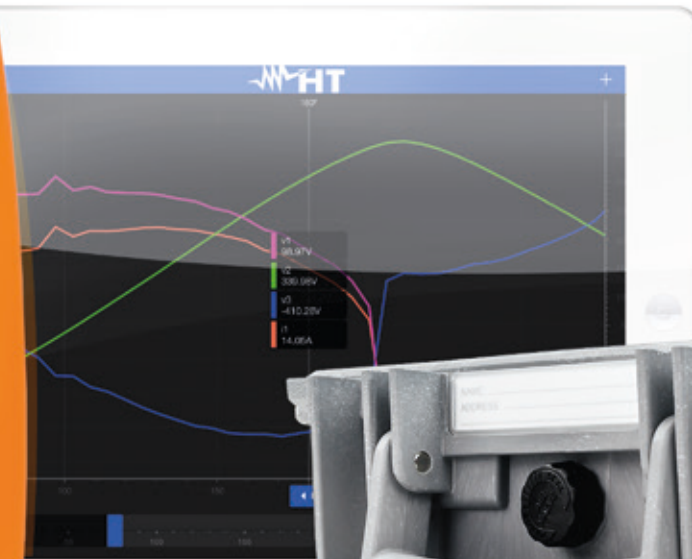


# Revolution.

P Q A 8 2 0  
M A C R O T E S T G 3  
H T A N A L Y S I S



# 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.

## MacroTestG3

- › 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.**





# Unrivalled technology. Faster than light.



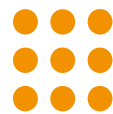
Clear answer.  
Complying or not.



Save time!  
You will take  
half time!



Color Touch  
Screen



Icon  
intuitive  
graphs



Wi-Fi  
and USB



App HTanalysis  
for iOS™  
and Android™



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.
- **Advanced Loop.** Testing of MCBs, fuses and cable sizing.
- **Earth resistance** with 2- or 3-pole **volt-ampere method** in TT, TN and IT systems, **non-trip earth loop impedance measurement, stack-less earth ground resistance measurement** with T2100 (optional).

- **Soil resistivity.**
- **RCD testing** type A, AC, B with test current up to 10A.\*\*
- **Insulation resistance** measurement.
- **Continuity** measurement of protective conductors.
- Measurement of **phase sequence (SEQ)** and **leakage currents.**
- **Measurement of environment parameters** through external probes.

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

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

# Advanced Loop

Testing of MCBs, fuses and cable sizing.

## For the first time ever.

For the first time you will be able to check whether a complex system is working in compliance with standards. **HT enriched loop measurement** including functions and tests which were earlier possible just thanks to project-oriented calculations.



## The rules of the game? We know all the answers.

In order to protect power lines, IEC/EN61557-1 standards require designers to size the installation to grant:

- protection against indirect contacts
- protection against short circuits.

MacrotestG3 is quite familiar with standards and is capable of directing you in solving any problem.

## Just challenge us.


- › **STD** Line impedance measurement between L-N, L-L, L-PE and calculation of prospective short circuit current.
- › **I<sup>2</sup>t** Testing of MCB against short circuit thermal effect.
- › **kA** Testing of MCB tripping power.
- ›  Testing of MCB against indirect contacts (TT-TN-IT systems).
- ›  Testing of MCB tripping time.

All the a.m. measurements can be also effected with high resolution (0.1mΩ) using IMP57 (optional accessory).

## No more guessing.

- › **I<sup>2</sup>t** Testing of MCB against short circuit thermal effect.

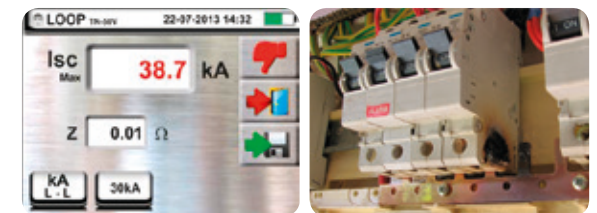
Are cables suitably sized to support short circuit currents? Is MCBs' tripping time short enough to safeguard your cables? MacrotestG3 will direct you in solving those problems. After setting the type of MCB/fuse, of cable section and conductor material you will be advised of line protection according to the following relation:

$$I_{cc}^2 \times t \leq K^2 \times S^2$$


Where, according to standards, K represents the conductor material while S is the cable section.

- › **kA** Testing of MCB tripping power.

Is the short circuit current calculated in every point of the line suitable? If yes your MCB is correctly sized.



Setting of MCB/fuse type and rated current

Selection of material type and conductor section

› **Testing of protection against indirect contacts (TT-TN-IT systems)**

When an earth fault occurs masses can become potentially dangerous as long as protection trips out. The instrument checks that danger does not overcome the limits set by the standards. For example in a TN system after setting the curve type and tripping time of MCB the instrument calculates short circuit current with positive outcome if MCB trips out before contact voltage becomes dangerous.

› **Testing of MCB tripping time.**

If MCBs comply with tripping times provided by the standards the instrument will indicate positive outcome.



Selection of tripping time

Positive outcome of measurements

## Earth Resistance

### Any kind of installation.

Earth resistance with 2- or 3-pole volt-ampere method in TT, TN and IT systems.

After setting the distribution system (TT, TN, IT) the instrument can check the requisites provided by the standards IEC/EN61557-1 for protection against indirect contacts with positive outcome in case of compliance.



Earth resistance measurement by Volt-ampere method

### Watchword: make it easier.

In TN systems after setting maximum earth fault current **I<sub>g</sub>** and tripping time for medium voltage protections (data provided by the Electricity Board) the instrument calculates contact voltage **U<sub>tp</sub>** after measuring earth resistance comparing it with EN50522's data. If outcome is **OK!** the user does not need to carry out step and contact voltage measurement.



### 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)**

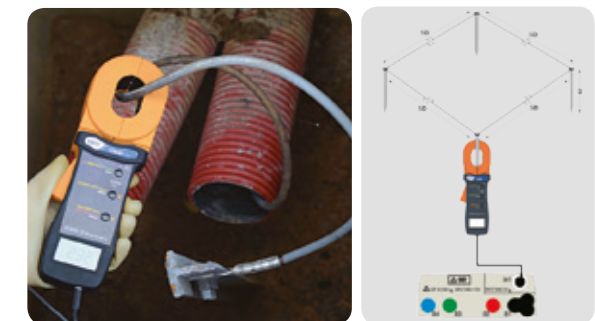
MacrotestG3 adopts an innovative method for earth resistance measurement eliminating the worry of finding a place for auxiliary earth rods. Earth resistance measurement will be easier thanks to an algorithm HTEarth storing all measurements effected with clamp T2100 and calculating earth resistance value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

› **Non-trip earth loop impedance measurement**

It measures earth resistance and contact voltage without causing protections tripping in systems with neutral and without neutral.

› **Soil resistivity**

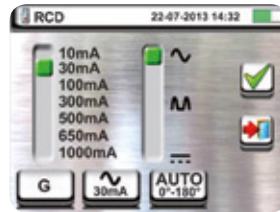
It measures soil resistivity ( $\rho$ ) with 4-pole Wenner method.



Measurement with clamp T2100

## RCD testing

- Test on **general, selective and delayed RCDs type A, AC up to 1A and B up to 300mA.**
- Test on **RCDs with external toroidal transformer and test current up to 10A\*.**
- Test mode **x½, x1, x2, x5 and AUTO** to make **6 test sequences.**
- **Ramp:** measurement of real tripping current.  
\*with optional accessory RCDX10.



Selection of RCD type and tripping current



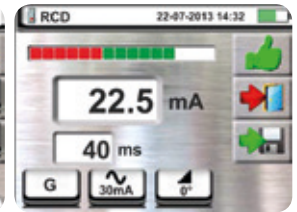
Selection of tripping current on RCDs with external toroidal transformer



Setting of RCD delayed time



AUTO test result on RCD



Ramp test result on RCD

## 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

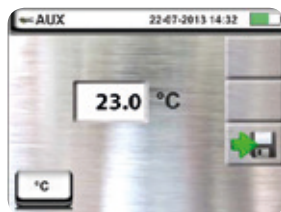
## Measurement of environmental parameters through external probes

Using external transducer it is possible to measure the following environmental parameters

- **Air temperature** in °C, °F and RH%
- **Air relative humidity**
- **Illuminance** with ranges 20/2k/20kLux



Selection of measurement type



Real time display of temperature measurement



Real time display of LUX measurement



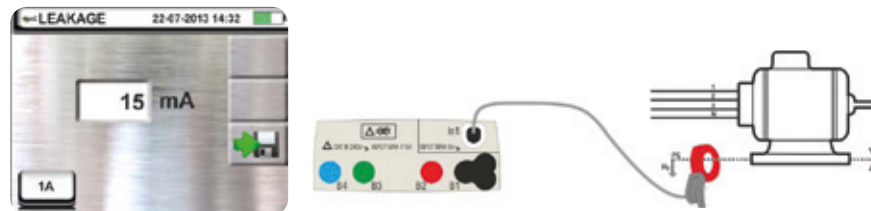
## Measurement of phase sequence SEQ

- Check of **phase sequence** with 1 or 2 terminals.
- Check of **phase compliance**.



## Measurement of leakage currents

Leakage current can be measured with external clamp **HT96U** (optional).



## 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.**



## 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<sub>o</sub> ≤ 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 V<sub>nom</sub> (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 + 3 digits)  
 Test current: 10mA, 77.5Hz  
 Open circuit voltage: <20Vrms

### RCD tripping time and current

RCD type: AC (⌚), A (⌚), B, General (G), Selective (S), Delayed (R)  
 RCD rated currents: 10, 30, 100, 300, 500, 650, 1000mA  
 Relays: 0.3..10A (with optional accessory RCDX10)  
 L-N, L-PE voltage: 100V ÷ 265V, 50/60Hz ± 5%  
 Half sine-wave test current: 0°, 180°  
 Tripping time accuracy: ±(2.0% reading + 2 digits)  
 Test current multipliers: x1/2, x1, x2, x5  
 Tripping current range: (0.3 ÷ 1.1) I<sub>dn</sub> (AC, A, B)  
 Tripping current accuracy: 5% I<sub>dn</sub> (10mA - 650mA)

### Non-trip earth loop impedance

L-N, L-PE voltage range: 100V ÷ 265V, 50/60Hz ± 5%  
 Measuring range: 0,01Ω ÷ 1999Ω (systems with neutral)  
                   1Ω ÷ 1999Ω (systems without neutral)  
 Accuracy: ±(5.0% reading + 3 digits)  
 Test current: <15mA

### Contact voltage Ut

Measuring range: 0 ÷ U<sub>lim</sub> (U<sub>lim</sub> = 25V o 50V)  
 Accuracy: ±(5.0% reading + 3V)

### 1 terminal phase sequence

L-N, L-PE voltage range: 100V ÷ 265V, 50/60Hz ± 5%  
 Measurement type: contact on metal parts (no insulating material)

### Leakage current (with clamp HT96U)

Measuring range: 2mA ÷ 999mA  
 Resolution: 1mA  
 Accuracy: ±(5.0% reading + 2 digits)

### 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)

## General specifications

Power supply	6x1.2V rechargeable type AA NIMH 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
- **KITERRNE** Soft carrying bag containing 4 cables and 4 earth rods
- **PR400** Remote switch probe
- **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
- **YABAT0004000** External battery charger for 8 pcs. type AA batteries
- **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
- **IMP57** High resolution impedance measurement adapter
- **T2100** Earth ground clamp transducer
- **HT52/05** Transducer for temperature/humidity measurement
- **HT53/05** Transducer for illuminance measurement
- **C2013** Wi-Fi adapter
- **SP-0400** Free hands kit
- **606-IECN** Magnetic adapter for connection to screw heads
- **1066-IECN** Black connector for extensions (4mm banana)
- **RCDX10** Accessory for industrial RCDs up to 10A



P Q A 8 2 0



# 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.

- › **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.

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



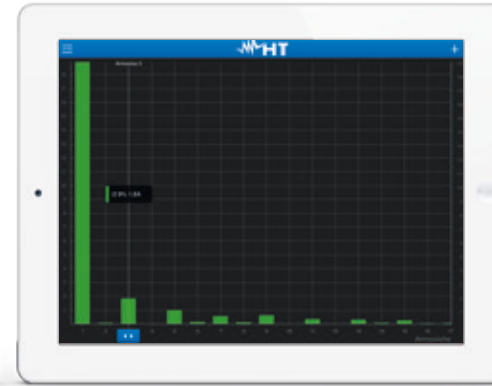
P Q A 8 2 0

## Live. Real time analysis.

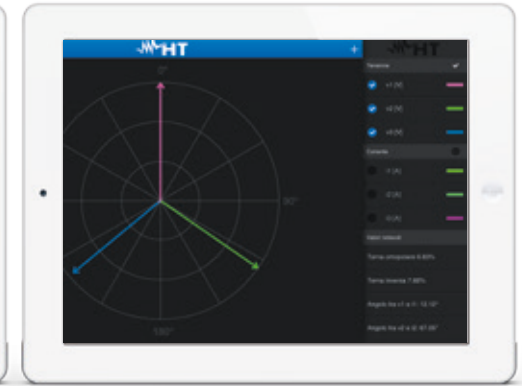
Using Wi-Fi connection you can display wave forms, vector diagrams, harmonics and all electrical parameters for each phase on your tablet/smartphone/PC.



Voltage and current wave forms



Current and voltage harmonics



Voltage and current vector diagram



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

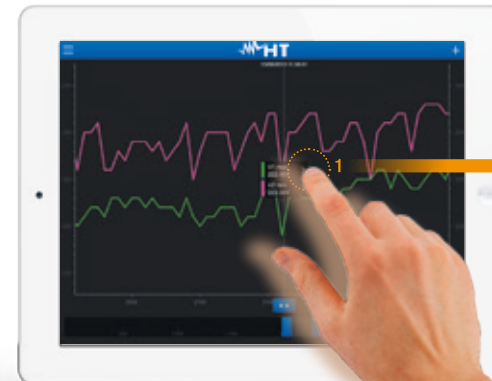
**PQA820** helps to dispel the myth that recording analysis is quite complex. **App HTanalysis** makes it simple and clear.

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.

HTanalysis 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.

## Unstoppable.

**UNLIMITED battery life.**

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



## We see everything.

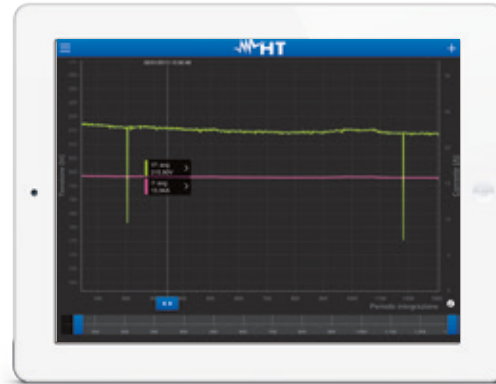
PQA820 is capable of recording 383 parameters simultaneously on THREE-PHASE and SINGLE-PHASE 3 or 4 Wire systems. Thanks to softwares TopView and HTAnalysis (App for tablet and smartphone) you can display the tracking of all the recorded quantities, which can be selected from menu such as: voltages,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

## IP65. Rain doesn't scare us.

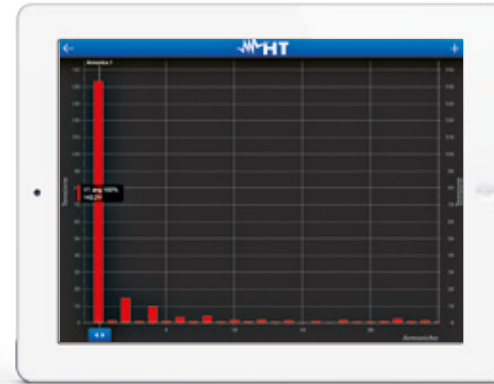
PQA820 is not afraid of the weather. Thanks to its heavy-duty and waterproof case the instrument is well protected and can be used in any environment.

## We work, you save up.

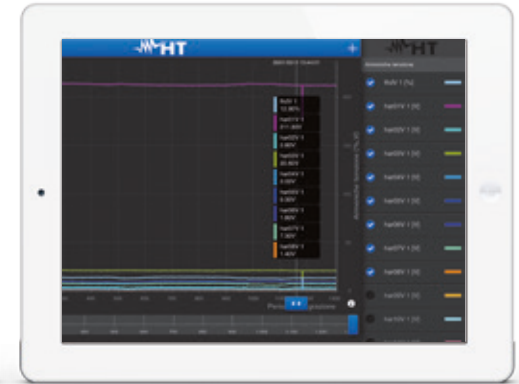
PQA820 is capable of recording all active, reactive and apparent powers over a long period, comparing them with cosphi, THD%, harmonics and power factor. Reduction of energy dissipation will be possible thanks to the HTAnalysis App.



Tracking of the main quantities.



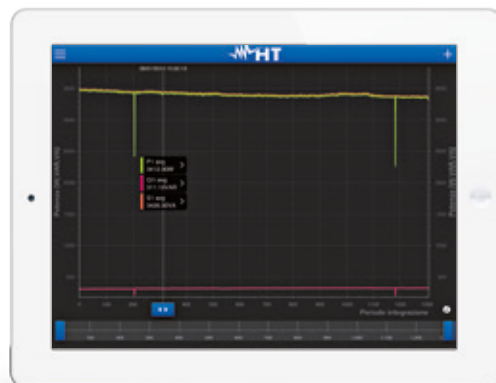
Harmonics up to 49<sup>th</sup>.



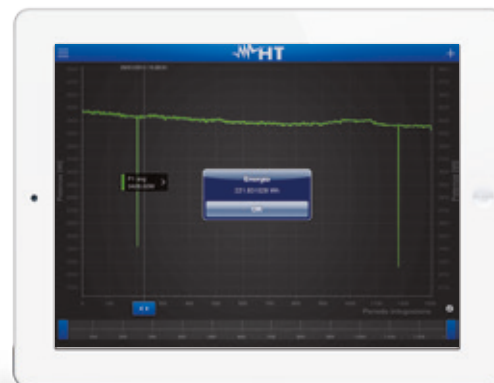
Tracking of all harmonics.



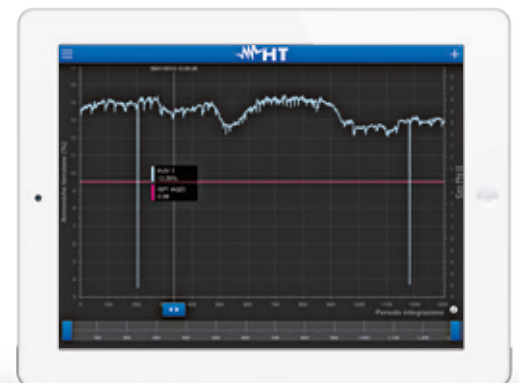
IP65 - Waterproof and resistant to extreme weather conditions.



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

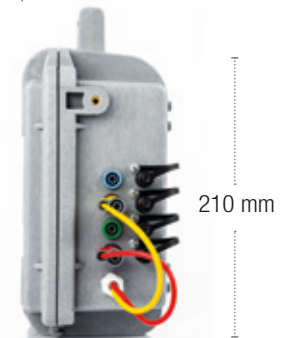


245 mm



210 mm

110 mm



210 mm

## 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



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÷1000AAC, 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



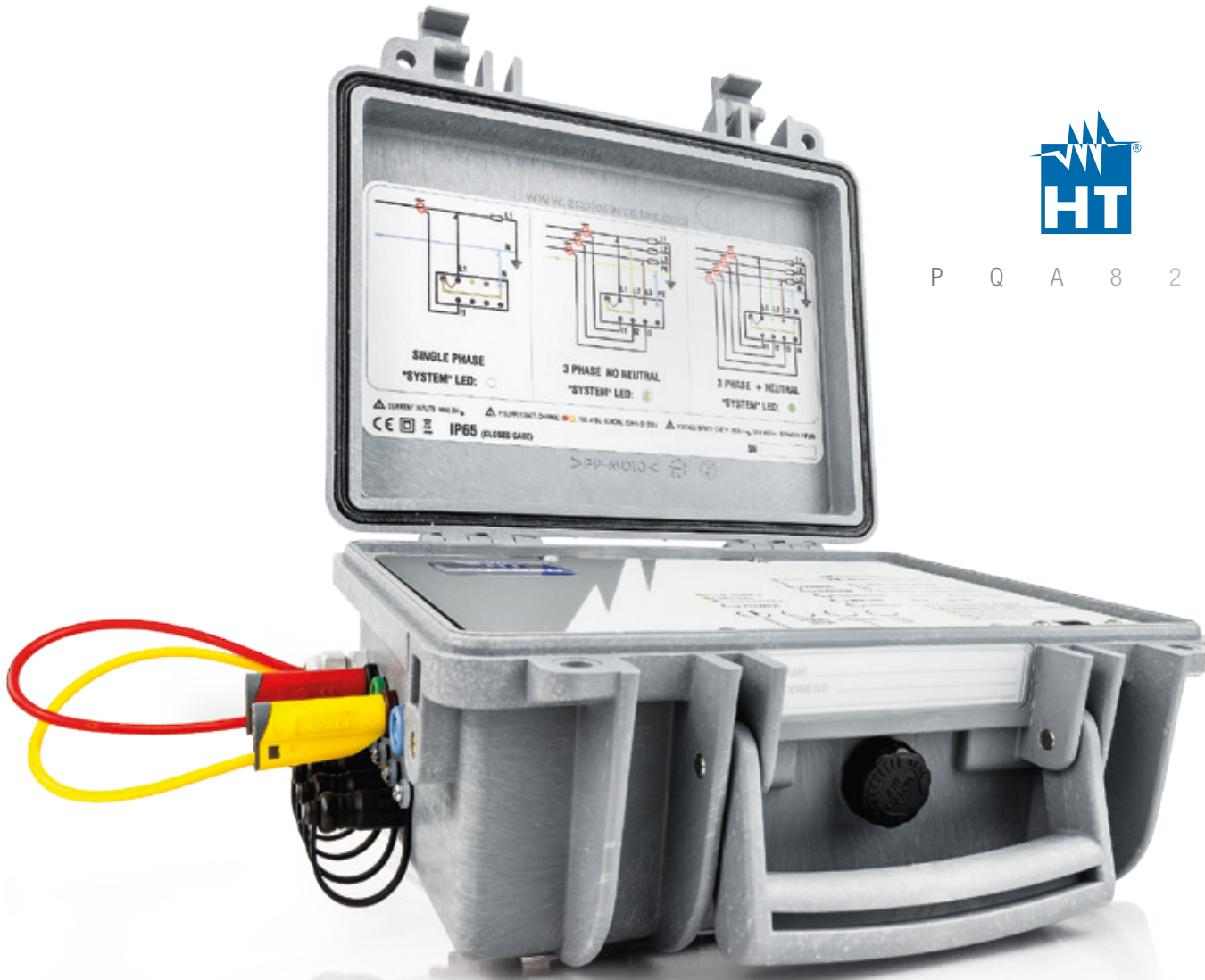
HT98U



ACONBIN







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