

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 2 MHz**
- ▶ **Ripple control signal analysis**
- ▶ **Software for PQ-Box 100 & 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 (2008) 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 6 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).
- 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		
Continuous recording with user defined interval of >2,500 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)		
Unbalanced voltage, current		
Voltage harmonics according to EN 61000-4-30 Class A		Up to 50th.
Voltage harmonics 200Hz frequency bands		2kHz up to 9kHz
Current harmonics		Up to 50th.
Current harmonics 200Hz frequency bands		2kHz up to 9kHz
Phase-angle of harmonics		Up to 50th.
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		40.96kHz
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		100Hz to 3kHz
Transient recorder programmable 200kHz; 500kHz; 1MHz; 2MHz – Option T1		2MHz

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 6 hours

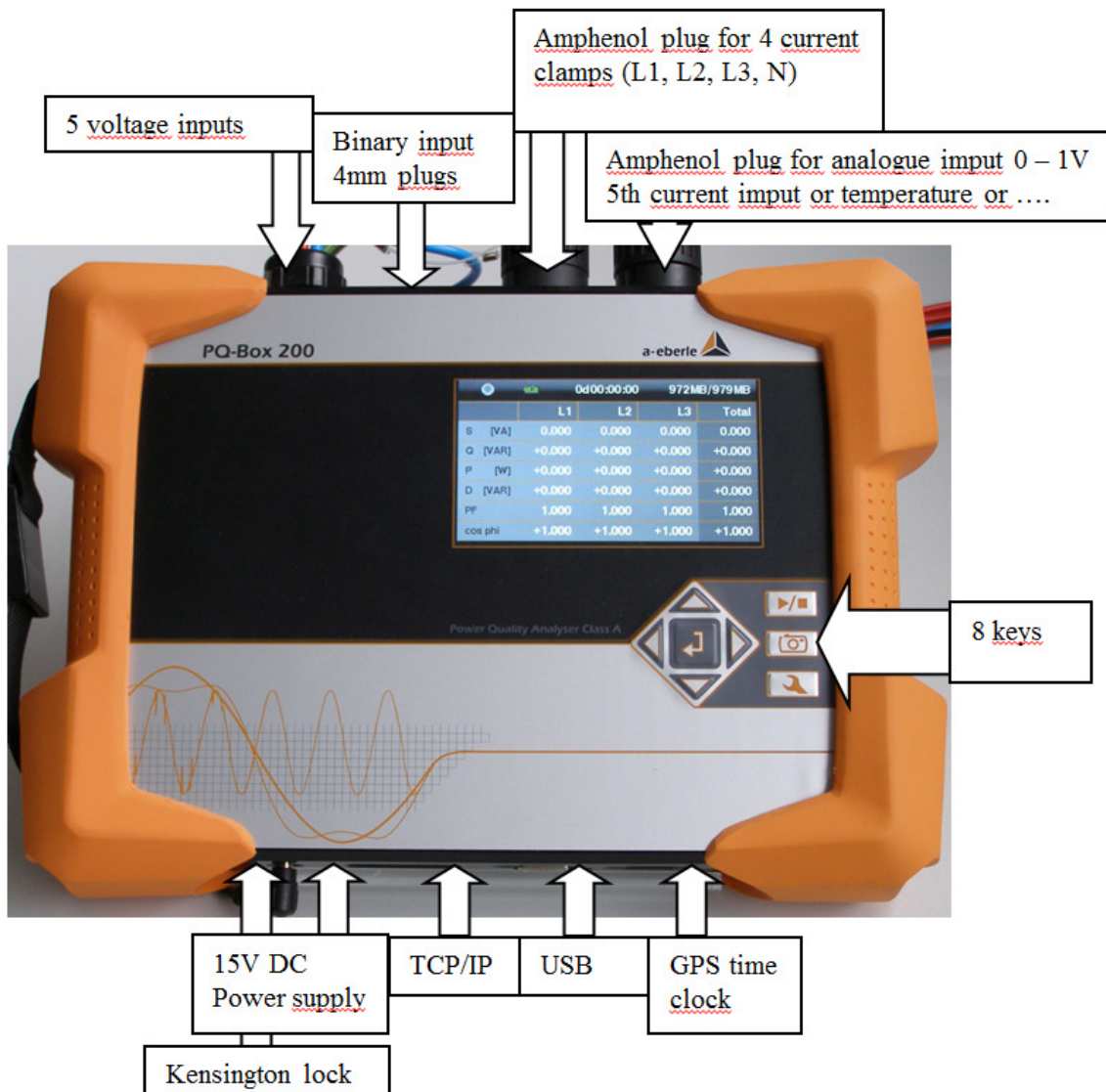
3.1 Evaluating measured data

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 1 GB and can use micro-SD memory cards up to 32Gbyte. While 1 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

Auswertung nach EN50160/IEC61000-2-2

29.03.2012
Seite 3/5

Firma	Führer der Aktiengesellschaft	Ab 18.05. 21:31 UTC Anlagenstillstand	
Abteilung	In Anlage FL 625	wg. Windmangel	
Kunde	Führer der Aktiengesellschaft	Rückwirkung Harmonische	
Adresse	5677 Wagendahl	Grund:	Wiederholte Zerstörung von Elektronik Komponenten
Contact:		SW-Version:	0.26499660
Spannungssystem:	4 Leit.-Netz	Seriesnummer Gerät:	1100-110
Nennspannung L-L / L-N:	690V / 400V	Messintervall:	500
Frequenz:	50Hz	Rundsteuerfrequenz:	16912
Messung Beginn:	16.05.2011 09:29:13	Messung Ende:	24.05.2011 07:50:00
Messdauer:	78 Zyk. 200% 4%	Analys. Messintervalle:	1142
Firmware:	1.130	DSP-Version:	1.233

Übersicht

L1 - Harmonische

L2 - Harmonische

L3 - Harmonische

Auswertung nach EN50160/IEC61000-2-2

Seite 1/5

Auswertung nach EN50160/IEC61000-2-2

Seite 3/5

Auswertung nach EN50160/IEC61000-2-2

29.03.2012
Seite 4/5

Auswertung nach EN50160/IEC61000-2-2

29.03.2012
Seite 5/5

THD	Grenzwert	L1 - 95.00%	L1 - Max	L2 - 95.00%	L2 - Max	L3 - 95.00%	L3 - Max
1	0.0000	0.7050	0.1911	0.2696	1.1159	0.7050	0.0000
2	2.0000	0.0366	0.0412	0.0324	0.0371	0.0327	0.0394
3	3.0000	0.1427	0.2186	0.1102	0.2071	0.1508	0.2228
4	1.0000	0.0388	0.0051	0.0466	0.0055	0.0388	0.0544
5	6.0000	0.6123	1.0847	0.6093	1.0053	0.6063	0.9833
6	0.5000	0.0295	0.0799	0.0295	0.0823	0.0257	0.0812
7	0.0000	0.4257	0.6109	0.2811	0.5690	0.4319	0.6233
8	0.5000	0.0390	0.0578	0.0379	0.0587	0.0393	0.0623
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	0.0260	0.0251
11	3.5000	0.2192	0.2857	0.2318	0.2899	0.2354	0.3151
12	0.5000	0.0400	0.0760	0.0397	0.0770	0.0299	0.0795
13	1.0000	0.1123	0.2068	0.1818	0.2008	0.1939	0.2008
14	0.5000	0.0471	0.0946	0.0517	0.0967	0.0506	0.0993
15	0.5000	0.0250	0.0479	0.0250	0.0372	0.0249	0.0500
16	0.5000	0.0598	0.0694	0.0445	0.0725	0.0648	0.0662
17	2.0000	0.2594	0.3812	0.2957	0.4002	0.1878	0.2886
18	0.5000	0.0371	0.0485	0.0281	0.0494	0.0390	0.0520
19	1.5000	0.0547	0.1453	0.0995	0.1746	0.0577	0.1612
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	0.0981	0.3761	0.4498	0.5798	0.4050	0.5146
23	1.5000	0.3075	0.3596	0.2555	0.4447	0.2136	0.3795
24	0.5000	0.1196	0.3705	0.3620	0.4226	0.3182	0.3720
25	1.5000	0.1312	0.1963	0.2190	0.1290	0.1983	0.1983
26	0.3500	0.3033	0.3478	0.3650	0.4171	0.3424	0.3880
27	0.5000	0.1152	0.1888	0.1396	0.2387	0.1320	0.2582
28	0.3000	0.0960	0.1517	0.1142	0.1831	0.1142	0.1927
29	1.0000	0.0640	0.1126	0.0787	0.1340	0.0760	0.1403
30	0.3300	0.0852	0.0827	0.0863	0.0880	0.0830	0.1051
31	0.9000	0.0909	0.0710	0.0991	0.0840	0.0561	0.0893
32	0.3300	0.0700	0.1660	0.0714	0.1770	0.0638	0.1159
33	0.2000	0.0509	0.3127	0.0497	0.2009	0.0527	0.1495
34	0.3000	0.0922	0.1189	0.0556	0.0529	0.0529	0.1211
35	0.8300	0.0494	0.1464	0.0430	0.1312	0.0447	0.1432
36	0.3300	0.0261	0.0612	0.0231	0.0543	0.0245	0.0595
37	0.7700	0.0388	0.0525	0.0342	0.0472	0.0387	0.0513
38	0.3300	0.0395	0.0602	0.0362	0.0354	0.0364	0.0548
39	0.4000	0.1400	0.0597	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	0.0539
43	0.6300	0.3611	0.4134	0.3468	0.3941	0.3466	0.3949
44	0.3100	0.0594	0.1239	0.0566	0.1217	0.0561	0.1208
45	0.2000	0.0719	0.4053	0.2697	0.4062	0.2696	0.4045
46	0.3000	0.0508	0.1527	0.0489	0.1442	0.0498	0.1516
47	0.9100	0.2841	0.3408	0.2797	0.3358	0.2764	0.3289
48	0.3000	0.0215	0.0571	0.0205	0.0577	0.0206	0.0573
49	0.5200	0.1613	0.1725	0.1546	0.1680	0.1555	0.1680
50	0.3000	0.0150	0.0263	0.0159	0.0337	0.0155	0.0291

ITIC Auswertung

Ergebnis-Matrix

Richtspannung u(%)	Dauer [ms]			
	10 ... 200	200 ... 500	500 ... 1000	1000 ... 5000
80 ... 85	7	10	5	0
80 ... 70	0	0	0	0
70 ... 40	0	0	0	0
40 ... 5	0	0	0	0
5 ... 0	0	0	0	0

Auswertung nach EN50160/IEC61000-2-2

Seite 4/5

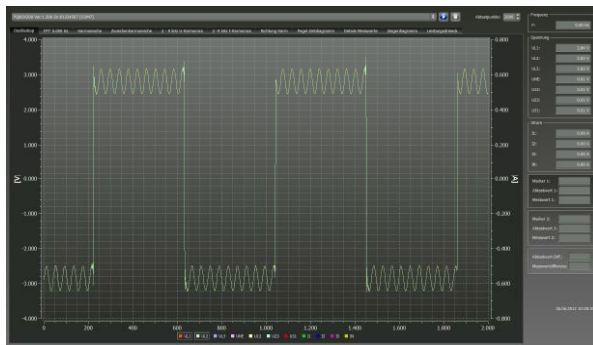
Auswertung nach EN50160/IEC61000-2-2

Seite 5/5

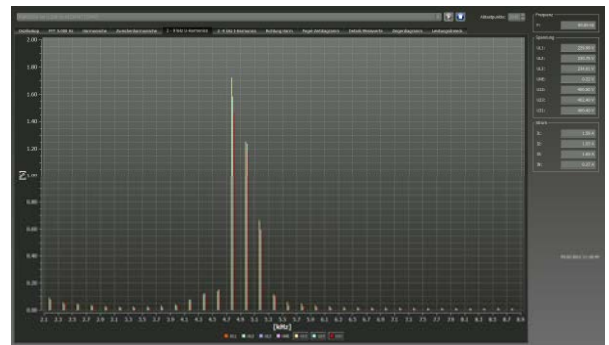
Automatic standard report

We take care of it.

3.10 Online analysis software



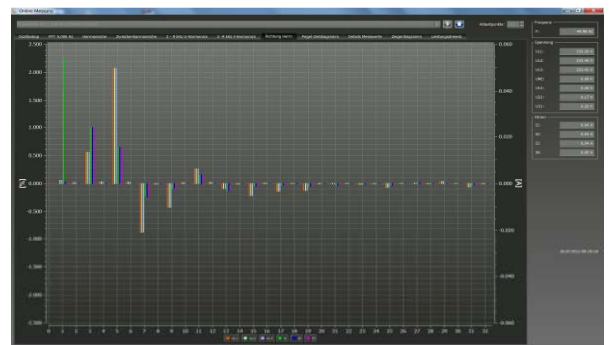
Online oscilloscope with 40,96 kHz



Online harmonics (voltage and current up to 9 kHz)



Online time level diagram

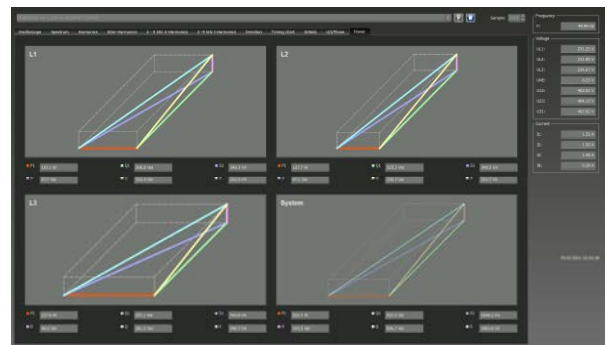


Direction and phase angle of harmonics

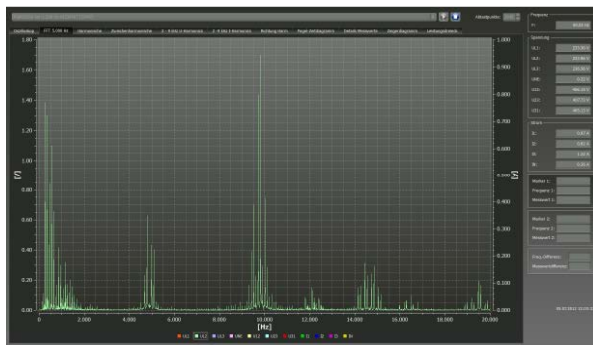
Leistung		THD	
P1:	16878 W	THD U/L1:	1,91 %
P2:	12770 W	THD U/L2:	1,70 %
P3:	22870 W	THD U/L3:	1,67 %
P Summe:	42518 W	THD I/NO:	0,86 %
S11:	28648 VA	THD I/20:	0,86 %
S2:	24671 VA	THD I/25:	1,00 %
S3:	26979 VA	THD I/31:	0,86 %
S Summe:	1,07 MVA	THD I1:	1,91 %
Q1:	31188 VAR	THD I2:	12,86 %
Q2:	22170 VAR	THD I3:	12,86 %
Q Summe:	83979 VAR	THD I4:	16,70 %

Leistungsleistung		Leistungsleistung	
PF1:	0,92	Phaseangle L1:	41,61°
PF2:	0,98	Phaseangle L2:	26,79°
PF3:	0,98	Phaseangle L3:	46,62°
PF Sum:	0,98	cos phi L1:	0,88
cos phi L2:	0,88	cos phi L2:	0,88
cos phi L3:	0,88	cos phi L3:	0,88

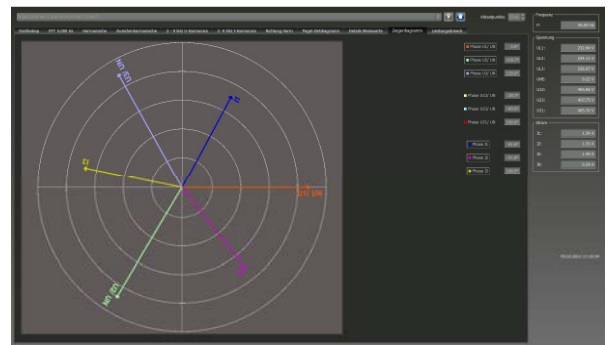
Online measured-values table



Online power-cube



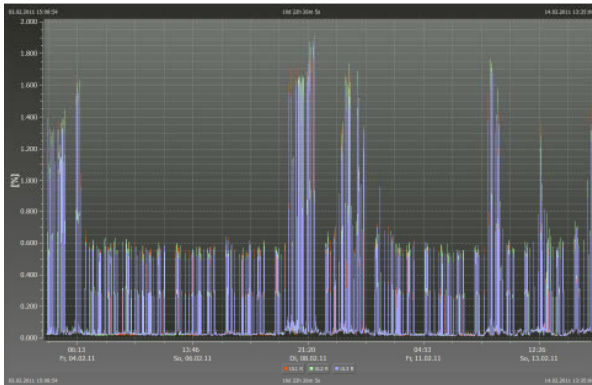
FFT-Analysis DC up to 20 kHz



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.



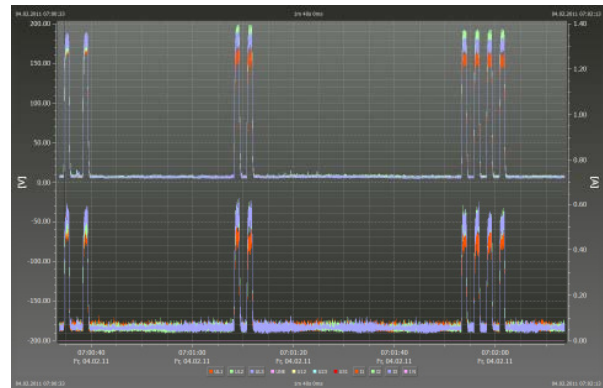
Ripple control level over a few days

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.

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)

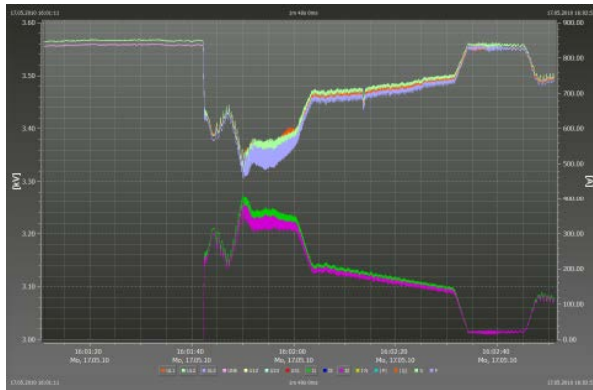
3.13 Transient circuit board (Option)

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

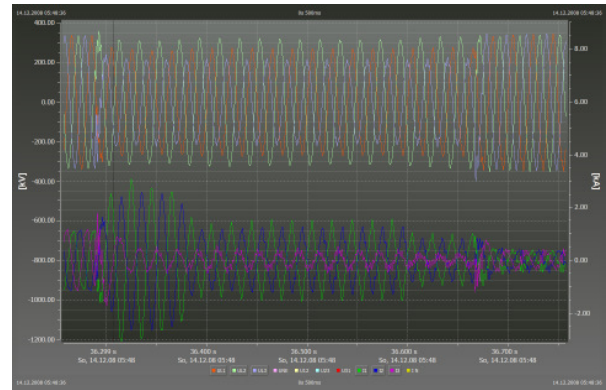
The Transient circuit board allows high speed transients to be capture with high speed and resolution.

We take care of it.

3.14 Fault records captured with Oscilloscope and 10ms RMS recorders

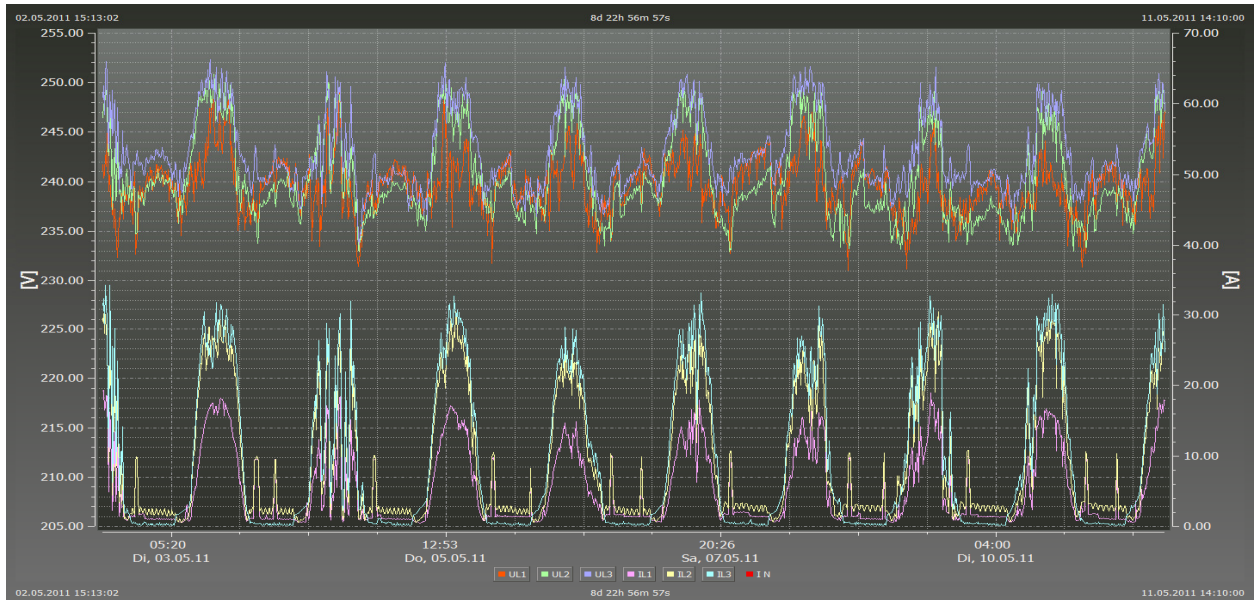


10 ms RMS record (example machine start-up)



Oscilloscope record

4. Continuous recording



Voltage, current 3-phase

4.1 Technical data

PQ Box200 (4U/4I)	
4 voltage inputs (TRMS):	L1, L2, L3, N, PE 500 V L-N; 870 V L-L
4 current inputs (TRMS):	1000 mV input for mini clamp and 230mV for Rogowski current probes
Sampling rate:	41 kHz at 50 Hz
Automatic synchronization to fundamental frequency:	45 Hz to 65 Hz
Measurement intervals:	adjustable from 1 sec to 30 minutes
Data memory:	1 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
Mass:	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
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...240 V AC (15V DC output)

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	8 kV / 16 kV
<ul style="list-style-type: none"> — IEC 61000-4-2 — IEC 60 255-22-2 	
Electromagnetic fields	10 V/m
<ul style="list-style-type: none"> — IEC 61000-4-3 — IEC 60 255-22-3 	
Burst	4 kV / 2 kV
<ul style="list-style-type: none"> — IEC 61000-4-4 — IEC 60 255-22-4 	
Surge	2 kV / 1 kV
<ul style="list-style-type: none"> — IEC 61000-4-5 	
HF conducted disturbances	10 V, 150 kHz ... 80 MHz
<ul style="list-style-type: none"> — IEC 61000-4-6 	
Voltage dips	100 1min
<ul style="list-style-type: none"> — IEC 61000-4-11 	
Emitted interference:	
<ul style="list-style-type: none"> ● Housing at a distance of 10 m 	30...230 MHz, 40 dB 230...1000 MHz, 47 dB
<ul style="list-style-type: none"> ● AC supply connection at a distance of 10 m 	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 100-240 V AC power adapter is supplied to 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 6 hours.

We take care of it.

5. Smart accessories

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

Rogowski current clamp: (Id.-Nr. 111.7001)

Current range:	3000 A AC RMS
Measuring range:	1 A to 3000 A RMS
Output voltage:	1 mV / 1000 A
Frequency range:	10 Hz to 30 kHz
Operation voltage:	1000 V CAT. III 600 V CAT. IV
Accuracy	1%
Angle error (45 – 65Hz)	1°
Rogowski clamp head	
— Length	610 mm
— Diameter	195 mm
Length of cable set	2 m

Current clamps: (Id.-Nr. 111.7002 / 3)

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

Current range:	20 A AC RMS
Measuring range:	100 mA to 22 A RMS
Output voltage:	10 mV / A
Frequency range:	40 Hz to 5 kHz
Operating voltage:	600 V AC / DC

Accuracy

Current 50Hz	10 mA	5 A	20 A
Accuracy	< 1.0%	< 0.5%	< 0.5%
Angle error	< 1°	< 0.5°	< 0.5°

Rogowski current clamp: (Id.-Nr. 111.7006)

Current range:	6000 A AC RMS
Measuring range:	20 A to 6000 A RMS
Output voltage:	42.5 mV / 1000 A
Frequency range:	10 Hz to 30 kHz
Operation voltage:	1000 V CAT. III 600 V CAT. IV
Accuracy	1%
Angle error (45 – 65Hz)	1°
Rogowski clamp head	
— Length	910 mm
— Diameter	290 mm
Length of cable set	2 m
Position influence	2%

Current clamps: (Id.-Nr. 111.7015)

Current range:	20A/20A AC RMS switchable
Measuring range:	10 mA to 20 A RMS 1A to 200A RMS
Output voltage:	10 mV & 1mV/A
Frequency range:	40 Hz to 20 kHz
Operating voltage:	600 V AC / DC

Accuracy

Current 50Hz	100mA - 10A	10A - 20A	20A - 200A
Accuracy	< 1%	< 1%	< 1%
Angle error	< 0.5°	< 0.5°	< 0.5°

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"> ● 1 GB micro SD card memory ● Slot for additional memory (SD card 1 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 ● 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.
Current clamps <ul style="list-style-type: none"> ● Set of 4 Rogowski-coils 0 – 3,000 A (61 cm) ● Set of 4 Rogowski-coils 0 - 6,000 A (91 cm) 	111.7001 111.7006
<ul style="list-style-type: none"> ● Set of 4 mini current clamps 0 – 20/200 A ● Set of 3 mini current clamps 0 - 20 A 	111.7015 111.7003
<ul style="list-style-type: none"> ● Adapter set for connecting other compatible clamps (4 ~) 	111.7004
<ul style="list-style-type: none"> ● AC/DC current clamp 60A/600A incl. power supply 	111.7020
<ul style="list-style-type: none"> ● Kit of magnetic voltage taps 	111.7008
<ul style="list-style-type: none"> ● DCF 77 radio controlled clock 	111.9024.01
<ul style="list-style-type: none"> ● GPS radio clock (230 V – RS 232) 	111.9024.47
<ul style="list-style-type: none"> ● CAT-Booster (600 V CAT IV) voltage adapter for PQ-Box 100 / 200 	111.7026



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Software - Version:

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Power Quality Analyzer – PQ-Box 200