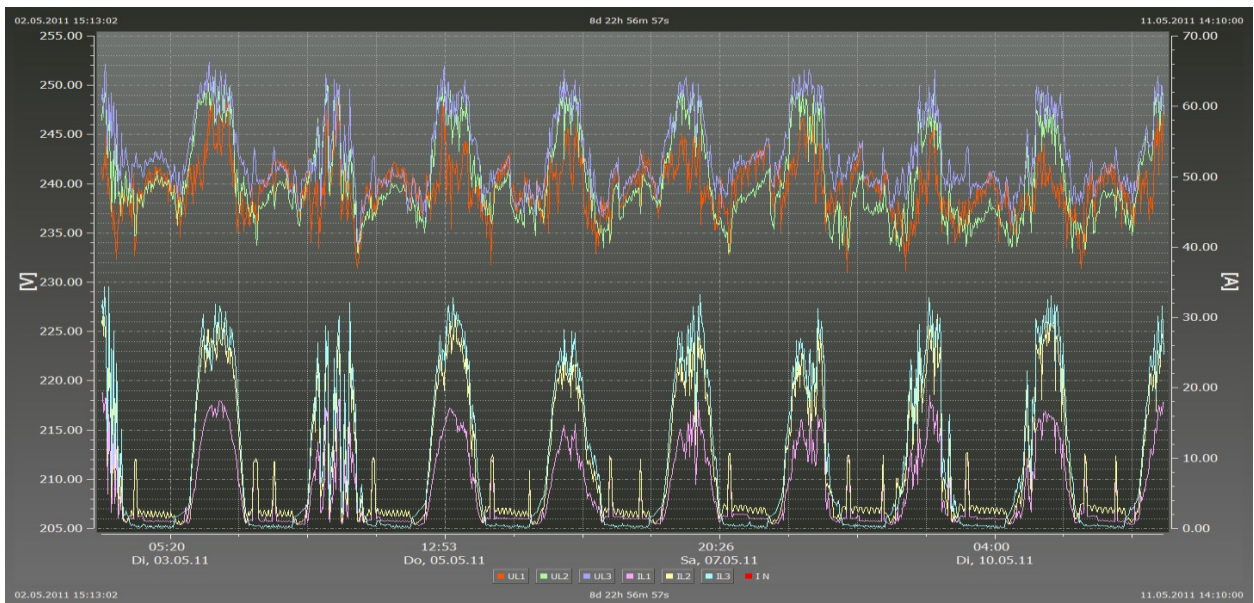


10 ms RMS record (example machine start-up)



Oscilloscope record

4. Continuous recording



Voltage, current 3-phase

4.1 Technical data

PQ Box200 (4U/4I)	
4 voltage inputs (TRMS): Maximum input voltage:	L1, L2, L3, N, PE 565V AC/800V DC L-N 980V AC/1380V DC L-L 10 MΩ impedance
4 current inputs (TRMS):	1000 mV input for mini clamp and 330mV for Rogowski current probes 10 kΩ impedance
AUX input:	1V AC / 1,4V DC 10 MΩ impedance
Automatic synchronization to fundamental frequency:	45 Hz to 65 Hz
Measurement intervals:	adjustable from 1 sec to 30 minutes
Data memory:	4 GB standard Up to 32GByte SD card (optional)
Interfaces:	USB 2.0
Time synchronization:	DCF77 or GPS radio clock
Dimensions:	242 x 181 x 50 mm
Weight:	2.5 kg
Degree of protection:	IP 65
IEC 61000-4-30:	Class A
Accuracy:	< 0.1%
Insulation class:	CAT III / 600V, CAT IV / 300V
Insulation test	Impulse voltage 6 kV 5 sec 5,4 kV rms 1 min 3,6kV rms
A/D converter:	24 Bit
Temperature range:	Operation: -20°60°C Storage:-30°80°C
Color display:	100 x 60 mm
Power supply: Via external adapter	100 V...440 V AC or 100 V...300 V DC (15V DC output) 47Hz to 63Hz

EMC	
CE-conformity	
<ul style="list-style-type: none"> ● Immunity <ul style="list-style-type: none"> — EN 61326 — EN 61000-6-2 ● Emitted interference <ul style="list-style-type: none"> — EN 61326 — EN 61000-6-4 	
ESD	
<ul style="list-style-type: none"> — IEC 61000-4-2 — IEC 60 255-22-2 	8 kV / 16 kV
Electromagnetic fields	
<ul style="list-style-type: none"> — IEC 61000-4-3 — IEC 60 255-22-3 	10 V/m
Burst	
<ul style="list-style-type: none"> — IEC 61000-4-4 — IEC 60 255-22-4 	4 kV / 2 kV
Surge	
<ul style="list-style-type: none"> — IEC 61000-4-5 	2 kV / 1 kV
HF conducted disturbances	
<ul style="list-style-type: none"> — IEC 61000-4-6 	10 V, 150 kHz ... 80 MHz
Voltage dips	
<ul style="list-style-type: none"> — IEC 61000-4-11 	100 1min
Emitted interference:	
<ul style="list-style-type: none"> ● Housing at a distance of 10 m ● AC supply connection at a distance of 10 m 	30...230 MHz, 40 dB 230...1000 MHz, 47 dB 0,15...0,5 MHz, 79 dB 0,5...5 MHz, 73 dB 5...30 MHz, 73 dB

The PQ-Box 200 features a 15 V DC input to power the device during measurement.

A robust 100-400 V AC/DC power supply (600V CAT IV) allow the unit to be powered from a mains power source. An internal rechargeable battery provides continuous measurement in case of external power supply failure, for up to 4 hours.

We take care of it.

5. Current accessories

- Standard accessories are automatically recognized by the meter.
- The conversion factor is automatically adjusted for the connected accessory.

- **Rogowski current clamp 4~: Ident-No. 111.7001**

Current range: 5A to 3000A RMS; Accuracy: 1%
Rogowski clamp length= 610mm;
Diameter = 194mm; Rogowski clamp head = 9,9mm
Frequency range: 10Hz to 20kHz

- **Rogowski current clamp 4~: Ident-No. 111.7006**

Current range: 10A to 6000A RMS; Accuracy: 1%
Rogowski clamp length = 910mm;
Diameter = 290mm; Rogowski clamp head = 9,9mm
Frequency range: 10Hz to 20kHz

- **Mini- Rogowski current clamp 4~: Ident-No. 111.7030**

Current range: 2A to 1500A RMS; Accuracy: 1%
Rogowski clamp length = 400mm;
Diameter = 125mm; Rogowski clamp head = 8,3mm
Frequency range: 10Hz to 20kHz

The MU-metal clamp is especially applicable for small current measurements on secondary transformers in medium- and high-voltage networks. High accuracy and small angle errors are combined.

- **Mu-Metal Current clamps 3~: Ident-No. 111.7003**

Current range: 10mA to 20A
Frequency range: 40Hz to 20kHz

- **Mu-Metal Current clamps 4~: Ident-No. 111.7015**

Current range: 10mA to 20A/200A AC RMS (two ranges)
Frequency range: 40Hz to 20kHz

- **Mu-Metal Current clamps 0...5A 1~: Ident-No. 111.7043**

Current range: 5mA to 5A AC RMS
Frequency range: 40Hz to 20kHz
Free current adapter set necessary

- **AC/DC Current clamp 1~: Ident-No. 111.7020**

AC/DC hall sensor clamp. Set with power supply and 2 pcs. 4mm connectors
Current range 60A/600A (two ranges)

- **Current-shunt 2A: Ident-No.: 111.7055**

Measurement of AC- and DC-currents. Current range = 2A / 200mV output signal

- **Free Adapter set for connecting 4 clamps: Ident-No.: 111.7004**

Adapter set for connecting 4 clamps or shunt with 4mm connectors

- **Current clamp cable extension: Ident-No.: 111.7025**

Cable extension 5 m for current clamps or Rogowski coils.

6. Order details

CHARACTERISTICS	CODE
Fault recorder and network analyzer according to DIN EN 50160 and IEC 61000-3-40 class A Mobile power-quality-network analyzer and power-meter for low-, medium- and high voltage networks according to DIN EN-50160/IEC 61000-4-30 class A <ul style="list-style-type: none"> ● 4 GB micro SD card memory ● Slot for SD memory card 1GB to 32GB ● USB 2.0 and TCP/IP interface ● RS232 interface to connect radio clock or GPS clock ● Color Display ● IP65 rated enclosure ● Uninterruptible power supply ● USB- and TCP/IP cable set ● Connection cable with 4 mm banana plus for voltage (phase connections fused) ● 5 pcs. Dolphin clips ● Hardcase for PQ-Box 200 and accessories ● Power supply 15V DC ● Evaluation software 	PQ-Box 200
Option <ul style="list-style-type: none"> ● Transient measuring circuit board ● Ripple control analysis 	T1 R1
Operating manual and display language <ul style="list-style-type: none"> ● German ● English ● French ● Spanish ● Italian ● Dutch ● Czech ● Russian ● Polish 	G1 G2 G3 G4 G5 G6 G7 G8 G9
ACCESSOIRES	IDENT-NO.
● Network adapter connector socket for 1 ~; 4mm safety plugs	582.0511
● Kensington lock - Lock for PQ-Box 200, 1.8 m length	111.7032
● Temperature sensor, air temperature -20...80°C	111.7041
● Combination sensor for lighting 0-1400W/m2 and temperature -30...70°C	111.7040
● Kit of magnetic voltage taps	111.7008
● DCF 77 radio controlled clock	111.9024.01
● GPS radio clock (230 V – RS 232)	111.9024.47
● SD memory card, 4GByte industry-standard	900.9099.4
● Replacement battery pack	570.0011



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Software - Version:

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Power Quality Analyzer – PQ-Box 200