# Revolution.

PQA820 | MACROTEST G1&G2 | HTANALYSIS

# Artificial Intelligence.

Thanks to the creation of App HTanalysis it is possible to interface HT last generation instruments with tablets and smartphones. **HTanalysis** is a professional software allowing to display and look at measurements or recordings on your devices then sharing them on HTCloud database.
HTanalysis permits to create professional reports complete with pictures, texts, video and voice notes. Interfacing the instrument with your device's display you can look at a fast and detailed tracking of the recorded quantities on touch-screen.

## PQA820

- It enables you to display **recordings of voltage, current, power, harmonics, THD%, cosphi and frequency**.
- It enables you to display **all waveforms, vector diagrams and harmonics instantly**.
- **It enables you to store all recordings** into **HTCloud** database **sharing** them through **mail** as well.

## MACROTEST G1&G2

- It enables you to create **reports** complete with **pictures, videos, text and voice notes, store** them into **HTCloud** database and share them through **mails**.

Share.
**Whenever, whatever and wherever.**

Install App HTanalysis to avail yourself of **HTCloud** database and **share** measurement results and recordings with your colleagues **from any place on the planet**.

HT Cloud™


MACROTEST G1&G2

# I'm pure technology.
# **Touch me, please.**


Clear answer.
Complying o not.

Save time!
You will take
half time!

Color Touch Screen
with icon intuitive
graphics

Wi-Fi
and USB

Power
measurement

App HTanalysis
for iOS™
and Android™

HT Cloud

Share.
Whenever,
whatever and
wherever*

You can enter
voice notes,
text notes
and pictures*

100%
"Made in Italy"
technology
and quality

- **One instrument for all electrical safety tests** according to **IEC/EN61557-1.**
- **Earth resistance** with 2- or 3-pole **volt-ampere method** in TT, TN and IT systems, **non-trip earth loop impedance measurement.**
- **Measurement of electrical parameters in single phase installations** (V, A ,W,VAR,VA, PF)

* Using HTanalysis App for iOS™ or Android™ on Tablet or Smartphone. The App can be downloaded for free on AppStore™ or Playstore™

- **Continuity** measurement of protective conductors.
- **Soil resistivity.**
- **Insulation resistance** measurement.
- **Stackless earth ground resistance measurement** with T2100 (optional).

** Optional accessory RCDX10 for testing industrial RCDs up to 10A.

# Earth Ground Resistance

The **Macrotest Series** easily measures **earth ground** (2 and 3 Point Method) and **soil resistivity** (4 Point Method) with an easy to understand **graphical user interface** and **color touchscreen**.
The meter can **store** internally **up to 999 measurements**. The included software enables **easy data transfer to a computer, tablet** or **phone** via **built-in Wi-Fi** or **USB** connection where it can be archived or used to **generate reports**.

The **HTAnalysis application** allows users, in **real time**, to **view, analyze**, **upload** and **share measurements** on the **HT Cloud**. This is **a free app** that is available to all.
The **Macrotest Series** provides a **complete set of easy to use measurements**.

The Macrotest Series utilizes the **three point test** (fall of potential), which measures **earth ground resistance** as required by **equipment manufacturer specifications** and as mandated by **national code requirements** for proper grounding. The **two point test** is used to test **grounding wires resistance** and **connection points resistance** between ground system elements (i.e. wires and electrodes). The tester can also be used to **test soils** for a **new ground system design** with the 4-point.

## More than one earth.

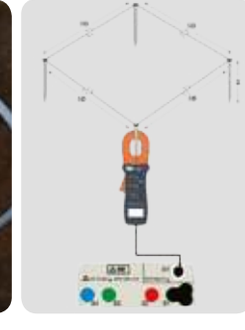
In addition to volt ampere method other testing modes can be adopted as follows:

- **Stackless earth ground resistance measurement with T2100 (optional)**
  MacrotestG3 adopts an innovative method for earth resistance measurement eliminating the worry of finding a place for auxiliary earth rods. Earth resistance measurement will be easier thanks to an algorithm HTEarth storing all measurements effected with clamp T2100 and calculating earth resistance value without disconnecting rods.

- **Soil resistivity**
  It measures soil resistivity (ρ) with 4-pole Wenner method.

Earth resistance measurement by Volt-ampere method





Measurement with clamp T2100

# Power
# and Load Analysis

- **Single Phase** and **Three Phase** balanced systems
- **Voltage,Current and frequency** measurement
- **Active power, reactive power** and **apparent power** measurement
- **Cosphi**, **power factor** measurement
- **THD%** and **Harmonics analysis** up to 25th


Power Analysis


Harmonics Analysis up to 25th

## Insulation resistance

- AUTO function
- Rapid setting of **limit values** and **test voltages through virtual keyboard.**
- Setting of **Timer for the test**
- **Test voltage 50, 100, 250, 500, 1000 VDC**


Selection of test voltage and minimum limit value


Selection of AUTO or TIMER measuring mode


Insulation measurement outcome

## Continuity of protection conductors with 200mA

- **Calibration of measuring cables**
- Rapid setting of **limit values** through virtual keyboard.
- Setting of **Timer for the test**


Negative outcome


Selection of maximum resistance value


Selection of AUTO or TIMER measuring mode

## Evolution of saving.

- Virtual keyboard to enter comments.
- Saving on file structure.
- **New detailed reports** with **TopView** software.


Saving with file tree


Entering comments on measurements

Transfer of data to PC by TopView software

## HTanalysis™ and HTCloud™

**App HTanalysis will change your working concept.**
During testing you can:

- Dictate comments orally
- Associate a picture or a video to each measurement
- Review and customize your measurements

**HTCloud** will enable you to **share your measurements with everybody.**

# Cross references

| Functions | MACROTEST G1 | MACROTEST G2 |
|---|---|---|
| Insulation with 1000VDC test voltage | | • |
| Insulation with 500VDC test voltage | | • |
| Insulation with 250VDC test voltage | | • |
| Insulation with 50, 100VDC test voltage | | • |
| Continuity of earth conductors with 200mA | • | • |
| Earth resistance with 2-pole and 3-pole | • | • |
| Earth resistance with ring mode | • ** | • ** |
| Ground resistivity with 4-pole | • | • |
| Measurement of electrical parameters (V, A, W, VAR, VA, PF) | • [1] | • [1] |
| Harmonic analysis up to 25th order and THD% calculation | • (25th) [1] | • (25th) [1] |
| Help on line | • | • |
| Internal memory to save measures | • | • |
| Optical/USB port for PC connection | • | • |
| Built-in WiFi communication interface | • | • |
| Hard carrying case | Optional | Optional |

Kit
## MACROTEST G1

**Macrotest G1** ‹
**T2100** Clamp ‹
**VA504** Hard case ‹

Kit
## MACROTEST G2

**Macrotest G2** ‹
**T2100** Clamp ‹
**VA504** Hard case ‹

# **Tech** specs

### Continuity with 200mA

Measuring range: 0,01Ω÷99.9Ω
Accuracy: ±(5.0% reading + 3 digits)
Test current: > 200mA (R ≤ 2Ω)
Open circuit voltage: 4V ≤ $V_0$ ≤ 12V

### Insulation resistance

Test voltage: 50, 100, 250, 500, 1000VDC
Measuring range: 0.01MΩ ÷ 99.9MΩ (50V)
0.01MΩ ÷ 199.9MΩ (100V)
0.01MΩ ÷ 499MΩ (250V)
0.01MΩ ÷ 999MΩ (500V)
0.01MΩ ÷ 1999MΩ (1000V)
Basic accuracy: ±(2.0% reading + 2 digits)
Test current: > 1mA on 1kΩ x Vnom (50,100, 250, 1kV)
> 2.2mA on 230kΩ @ 500V
Short circuit current: <6.0mA for each test voltage

### Line/Loop Impedance (L-L, L-N, L-PE)

Measuring range: 0.01Ω ÷ 199.9Ω
Resolution: 0.01Ω min (0.1mΩ with optional accessory IMP57)
Accuracy: ±(5.0% reading + 3 digits)
Test voltage: 100÷265V (L-N) / 100÷460V (L-L), 50/60Hz
Maximum test current: 5.81A (@265V); 10.10A (@457V)
Selectable MCB protections: curves B, C, D, K
Selectable fuse protections: type aM and gG
Insulating material (test I2t): PVC, butyl rubber, EPR, XLPE

### Earth resistance and ground resistivity

Measuring range R: 0.01Ω ÷ 49.99kΩ
Measuring range: ρ 0.60Ωm÷3.14MΩm
Accuracy: ±(5.0%reading + 3digits)
Test current: 10mA, 77.5Hz
Open circuit voltage: <20Vrms

### Measurement of environmental parameters (with optional probes)

Air temperature (°C/°F): -20.0 ÷ 60.0 °C / -4.0 ÷ 140.0 °F
Relative humidity: 0% ÷ 100%RH
Illuminance (Lux): 0.001lux ÷ 20klux
Accuracy: ±(2.0% reading + 2 digits)

### Measurement of main parameters and harmonics (PQA)

**AC TRMS Voltage**

| Range (V) | Resolution (V) | Accuracy |
|---|---|---|
| 15.0÷459.9 | 0.1 V | ± (1.0%rdg + 1dgt) |

Allowed crest factor ≤ 1,5 • Frequency 42.5 ÷ 69.0 Hz

**Frequency**

| Range (Hz) | Resolution (V) | Accuracy |
|---|---|---|
| 42.5÷69.0 | 0.01 V | ±(2.0%rdg + 2dgt) |

Allowed voltage: 15.0 ÷ 459.9V • Allowed current: 5%FS clamp ÷ FS clamp

**AC TRMS Current**

| FS clamp | Range (A) | Resolution (A) | Accuracy |
|---|---|---|---|
| ≤10A | 5% FS ÷ 9.99 | 0.01 | 1ph: ±(1.0%rdg + 3dgt)<br>3ph: ±(2.0%rdg + 5dgt) |
| 10A ≤ FS ≤ 200 | 5% FS ÷ 199.9 | 0.1 | |
| 200A ≤ FS ≤ 3000 | 5% FS ÷ 2999 | 1 | |

Range: 5 ÷ 999.9 mV • Values under 5mV are zeroed • Allowed crest factor ≤ 3 • Frequency: 42.5 ÷ 69.0 Hz

**Active Power**
**(@ 230V in 1Ph systems, 400V in 3 Ph systems, cosphi=1, f=50.0Hz)**

| FS clamp | Range (kW) | Resolution (kW) | Accuracy |
|---|---|---|---|
| ≤10A | 0.000 ÷ 9.999 | 0.001 | 1ph: ±(2.0%rdg + 5dgt)<br>3ph: ±(2.5%rdg + 8dgt) |
| 10A ≤ FS ≤ 200 | 0.00 ÷ 999.99 | 0.01 | |
| 200A ≤ FS ≤ 1000 | 0.0 ÷ 999.9 | 0.1 | |
| 1000A ≤ FS ≤ 3000 | 0 ÷ 999.9 | 1 | |

**Reactive Power**
**(@ 230V in 1Ph systems, 400V in 3 Ph systems, cosphi=0, f=50.0Hz)**

| FS clamp | Range (kVAr) | Resolution (kVAr) | Accuracy |
|---|---|---|---|
| ≤10A | 0.000 ÷ 9.999 | 0.001 | 1ph: ±(2.0%rdg + 7dgt)<br>3ph: ±(3.0%rdg + 8dgt) |
| 10A ≤ FS ≤ 200 | 0.00 ÷ 999.99 | 0.01 | |
| 200A ≤ FS ≤ 1000 | 0.0 ÷ 999.9 | 0.1 | |
| 1000A ≤ FS ≤ 3000 | 0 ÷ 999.9 | 1 | |

**Power Factor**
**(@ 230V in 1Ph systems, 400V in 3 Ph systems, f=50.0Hz)**

| Range | Resolution | Accuracy |
|---|---|---|
| 0.70c÷1.00÷0.70i | 0.01 | ±(4.0%rdg + 10dgt) if I ≤ 10% FS<br>±(1.0%rdg + 7dgt) if I >10% FS |

**Power Factor**
**(@ 230V in 1Ph systems, 400V in 3 Ph systems, f=50.0Hz)**

| Range | Resolution | Accuracy |
|---|---|---|
| 0.70c÷1.00÷0.70i | 0.01 | ±(4.0%rdg + 10dgt) if I ≤ 10% FS<br>±(1.0%rdg + 7dgt) if I >10% FS |

**Voltage Harmonics**
**(@ 230V in 1Ph systems, 400V in 3 Ph systems, f=50.0Hz)**

| Range (%) | Resolution (%) | Order | Accuracy |
|---|---|---|---|
| 0.1÷100.0 | 0.1 | 01÷25 | ±(5.0%rdg + 5dgt) |

Frequency of fundamental: 42.5 ÷ 69 Hz, DC accuracy not declared.

**Current Harmonics (f=50Hz)**

| Range (%) | Resolution (%) | Order | Accuracy |
|---|---|---|---|
| 0.1÷100.0 | 0.1 | 01÷9 | ±(5.0%rdg + 5dgt) |
| | | 10÷17 | ±(10.0%rdg + 5dgt) |
| | | 18÷25 | ±(15.0%rdg + 10dgt) |

# **General** specifications

| | |
|---|---|
| Power supply | 6x1.2V rechargeable type AA NiMH<br>or 6x1.5V type AA alkaline |
| Battery life | > 550 test (alKaline) |
| Display | 320x240 resistive color LCD with touch screen |
| Memory | 999 locations, 3 marker levels |
| PC interface | optical/USB and Wi-Fi (with optional accessory C2013) |
| Dimensions (L x D x H) | 225 x 165 x 75 mm / 8.8 x 6.5 x 2.9 in |
| Weight (including batteries) | 1.2 kg / 2.5 lb |
| Safety | IEC/EN61010-1, double insulation |
| Pollution degree | 2 |
| Mechanical protection | CAT III 240V, max 415V among inputs |
| Reference standards | IEC/EN61557-1-2-3-4-5-6-7 |
| Working temperature | 0°÷ 40°C / 32°÷104°F |
| Working humidity | <80%RH |
| Storage temp. | -10°÷ 60°C / 14°÷140°F |
| Storage humidity | <80%RH |




## **Standard** accessories

- **C2033X** 3-banana to Shuko plug cable
- **KITGSC5** Kit including 4 cables, 4 alligator clips and 2 test leads
- **KITTERRNE** Soft carrying bag containing 4 cables and 4 earth rods
- **PT400** Stylus
- **BORSA2051** Soft carrying bag
- **TOPVIEW2006** PC software and optical-to-USB connection cable C2006
- **YABAT0003000** Rechargeable NiMH battery 1.2V, AA, 6 pcs
- **Quick user's guide**
- **User's manual** on CD-ROM
- **Calibration certificate** ISO9000

## **Optional** accessories

- **HT96U** Transducer for AC currents (including leakage current) 0 ÷ 1, 0 ÷ 100, 0 ÷ 1000A AC
- **T2100** Earth ground clamp transducer
- **PR400** Remote switch probe
- **SP-0400** Free hands kit
- **606-IECN** Magnetic adapter for connection to screw heads

KITGSC5

PT400

YABAT0003000

C2033X

PR400

T2100

HT96U

# P Q A 8 2 0


SINGLE PHASE
"SYSTEM" LED:
3 PHASE NO NEUTRAL
"SYSTEM" LED:
3 PHASE + NEUTRAL
"SYSTEM" LED:
IP65 (CLOSED CASE)
HT

# Power analysis and energy saving evolve.
# **In one finger.**


383 parameters recorded simultaneously


Suitable to any environment

Self-powered


Wi-Fi and USB

HTanalysis App for iOS™ and Android™


Share. Any style, place and time*

Multimedia notes

100% "Made in Italy" technology and quality

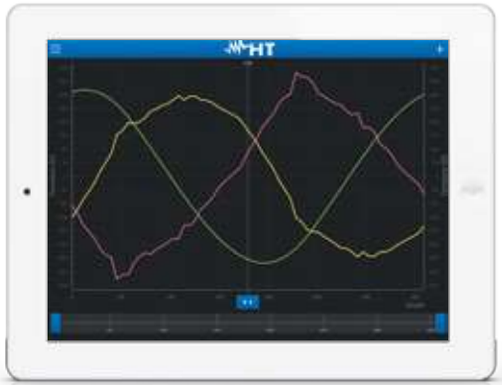
- **Turn your smartphone or tablet into the most advanced power and energy consumption analyzer in the world.**
- **3 system types:** Single-phase, 3-wire Three-phase, 4-wire Three-phase.
- **Easy to set up** directly **from Smartphone or Tablet**.
- **Technology and straightforwardness.** Immediate display of all recordings and simple analysis thanks to rapid gestures and detailed zoom on all quantities.

* Using HTanalysis App for iOS™ or Android™ on Tablet or Smartphone. The App can be downloaded for free on AppStore™ or Playstore™

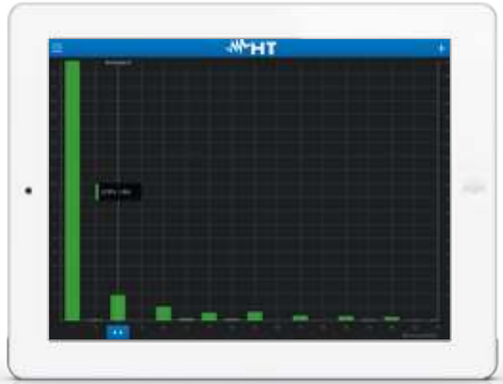
- **Real Time**. Instant display of all wave forms, harmonics, vector diagrams and summary function for a prompt reading of the most important parameters.
- **Energy saving**. Discover absorption capacity of all your equipment with one click and save energy.
- **383 parameters which can be displayed simultaneously.**
- **Jump function**. Relation between time and frequency domains or between power and energy consumed available instantly.

## Live.
## Real time analysis.

Using Wi-Fi connection you can display wave forms, vector diagrams, harmonics and all electrical parameters for each phase on your tablet/smartphone/PC.



Voltage and current wave forms



Current and voltage harmonics

Voltage and current vector diagram

## Unstoppable.

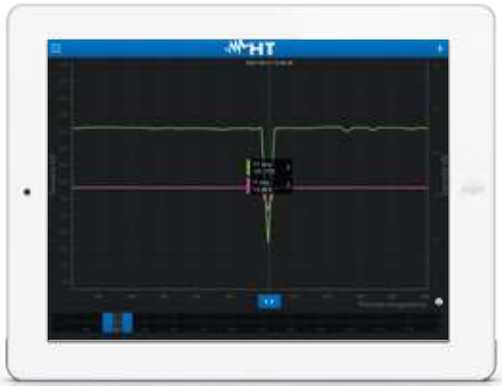
**UNLIMITED battery life.**
**PQA820** gets self-powered during measurement recordings. This features eliminates all problems related to limited life of standard batteries **so avoiding employment of external power supplies.**

HT cloud

## Zoom, Zoom, Zoom!
## Enlarge, jump, analyze.
## Two fingers needed.

**PQA820** helps to dispel the myth that recording analysis is quite complex.
**App HTanalysis** makes it simple and clear.
Using **ZOOM Functions** you can thoroughly display all the recorded quantities. **JUMP Function** permits to display harmonics in any recording step just by clicking on the quantity.

HTanalysys App can be downloaded for free on AppStore™ or Playstore™



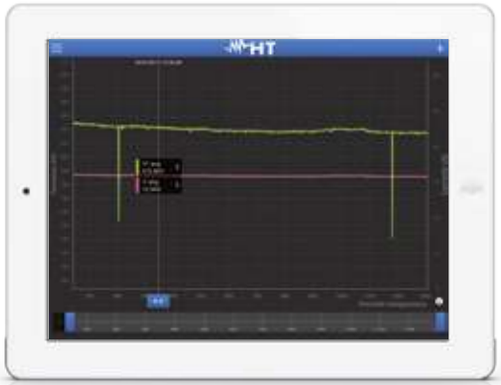
**Zoom** on voltage and current drop.


**Jump Function**
1. Click on arrow close to the value under test.


**Jump Function**
2. Go to real time harmonic values.

## We see everything.

**PQA820** is **capable** of recording **383 parameters simultaneously** on **THREE-PHASE** and **SINGLE-PHASE 3 or 4 Wire** systems. Thanks to softwares TopView and HTAnalysis (App for tablet and smartphone) you can display the tracking of all the recorded quantities, which can be selected from menu such as: voltages, currents, frequencies and powers, THD%, harmonics up to 49th, cosphi and voltage breaks.Trouble-shooting and pre-emptive service have never been achieved so easily and immediately.



Tracking of the main quantities.

Harmonics up to 49th.

Tracking of all harmonics.

## IP65. Rain doesn't scare us.

**PQA820** is not afraid of the weather. Thanks to its heavy-duty and waterproof case the instrument is well protected and can be used in any environment.

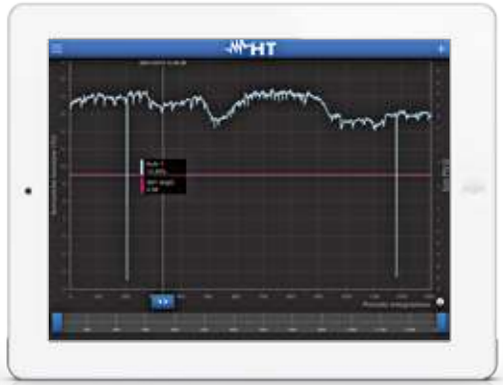
IP65 - Waterproof and resistant to extreme weather conditions.

## We work, you save up.

PQA820 is capable of recording all active, reactive and apparent powers over a long period, comparing them with cosphi, THD%, harmonics and power factor. Reduction of energy dissipation will be possible thanks to the HTanalysis App.

Tracking of powers.

Jump function to check how much energy was consumed.



Example of analysis on THD% and power factor.

# Functions

- DC/AC TRMS voltage (4 inputs)
- DC/AC TRMS current (4 inputs)
- DC and AC active, reactive, apparent power
- Active, reactive, apparent energy
- Power factor and cosPhi
- Analysis of voltage/current harmonic up to 49th order
- Voltage anomalies (sag, swell) with 10 ms resolution
- Voltage unbalance
- LED indication of phase sequence
- Frequency
- Parameter data table, graphs, harmonic histograms, voltage and current phasors with PC or iPad/iPhone and Android device connection
- Max 383 parameters simultaneously selectable
- Recording with integration period ranging between 5s and 60 min

# **Electrical** Specifications

### AC TRMS Voltage
Measuring range: 10.0V ÷ 265.0V (L-N)
50.0 ÷ 460.0V (L-L)
Basic accuracy: ±(0.5% reading + 0.2V)
Frequency: 42.5Hz ÷ 69.0Hz

### Voltage anomalies (sags, swells)
Measuring range: 15.0V ÷ 265.0V (L-N)
Basic accuracy: ±(1.0% reading + 2 digits)
Time resolution: 10ms @ 50Hz
Time accuracy: ±1/2 period

### AC/DC TRMS Current – Standard transducer (STD)
Transduced voltage range: 5.0mV ÷ 9999mV
Resolution: 0.1 mV
Basic accuracy: ±(0.5% reading)
Frequency: 42.5Hz ÷ 69.0Hz

### DC and AC Active, Reactive, Apparent power
Measuring range: 0.000 ÷ 9999 kW/kVAR/kVA
Resolution: 0.001 kW/kVAR/kVA
Basic accuracy: ±(0.7% reading)

### Active, Reactive energy
Measuring range: 0.000 ÷ 9999 kW/kVAR/kVA
Resolution: 0.001 kW/kVAR/kVA
Basic accuracy: ±(0.7% reading)

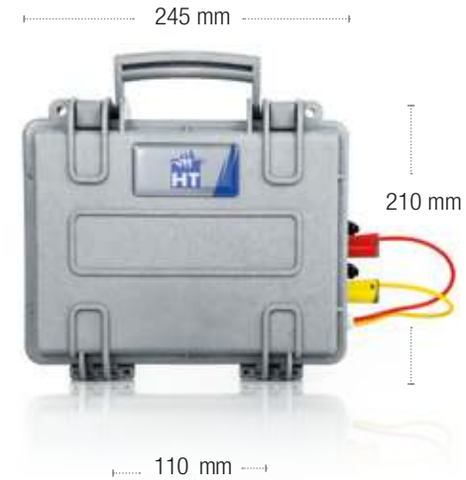
### Power factor (Cosphi)
Measuring range: 0.20 ÷ 1.00
Resolution: 0.01
Basic accuracy: 0.6° ÷ 1.0°

### Voltage/Current harmonics
Range: DC ÷ 49th order
Resolution: 0.1V / 0.1A
Basic accuracy: ±(5.0% reading + 2 digits) for DC ÷ 25th order
Frequency: 42.5Hz ÷ 69.0Hz

# **General** Specifications

Simultaneously recorded parameters

- Line to Neutral and Line to Line voltages, DC voltage
- Voltage anomalies (sags, swells)
- Line current, Neutral current, DC current
- Voltage/Current harmonics
- Phase and total Active, Reactive, Apparent power
- Phase and total power factor and cosphi
- Phase and total Active energy (class 2 EN61036)
- Phase and total Reactive energy (class 3 IEC1268)
- Maximum number of selectable parameters: 383
- Maximum number of voltage anomalies: 65530
- Integration period: 5, 10, 30s, 1, 2, 5, 10, 15, 60 min
- Recording duration: > 30 days (IP = 10 min)
- Power supply: rechargeable Li-ION battery
- External power supply: 100 ÷ 415V, 50/60 Hz
- PC interface: USB and WiFi
- Dimensions (L x D x H): 245 x 210 x 110mm 9.6 x 8.3 x 4.3in
- Weight (including batteries): 1.5 kg / 3.3lb
- Safety: IEC/EN61010-1, double insulation
- Pollution degree: 2
- Mechanical protection: IP65
- Measuring category: CAT IV 300V, max 415V among inputs
- Reference standards: EN50160
- Working temperature: 0° ÷ 40°C / 32° ÷ 104°F
- Working humidity: <80%RH
- Storage temperature: -10° ÷ 60°C / 14° ÷ 140°F
- Storage humidity: <80%RH




# **Standard** accessories

- **KITMPPACW** Set of 4 measuring cables
- **KITMPPACC** Set of 4 alligator clips
- **606-IECN** Adapters with magnetic ends, 4 pcs.
- **HTFLEX33L** 0÷100A, 0÷1000A AC flexible clamp, 174mm, 4 pcs.
- **TOPVIEW2007** PC Windows software + USB cable
- **BORSA2051** Carrying case
- **Quick user's guide**
- **User's manual** on CD-ROM
- **Calibration certificate** ISO9000

KITMPPACW

KITMPPACC

606-IECN (4 pcs)

HTFLEX33L (4 pcs)

# **Optional** accessories

- **HP30C2** Clamp transducer 0÷200A, 0÷2000A AC, diameter 70mm
- **HT96U** Clamp transducer 0÷1A, 0÷100A, 0÷1000A AC, diameter 54mm
- **HT98U** Clamp transducer 1000A/1V DC, diameter 50mm
- **HP30D1** Clamp transducer 1000A/1V DC, diameter 83mm
- **HT903** Box 3 x 1 5A/1V for connection to external CTs
- **ACONBIN** Adapter for clamp transducers

HP30C2

HP30D1

HT96U

HT98U

ACONBIN


# MACROTEST G1 & G2


SINGLE PHASE
"SYSTEM" LED:
3 PHASE NO NEUTRAL
"SYSTEM" LED:
3 PHASE + NEUTRAL
"SYSTEM" LED
IP65 (CLOSED CASE)
HT

P Q A 8 2 0

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**proArte** grafica bsh_G1-G2-P0A_En1-00