

# MPQ2000

## Portable Power Quality Analyzer



- **IEC61000-4-30 Class A compliance**
- **Powered off of phase A voltage ac/dc**
- **1000 Vac and 1000 Vdc range**
- **Real time scope and DVM**
- **Connection verification**
- **On-board data analysis**

### DESCRIPTION

The Megger MPQ2000 Power Quality Analyzer is a highly intuitive, advanced portable 3-phase analyzer, delivering unmatched capability, in a rugged IP54 weatherproof enclosure. View RMS data, waveforms, demand data, phase angles, harmonics, unbalance, flicker and more in real time with the MPQ2000 scope mode and DVM mode. When data needs to be recorded, the MPQ2000 record verification automatically identifies the current clamps, recognizes their range and verifies the unit is connected properly. Simply connect it and push the record button.

The MPQ2000 can record for extended periods of time because of its massive memory. It utilizes an SD card which makes expanding the memory as easy as installing a new SD card. The recorded data can be viewed on the unit's color VGA display. The data can be transferred to the high-power Megger PQ Power Quality Analysis software via USB cable, USB stick, Ethernet, or directly from the SD card.

The free software, which requires no license, optimizes the MPQ2000 to locate the power quality phenomenon such as lighting issues, computer problems, tripping breakers, and much more. It offers advanced charting, advanced waveform and advanced harmonic analysis.

### MEASURED PARAMETERS

- |                                              |                                        |
|----------------------------------------------|----------------------------------------|
| ■ RMS voltage / current                      | ■ Total harmonic distortion            |
| ■ DC voltage                                 | ■ Total demand distortion              |
| ■ DC current (requires DC CT)                | ■ Harmonics                            |
| ■ Phase-to-phase voltage                     | ■ Inter-harmonics                      |
| ■ Power parameters (KW, KVAR, KVA, DPF, TPF) | ■ Energy parameters (KWH, KVARH, KVAH) |
| ■ Voltage sags/dips and swells               | ■ Power harmonics                      |
| ■ Phase angles                               | ■ Harmonic direction                   |
| ■ Current sags/dips and swells               | ■ IEC flicker                          |
| ■ Transient down to 1 $\mu$ sec              | ■ Rapid voltage change                 |
| ■ IEC unbalance and ANSI unbalance           | ■ Phase angle deviation                |
| ■ Frequency                                  |                                        |

### FEATURES AND BENEFITS

- Powering off phase A makes the unit versatile, allowing its use in any location.
- IP54 weatherproof enclosure is designed for outdoor operation. The unit is robust enough to remain recording outdoors.
- Automated configuration in the Megger PQ software for quick and easy setup.
- Easy intuitive menus allow for simple navigation and operation.
- Record verification ensures the unit is configured correctly and you get the data you need — no wasted recordings.
- Automatic CT recognition means never having the unit programmed for a wrong range.
- CTs are powered by the unit so there's no need for additional connections or batteries.
- Full-featured Class A compliant (all parameters).
- On-board data analysis saves time by allowing an immediate examination of the data while still in the field.
- The expanded 1000 Vac range allows for more applications; no need for a second unit.
- 1000 DC measurement allows testing and analysis of renewable applications dismissing the need for additional equipment.
- Phase angle stability measurement lets you easily find tricky phasing problems caused by multiple erratic sources.
- CAT IV at 600 V ensures a safe unit for all applications.
- Multiple communication methods (USB, Ethernet, USB stick or SD card) allow flexible and convenient operation
- Removable SD card allows for large recording capabilities and simple memory expansion.
- Included PC software: data analysis, configuration wizard, analyze waveforms through 128th order.

### ■ APPLICATIONS

Using experience gained from supplying a multitude of analyzers to a large number of utilities, industries and service providers, Megger has designed the most versatile unit available today. Some of the applications include the following:

- Compliance testing to any PQ standard
- Power factor studies
- Load studies and load balancing
- Billing verification
- Substation monitoring
- Capacitor bank sizing
- Transformer analysis and de-rating
- Motor troubleshooting and inrush testing
- Switchgear and component failure
- Tripping breakers
- Equipment tripping offline
- Dimming/surging lighting
- Lamp flicker analysis
- Neutral overheating

### SPECIFICATIONS

#### Input Power

Phase A 90-600V 50Hz/60Hz or 105-600V DC  
or

Aux Input Power - 120/240 V, 50/60 Hz

Water-tight cord to operate off standard US, UK and EU plugs

Supports live connect/disconnect

#### Battery

NiMH battery pack (field replaceable)

Discharge time – 8 hours

Recharge time – 3 hours

#### Data storage

External SD card (up to 32 GB)

#### Communication

Ethernet communications: network communications.

Wireless communications with off-the-shelf bridge.

USB stick - transfer data file to USB. Transfer setup configurations to and from USB stick. Perform firmware upgrades using USB stick.

SD card: automatically writes data to SD card; no manual transfer required. Transfer setup configurations to and from SD card. No tool needed to access the SD card.

#### Environmental

Operating: -20° C to 50° C (-4° F to 122° F)

Storage: -30° C to 60° C (-22° F to +140° F)

Relative humidity: 0-95% non-condensing

Altitude <2000 m: 1000V CAT III / 600 V CAT IV

Altitude 2000 m - 4000 m: 600 V CAT III / 300 V CAT IV

Altitude 4000 m - 5000 m: 300 V CAT III / 150 V CAT IV

#### Case

Ruggedized enclosure IP54 when closed

Lockable by means of padlock

#### Display

Backlit 11.5 cm x 8.5cm color VGA

#### PQ Events

Dips / sags: Triggers off of voltage and current. IEC61000-4-30 compliant.

Swells: Triggers off of voltage and current. IEC61000-4-30 Compliant

Sub-cycle distortions: Triggers off of voltage and current. IEC61000-4-30 compliant.

Transient detection: 1 µsecond. Triggers off of first 3 voltage channels. IEC61000-4-30 compliant.

THD: Triggers off of voltage and current. IEC61000-4-30 Compliant

Rapid Voltage Change (RVC): Triggers off of first 3 voltage channels. IEC61000-4-30 compliant.

Phase shifts: Trigger event when a phase shift occurs between the voltage channels. Record date and time, duration and waveforms of all enabled channels. Phase shift user selectable down to 1 degree.

Waveform capture of events: Capture waveforms on all enabled channels when an out of limits event occurs. Waveforms programmable with up to 9 pre-trigger cycles and 99 post-trigger cycles.

Timed waveform capture: Captures waveforms periodically on all enabled channels. Waveform capture interval programmable down to 1 cycle. Programmable number of cycles to be captured up to 99 cycles.

Event triggered waveforms and timed triggered waveforms simultaneously.

Mains signaling events: Two selectable frequencies and amplitudes.

Selectable time interval. Measured per IEC61000-4-30.

Captures waveforms on all enabled channels when a mains signaling event occurs. Waveform programmable with up to 9 pre-trigger cycles and 99 post-trigger cycles.

Event Flagging: Measured per IEC61000-4-30.

#### Motor Inrush

Records RMS, Power and PF at a 1 cycle resolution.

Capture inrush current during motor start up.

Support both three-phase and single-phase motors.

#### Real Time Data

Scope Mode: View waveforms in scope mode

Freeze, zoom and pan

View Vector scope

View ANSI unbalance

View IEC unbalance

View harmonic in real time

View inter-harmonics in real time

View RMS voltage and current in real time

DMM Mode: View IEC unbalance

View Harmonic in real time

View RMS voltage and current in real time

View THD in real time

View active power in real time

View reactive power in real time

View apparent power in real time

View DPF in real time

View TPF in real time

View flicker in real time

**Compliance**

IEC61000-4-7	IEC61326
IEC61000-4-30 (Class A)	IEC60529
IEC61000-4-15	MIL-STD-810 G
IEC61000-4-27	IEEE 1453
IEC61010-1	IEEE 1459
RoHS2 Directive 2011/65/EU	CAN/CSA-C22 No. 1010.1-92

**Dimensions**

305 mm x 266 mm x 143 mm (12.01 in. x 10.47 in. x 6.38 in.)

**Weight**

Standard unit: 2.27 kg (5 lbs)

**Sampling**

Resolution:	16 bit analog to digital converter on 8 channels
Max sampling speed:	1 MHz max
Max RMS sampling:	17,664 per channel max
PLL synchronization:	42.5 Hz to 69 Hz

**Real Time Clock**

Accuracy:  $\pm 20$  ppm

**Trended Parameters**
**Voltage**

4 voltage channels (isolated)	
Voltage range:	0 to 1000 V range AC RMS DC
<i>Measures AC &amp; DC simultaneously (NO common neutral required)</i>	
Voltage accuracy:	0.1% per IEC61000-4-30
Voltage ratios:	Adjustable voltage ratios for measuring secondaries. (.0001 through 9999)
Resolution:	16 bit
Crest factor:	1.5
Max pk voltage:	1628 V / 2500 V
Voltage lead set:	4 voltage leads, 6 ft (2 m) in length. Safety banana leads. Removable alligator clips. Optional plunger clips. Set of color bands for customizing color codes. Safety green/yellow ground lead included.
Fused adapter:	In line with voltage leads to provide fuse protection (optional).

**Current Channels**

5 current channels	
Current range:	0 to 6000 A (CT dependent)
Current ratios:	Adjustable current ratios for measuring secondaries (000.1 through 9999)
Current accuracy:	±0.5% of reading ±0.05% of full scale
Resolution:	16 bit
Crest factor:	4.0

**Power and Energy**

Active power (KW):	Per IEEE1459
Reactive power (KVAR):	Per IEEE1459
Apparent power (KVA):	Per IEEE1459
Energy parameters (KWH, KVARH, KVAH):	Per IEEE1459
Displacement power factor range:	-1.0 to +1.0
Displacement power factor accuracy:	$= \pm 0.02 + \text{CT error}$
True power factor range:	0.0 to +1.0
True power factor accuracy:	$= \pm 0.02 + \text{CT error}$
Power configurations:	11
Aggregation window:	1 cycle to 1 hour - fixed and sliding windows
Unbalance:	ANSI & IEC methodology per IEC61000-4-27
Total Harmonic Distortion (THD):	Per IEC61000-4-30 per IEC61000-4-7
Harmonics:	0 through 50th continuous
Inter-harmonics:	0 through 50th continuous
Total Demand Distortion (TDD):	Per IEEE519
Frequency:	Per IEC61000-4-30
Flicker:	Per IEC61000-4-15

**Functions**

Auto identify CT and CT range setting
Configuration verification - Display if unit is connected incorrectly.
On board analysis - Perform data analysis on unit. Compare recorded values against customizable templates.
Waveform analysis through the 128th order.
Clock hour orientation - Time sync recording to nearest interval.
Scheduled run - Select start and stop time of recording. Instrument then automatically begins recording.
On board configuration - Ability to configure recording parameters from front panel of instrument.
Auto Setup - Ability to have instrument automatically configure itself.
On board naming of data and setup files - Ability to name data and setup files from the front panel of the instrument.
Supported languages: English, Spanish, French, German & Czech
On Board Instrument Preference Settings:
Selectable Traces Colors
Selectable Short Cut Buttons
Selectable Time Out Period
Chart Grid ON / OFF

## Measurement Parameters

RMS voltage  
RMS current  
Sags / dips / swells  
Transients (1  $\mu$ sec) ( $\pm 2697$  V)  
Sub-cycle events 64  $\mu$ sec (notching, noise)  
Rapid voltage change  
Phase angle stability  
IEC Unbalance  
ANSI Unbalance  
Power (KW, KVAR, KVA, DPF & TPF)  
Energy (KWH, KVARH & KVAH)  
Power Factor 1 to 0 to -1  
Phase Angle  
THD  
TDD  
Harmonics  
Inter-Harmonics  
Power Harmonics  
Harmonic Direction  
Flicker  
Waveform Capture  
Frequency

## Software

Windows compliant (XP, Win 7, 8, 10)  
See MPQ Analysis Software datasheet for details

## OPTIONAL ACCESSORIES

### Power Quality Simulator (MPQ-SIM-01)

An ideal training tool. Creates a three-phase source, 50/60 Hz and loads off of single-phase dc adapter.

- Create dips and swells on voltage and current channels
- Create transients
- Create phase shifts between voltage channels
- Create phase shifts between voltage channels and current channels
- Create harmonics
- Create flicker
- Create power reversals



## OPTIONAL ACCESSORIES CONTINUED

CP-1000WCE-ID	1000 A split core CT
CP-100CE-ID	100 A split core CT
CP-20CE-ID	20 A split core CT
CP-5CE-ID5	A split core CT
CP-600DC-ID	600 A split core AC/DC current clamp

### MCCV Rain Tight Flexible Current Clamps

These flexible rain tight CTs have four current ranges that are all self-identifying.

The current clamps are powered from the MPQ2000 Analyzer and come in three different diameters (18 cm, 27 cm and 37 cm).

Ranges includes 60 A, 600 A, 3000 A and 6000 A.

### C/N 2007-216 Voltage Lead Set

Kit of 4 differential voltage leads.

Includes 4 voltage leads, 3 jumper leads and 1 ground lead.

Range = 0 to 1000 Vac / Vdc.

Voltage leads come with a kit of multi-color clip on bands. Configure the voltage leads to match the color code configuration.

CAT IV @ 600 V.

### C/N 1008-645 Voltage Lead Fuse Adapters

Optional fuse adapter kit. This adapter connects to the MPQ2000 standard leads.

Includes 4 adapters with multiple color straps.

Fuses come with a kit of multi-color clip on bands. Configure the fuse adapters to match the color code of your voltage lead.



CP-5CE-ID, CP-20CE-ID, CP-100CE-ID



CP-1000WCE-ID



MCCV6000-18  
MCCV6000-27  
MCCV6000-37



CP-600DC-ID



Optional Plunger Clips  
(1008-756)



Voltage Lead Set  
(2007-216)



Optional Fuse Adapter Kit  
(1008-645)



## ACCESSORY KITS



### MPQ2000 Basic Kit C/N MPQ2000-BASIC

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag plus fused adapters. Does **not** include current clamps.



### MPQ2000 Silver Kit C/N MPQ2000-S-KIT

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag, plus fused adapters and 3 MCCV6000-18 (four range flex 18 cm ID) CTs



### MPQ2000 Silver Plus Kit C/N MPQ2000-S-KIT-PLUS

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag, plus fused adapters and 4 MCCV6000-18 (four range flex 18 cm ID) CTs



### MPQ2000 Gold Kit C/N MPQ2000-G-KIT

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag, plus fused adapters and 3 MCCV6000-27 (four range flex 27 cm ID) CTs



### MPQ2000 Gold Plus Kit C/N MPQ2000-G-KIT-PLUS

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag, plus fused adapters and 4 MCCV6000-27 (four range flex 27 cm ID) CTs



### MPQ2000 Platinum Kit C/N MPQ2000-P-KIT

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag, plus fused adapters and 3 MCCV6000-37 (four range flex 37 cm ID) CTs



## MPQ2000 Platinum Plus Kit C/N MPQ2000-P-KIT-PLUS

Includes MPQ2000 analyzer, voltage leads, SD card, USB cable, ethernet cable, universal power cords, soft-sided carry bag, plus fused adapters and 4 MCCV6000-37 (four range flex 37 cm ID) CTs

## SPLIT CORE CURRENT CLAMP KITS



### Kit of 4 split core self ID 1000A PQ CT C/N CP-1000WCE-ID-KIT

Split core current clamp for the MPQ and PA9 series. Self-identifying on MPQ. Supports 1000A range. 6 in. (1.82 m) cord.



### Kit of 4 split core self ID 100A PQ CT C/N CP-100CE-ID-KIT

Split core current clamp for the MPQ and PA9 series. Self-identifying on MPQ. Supports 100A range. 6 in. (1.82 m) cord.



### Kit of 4 split core self ID 20A PQ CT C/N CP-20CE-ID-KIT

Split core current clamp for the MPQ and PA9 series. Self-identifying on MPQ. Supports 20A range. 6 in. (1.82 m) cord.



### Kit of 4 split core self ID 5A PQ CT C/N CP-5CE-ID-KIT

Split core current clamp for the MPQ and PA9 series. Self-identifying on MPQ. Supports 5A range. 6 in. (1.82 m) cord.



### Kit of 3 split core self ID 600A (AC/DC) PQ CT C/N CP-600DC-ID-KIT

Hall effect current clamp for the MPQ and PA9 series. Self-identifying on MPQ. Supports 600A dc and 400A ac range. 6 in. (1.82 m) cord.

## ORDERING INFORMATION

Item (Qty)	Cat. No.	Item (Qty)	Cat. No.
MPQ2000 9 channel 3-phase portable power quality analyzer	MPQ2000	<b>Optional Accessories</b>	
*MPQ2000 basic kit	MPQ2000-BASIC	PQ simulator	MPQ-SIM-01
*MPQ2000 silver kit	MPQ2000-S-KIT	Green ground lead and clip	2008-101
*MPQ2000 silver plus kit	MPQ2000-S-KIT-PLUS	White jumper lead	CA-PA9-JMP-KIT
*MPQ2000 gold kit	MPQ2000-G-KIT	Fused adapter kit (3 adapters and 3 fuses)	1008-645
*MPQ2000 gold plus kit	MPQ2000-G-KIT-PLUS	Kit of 4 plunger clips	1008-756
*MPQ2000 platinum kit	MPQ2000-P-KIT	Lid modification to include external Ethernet port	MPQ2000EE
*See description of Kit contents on previous pages		<b>Current Clamps</b>	
<b>Included Accessories</b>		Four range 6000 A AC rain tight, self-identifying, flexible rope current clamps (18 cm ID)	MCCV6000-18
Unfused differential voltage lead kit	2007-216	Four range 6000 A AC rain tight, self-identifying, flexible rope current clamps (27 cm ID)	MCCV6000-27
32 GB SD card	90023-619	Four range 6000 A AC rain tight, self-identifying, flexible rope current clamps (37 cm ID)	MCCV6000-37
USB communications cable	CA-USB	1000 A AC split core current, self-identifying current clamps (50 mm ID)	CP-1000WCE-ID
USB memory stick contains user guide, Megger PQ PC software and Megger PQ PC software user guide	1006-532	100 A AC split core current, self-identifying current clamps (20 mm ID)	CP-100CE-ID
Ethernet communications cable	36798	20 A AC split core current, self-identifying current clamps (20 mm ID)	CP-20CE-ID
Soft sided case	2007-626	5 A AC split core current self-identifying current clamps (20 mm ID)	CP-5CE-ID
Power cord and adapter - US	1007-980	AC/DC 600 A split core current self-identifying current clamps (50 mm ID)	CP-600DC-ID
Power cord and adapter - UK	1007-981	**Kit of 4 split core self ID 1000A PQ CT	CP-1000WCE-ID-KIT
Power cord and adapter - EU	1007-982	**Kit of 4 split core self ID 100A PQ CT	CP-100CE-ID-KIT
Battery pack	2008-369	**Kit of 4 split core self ID 20A PQ CT	CP-20CE-ID-KIT
		**Kit of 4 split core self ID 5A PQ CT	CP-5CE-ID-KIT
		**Kit of 3 split core self ID 600A (AC/DC) PQ CT	CP-600DC-ID-KIT
		**See description of Kit contents on previous pages	