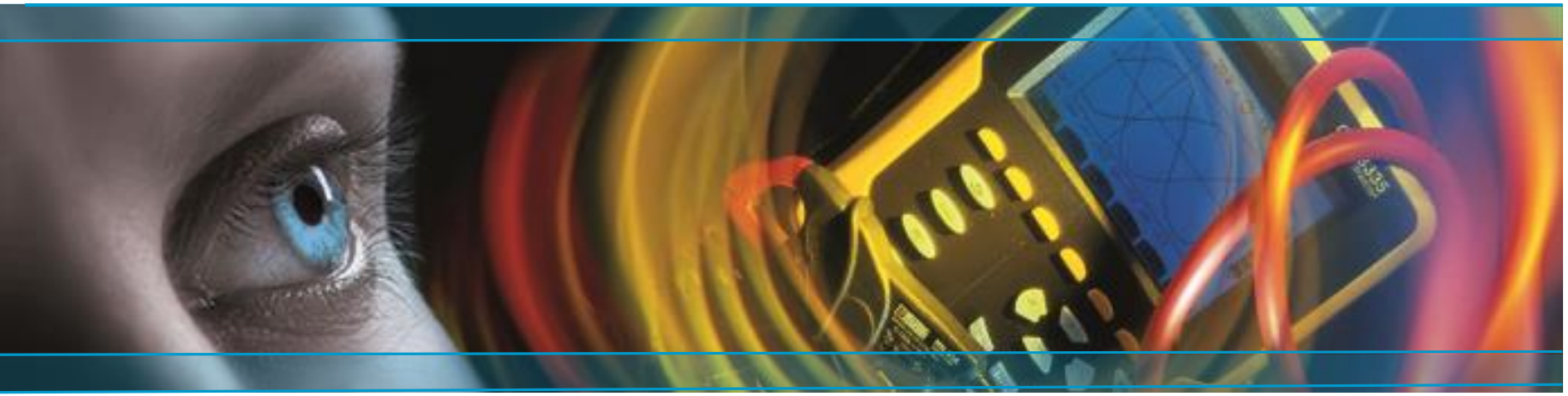
# Test & Measurement Instruments

## Portable and laboratory measuring instruments



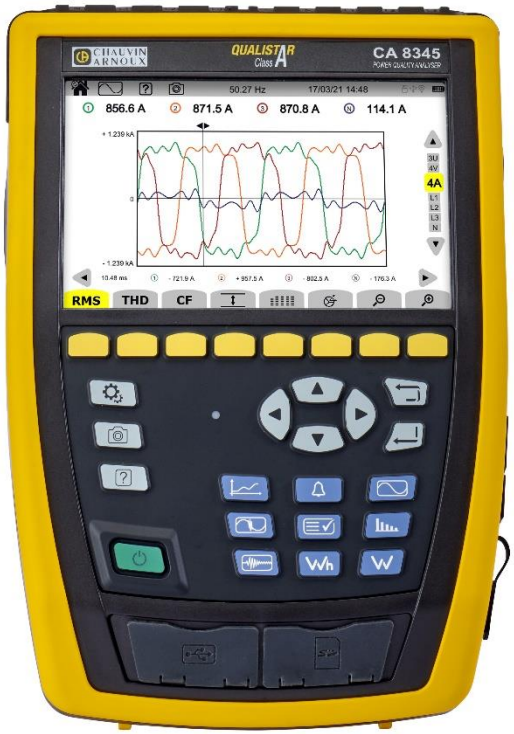
CA8435 power quality analyser

October 2021 – JOP

Measure up

# New product : CA8345

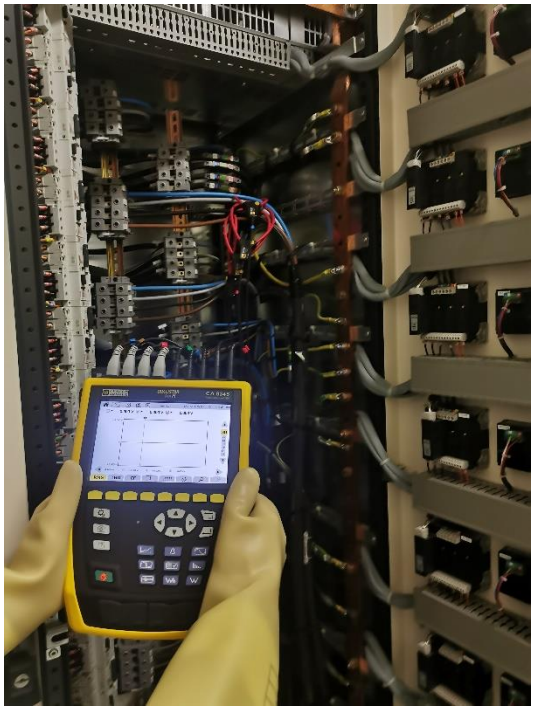
# The Qualistar




# Installation troubleshooting

**How does the CA8345 help me?**

- Understand the causes of network interruptions,
- What happened?
- Did it come from my installation?
- Observe the pattern of the event
- Confront the event with the current
- Have all the tools to analyse in depth
- Zoom in on the waveform at the time of the event
- Visualisation of the most furtive phenomena
- Do not miss any disturbance
- Simple installation: save the installation of a meter for one of your departures



# Energy efficiency

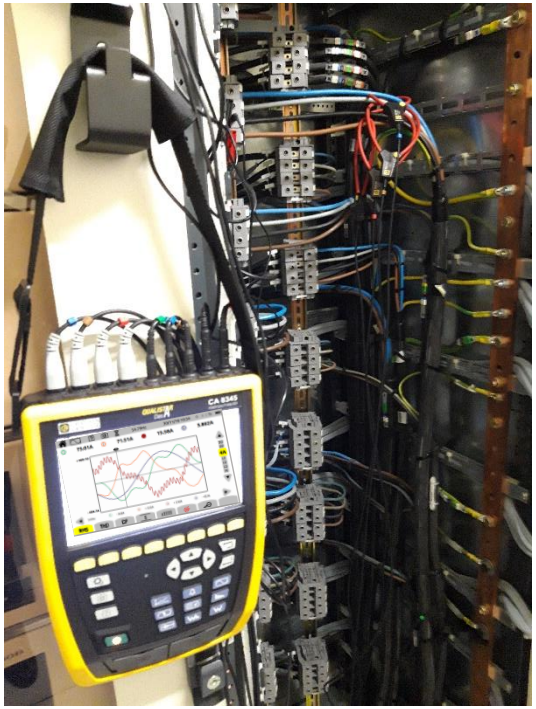
## How does the CA8345 help me?

- Observe the consumption profile
- Convert energy into local currencies
- Compare the record to the bills
- Have records long enough for a representation
- Get an accurate and factual timestamp
- Issue: Arbitration to enforce energy delivery commitments
- The energy supplier vs. the energy consumer

# Voltage quality analyses

## How does the CA8345 help me?

- The simplicity of configuring the device avoids errors
- Having a device that fits all installations,
- Simple and safe benching of the device,
- Sufficient recording capacity for the times imposed by the standards
- Analyse the results according to EN50160
- EN50160: How should the voltage waveform be during a week?
- Monitor your electrical network in a simple and efficient way



# Current QualistarPlus

Already several generations of devices. They have always been more and more efficient

Today 4 models

- C.A 8331
- C.A 8333
- C.A 8336
- C.A 8436

Main strengths

- Simplicity: a characteristic that has been recognised for years
- All useful functions: recorder, alarms, harmonics, ...
- IEC 61000-4-30 Class B: minimum level for EN50160

# Standards : reminder

## Power system evaluation

Assessment of the quality of mains supply :

**EN 50160:** Characteristics of voltage supplied by public distribution networks

**IEC 62749:** Assessment of Power Quality - Characteristics of electricity supplied by public electricity networks

## Measurement method standards

**IEC 61000-4-30 :** Electromagnetic compatibility - Testing and measurement techniques - Power quality measurement methods

**IEC 61000-4-7** : Methods of measurement of harmonics and inter harmonics

**IEC 61000-4-15** : Methods of measuring flicker

## Product validation standard

**IEC 62586 :** Measurement of power quality in power systems - Functional tests and uncertainty requirements (compliance with IEC 62586 implies compliance with IEC 61000-4-30)

# CA 8345

**3-phase analyser 4U / 4I**
**IEC 61000 -4-30 Class A**

- Isolated inputs
- 1000V AC DC
- Current according to sensor
- Power and energy measurements
- Harmonics and Inter-harmonics analysis
- Main signalling
- Data logger with over 900 parameters
- Monitoring with alarms
- Transient and surge capture
- Inrush recorder
- EN50160 measurement campaign
- Communication, Wi-Fi, Ethernet, USB, VNC
- IEC 61010 CATIV 1000V

# Sampling

The acquisition chains sample

- for voltages at 400 ksamples/s (2,5µs)
- for currents at 200 ksamples/s (5µs)

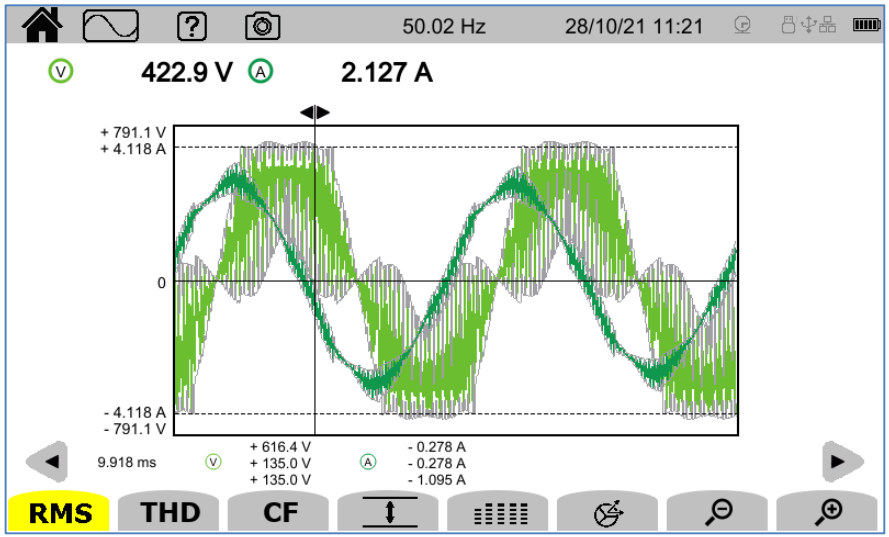
Directly used for the Peak values and the Transient mode

200ms, Power, Inrush measurements: 40 ks/s flow (25 µs)

The curves displayed are from the 512 spc acquisition (sample by cycle)

In Transient mode,

Surges / Shockwave: 2 Msps / 500 ns




*variable speed drive control output*

# Keyboard

**Icons of the Qualistar family**.
Direct access to functions

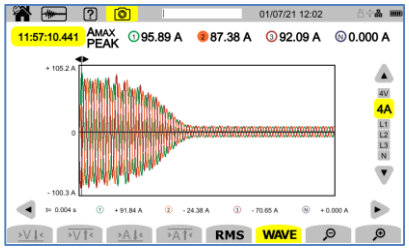
8 tab keys

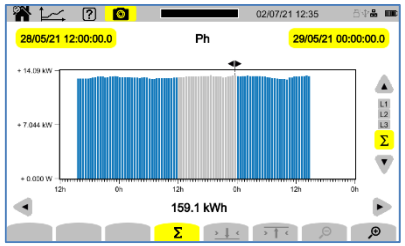
3 accesses to real time measurements
6 monitoring and recording functions
1 configuration button
1 screen capture key
1 multilingual online help button

1 multi-directional keyboard
2 enable/exit keys
1 illuminated On/Off button

# Display

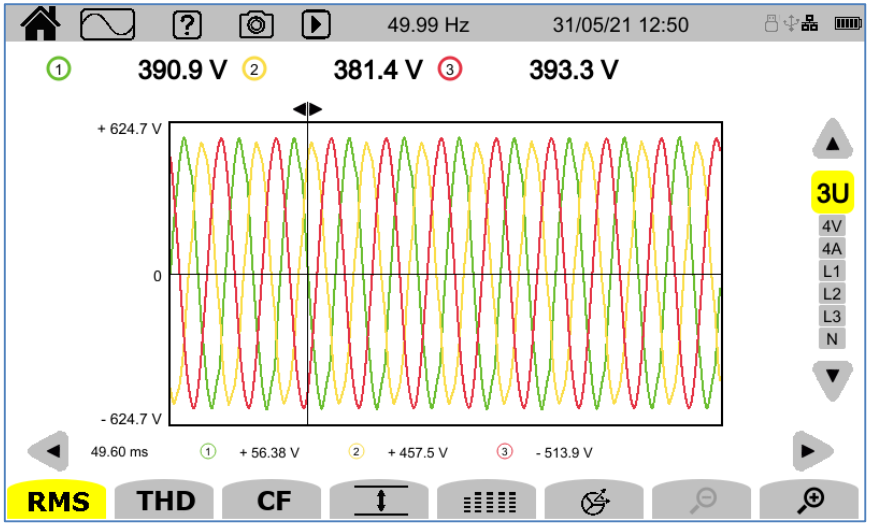
- 7-inch backlit colour TFT touchscreen
- 800 pixels x 480 pixels (WVGA)
- Easy-to-use interface, Qualistar filiation



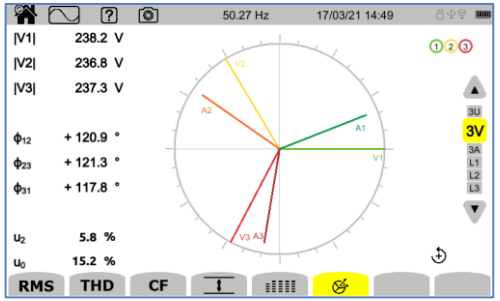

# Waveform mode

- RMS values
  - 200 ms or 1 s depending on setup
  - Saturation indication
- Cursor values
- Waveform 512 samples / period
- Min - Max: samples at 400 (voltage) and 200 kHz (current)
- Indication of incorrect phase rotation
- Vertical display filter
- Zoom to 10 periods



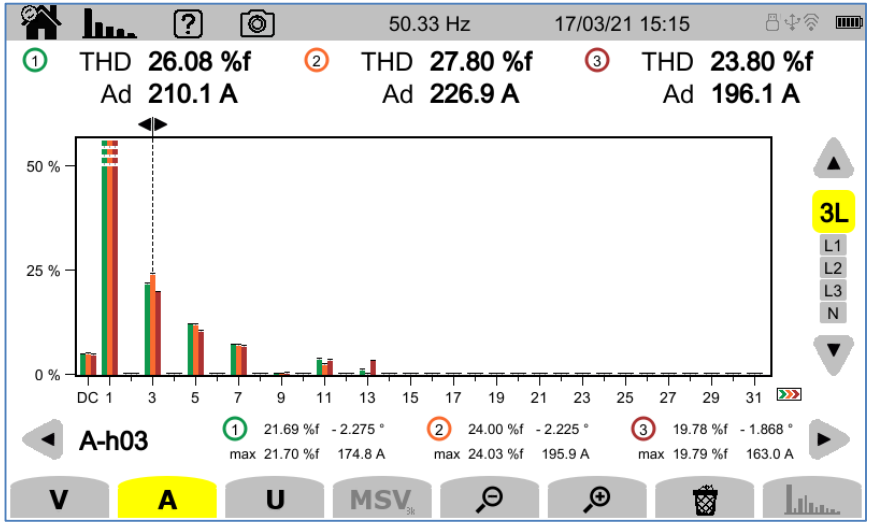

- The extra thing:

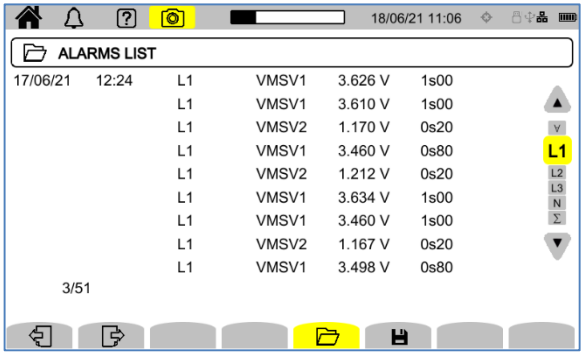
If you have connected your current collectors and when measuring you find that one or more collectors are not in the right direction. You can easily reverse them without having to turn them over

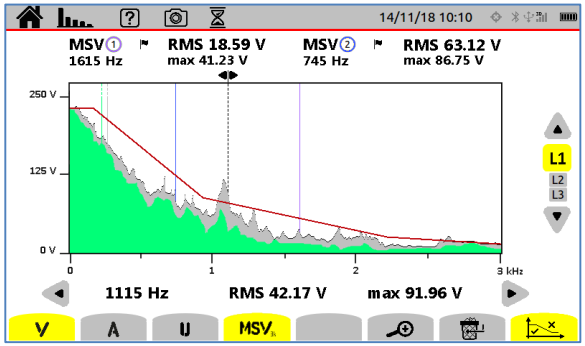


# Harmonics mode

- IEC 61000-4-7
- Harmonics up to 63 range
- Interharmonics up to 62 range
- Main signalling detection
- Amplitude zoom

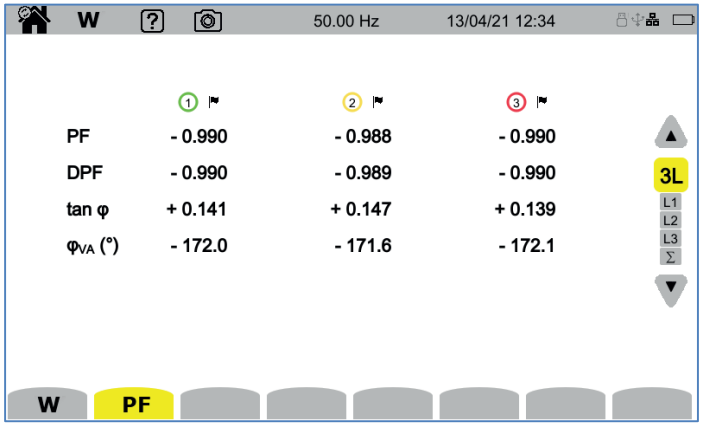


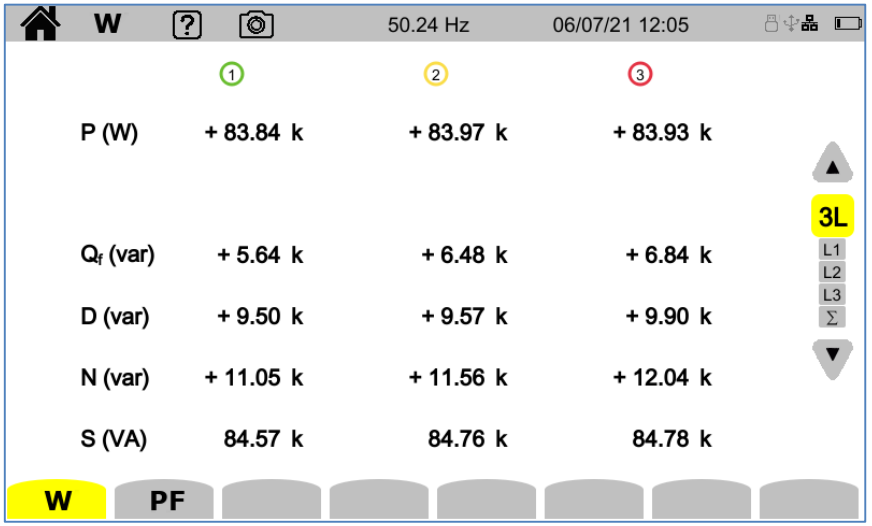



# Power mode

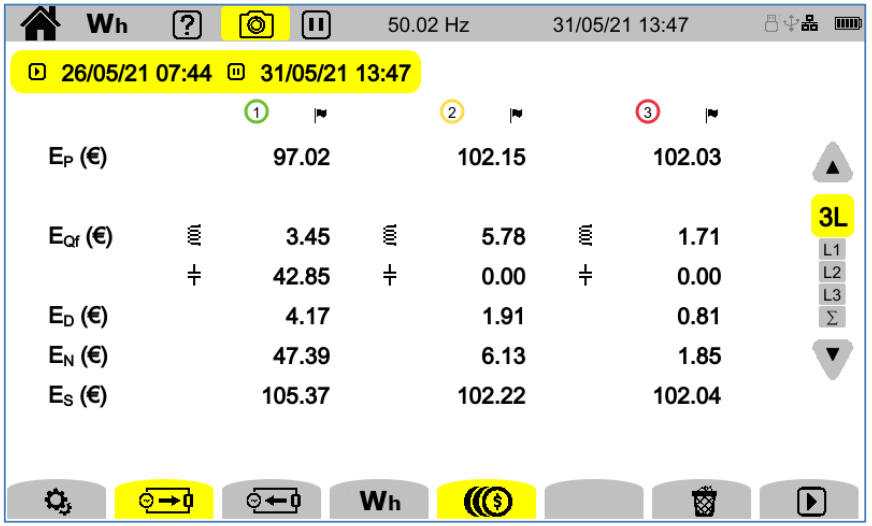
- Values
  - 200 ms or 1 s setup
  - IEEE 1459
- Parameters
  - P, $P_{DC}$, N, $Q_1$, D, S
  - PF, DPF/$PF_1$/Cos phi, Tan, angle
- DPF or Cos Phi or $PF_1$ choice

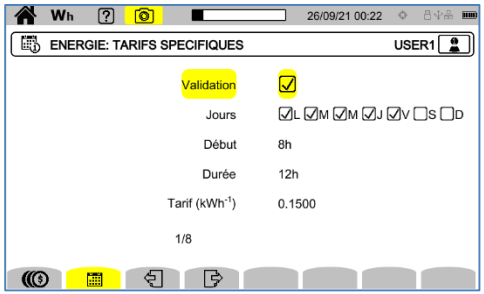


# Energy mode

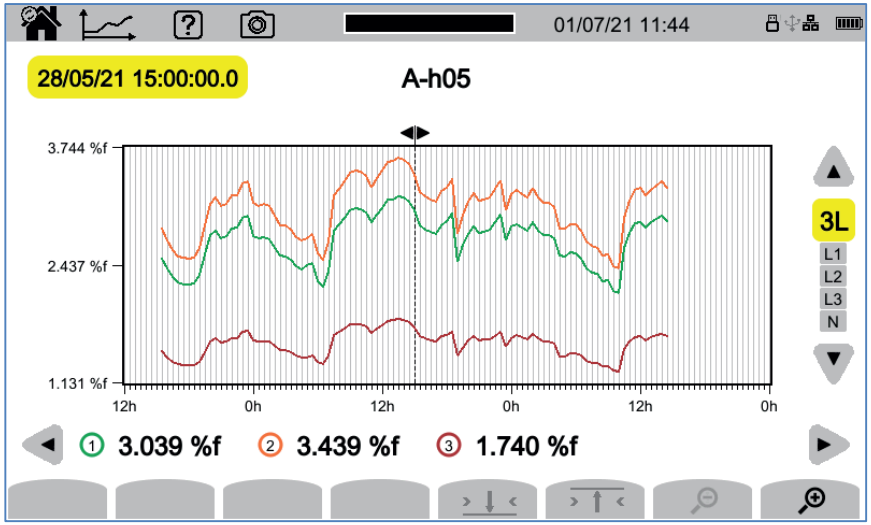
- Parameters
  - $E_P$, $E_{PDC}$, $E_N$, $E_{Q1}$, $E_D$, $E_S$
- Definition of the meaning of energy
- Choice of energy units: Wh, J, TPU, toe (nuclear or not),
- Energy valuations
- Definition of tariff ranges
- Display directly in local currency

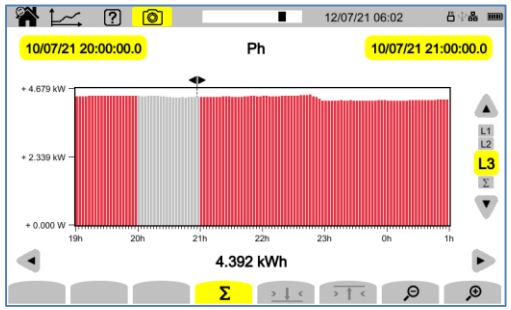



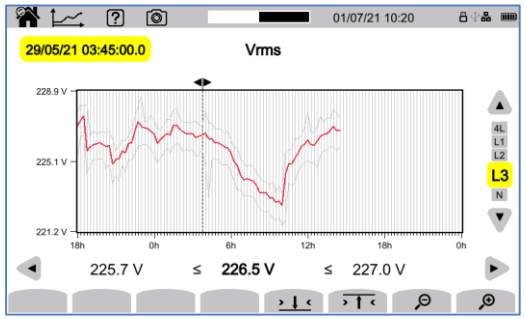



# Trend mode

- 49 recordable parameters
- Acquisition step from 200ms to 2h
- 4 setups in memory
- Zoom

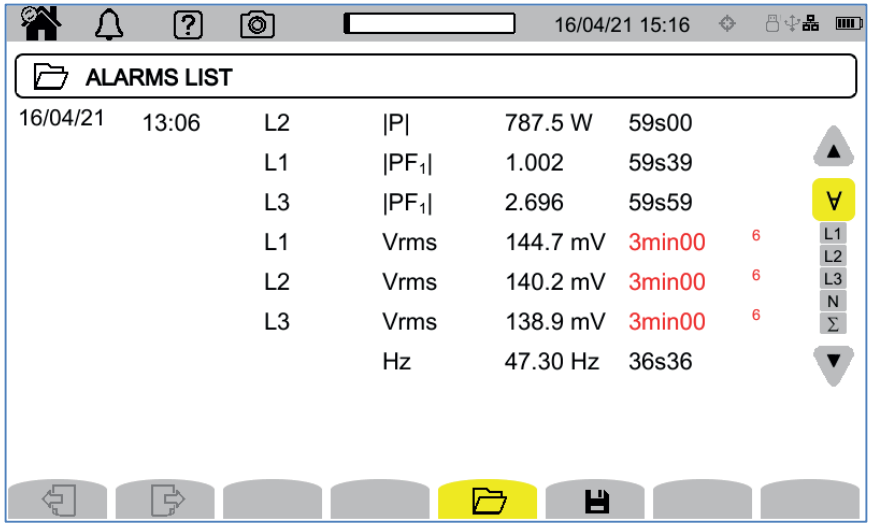


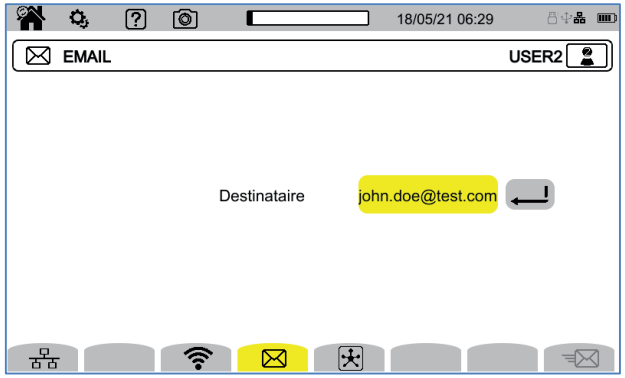



# Alarms mode

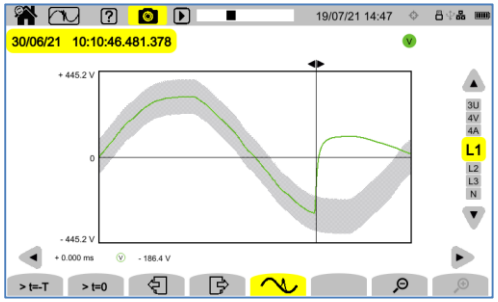
- 40 alarms type
- 53 surveyed parameters
- 20 000 saved alarms
- ½ cycle value or 200ms, or 1s, …
- Email send if request

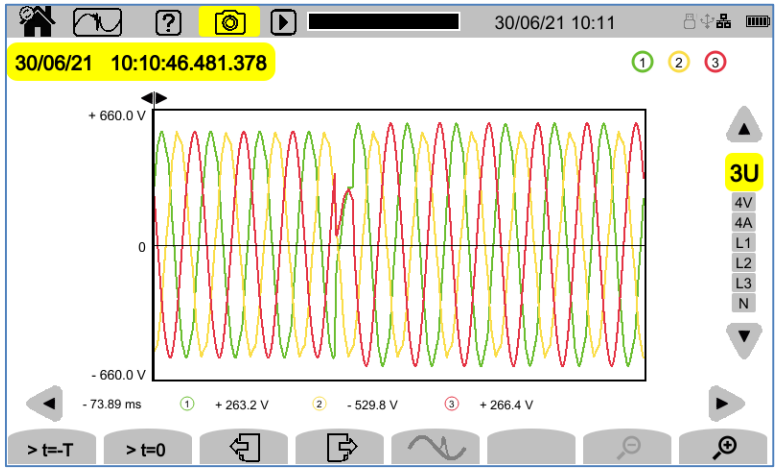


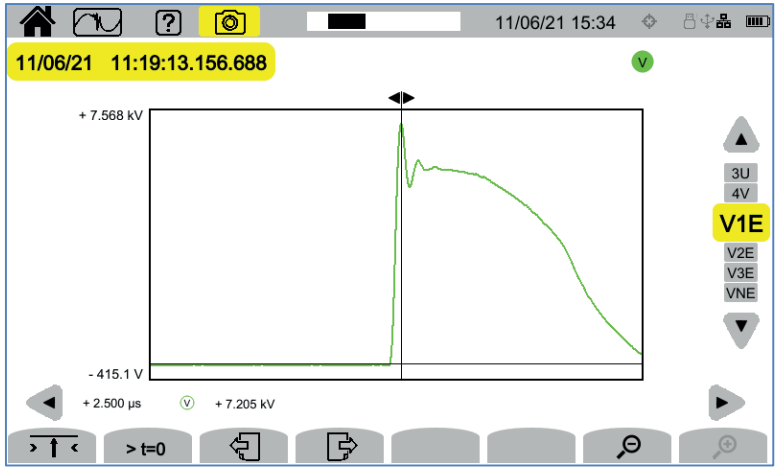



# Transient mode

- Transient
  - Catch and saved on 10 periods
  - Number of pre trig cycle to be setup
  - Waveform  512 sample / cycle
  - Min – Max : sampling at 400 (voltage) and 200 kHz (current)
  - Cursor values
  - Representation of the trigger tube
- Surge
  - Between phases and with earth
  - Up to 12 kV
  - Sampling at 2Ms./s, = 500ns event
  - Storage of the time-stamped peak value



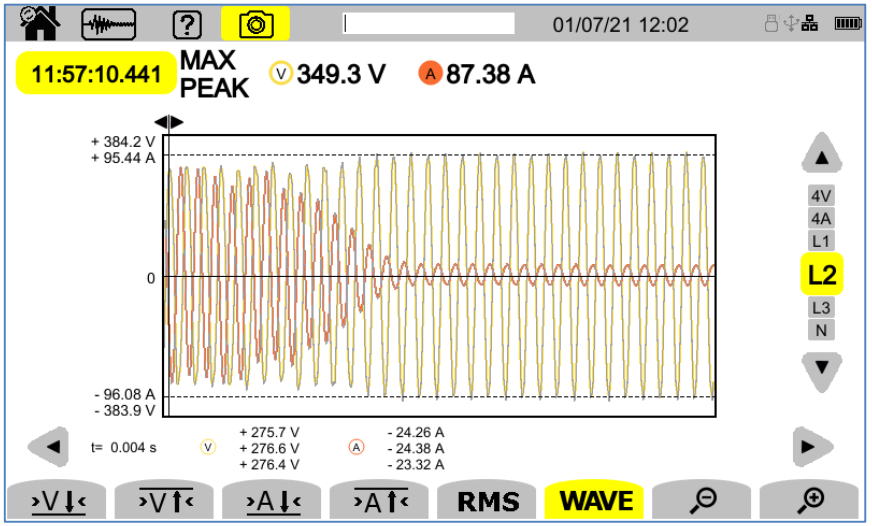



# Inrush mode

- Capture in RMS mode
  - ½ cycle RMS values
  - During 30 minutes max
- Capture wave (Peak) mode
  - 512 s./ cycle
  - During 10 minutes max
- Cursor values
- Zoom

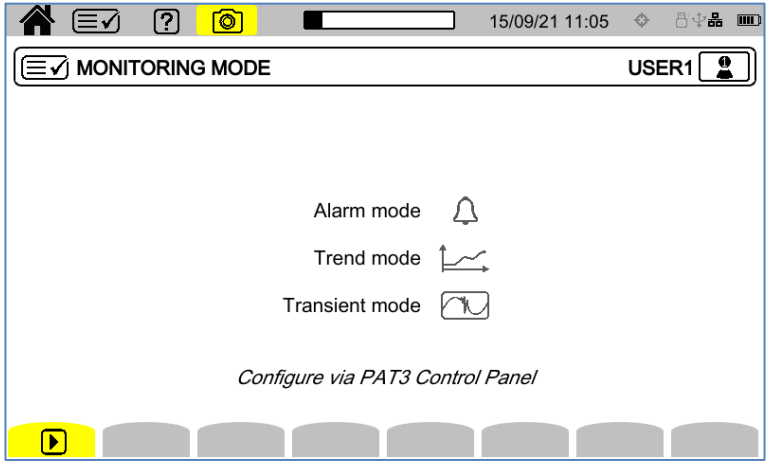
- Few Inrush saved on SD card

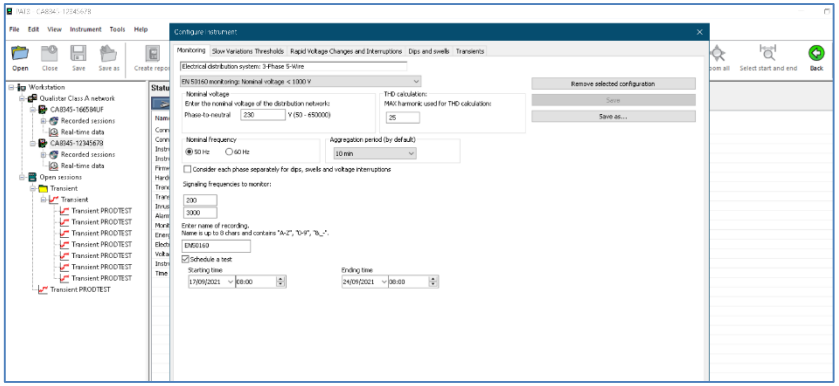


# Monitoring mode

- For the EN50160 measurement campaigns

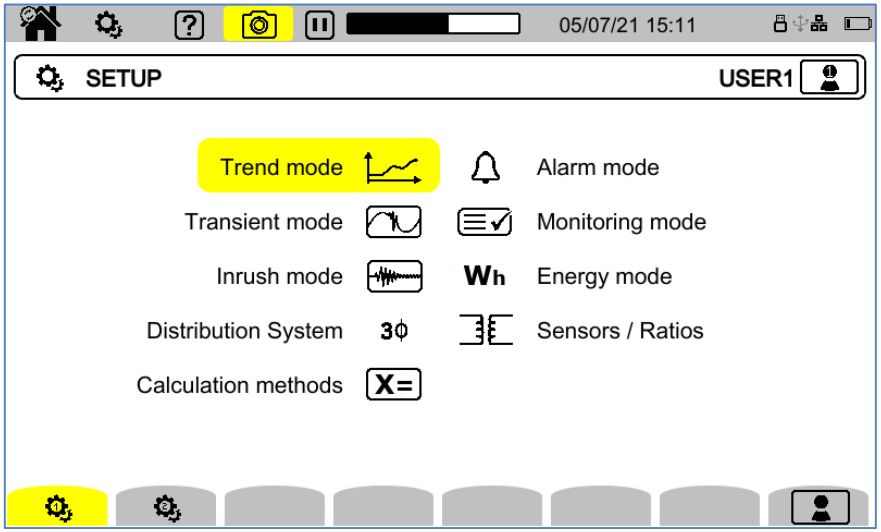
- Setup with the PAT3
- Datas downloaded with PAT3 software



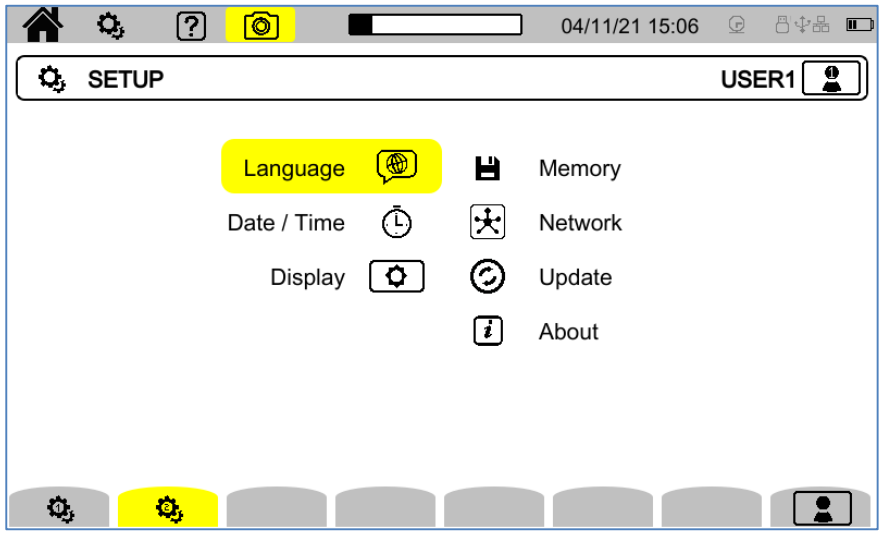



# Setup

## Measurements




## Instruments



# Synchronisation

Maximum drift according to Class A (IEC61000-4-30)

- No satellite in view ±1s / 24h
- Minimum one satellite in view ±16.7 ms vs UTC
- Validity 40 days

For Class A, have to be synchronised

- GPS mode :

or

- NTP mode
  - Time zone specification


# Communication

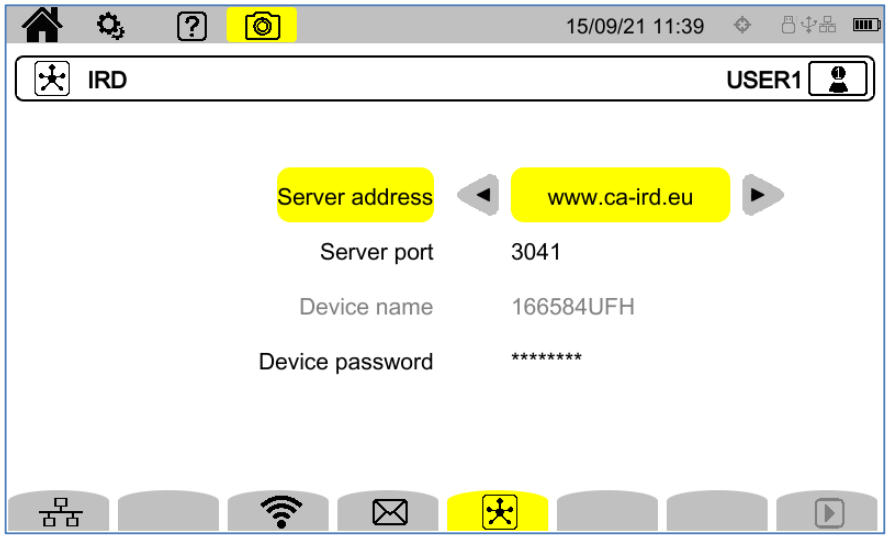
Ethernet
- DHCP or not

Wifi
- direct or using server

Email
- if the alarm is exceeded

IRD server
- IRD (Internet Relay Device) is a protocol that allows two devices to communicate on an authorized output address

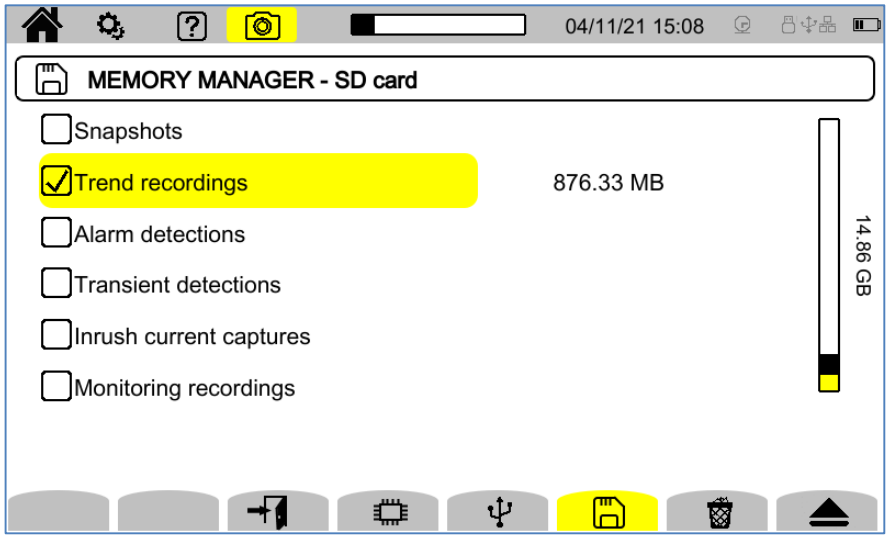
USB
- USB Type B
  - For PC communication
  - Datas transfer
  - Setup
- USB Type A
  - For instrument upgrade
  - Copy data from SD card to USB stick



# Memory

Files management

- User configuration management
- USB key management
- SD card management
- Copy content to USB key
- SD card ejection 



# Other tools

Possibility to use the data with external software.

- A file in json format is associated with each binary file on the SD card.


Remote control of the unit is possible with client software.

- SCPI commands are available.

| | | | |
|---|---|---|---|
| ***CLS** | Clear Status Command | SCPI-99.PDF<br>IEEE 488.2 | To clean error stack |
| ***ESE** | Standard Event Status Enable Command | SCPI-99.PDF<br>IEEE 488.2 | |
| ***ESE?** | Standard Event Status Enable Query | SCPI-99.PDF<br>IEEE 488.2 | |
| ***ESR?** | Standard Event Status Register Query | SCPI-99.PDF<br>IEEE 488.2 | |
| ***IDN?** | Identification Query | SCPI-99.PDF<br>IEEE 488.2 | Response format: <model>, <serial number>,<Firmware version>, <HPS version>,<FPGA version><br><br>Used to test the presence of CA834X |
| ***OPC** | Operation Complete Query | SCPI-99.PDF<br>IEEE 488.2 | |
| ***OPC?** | Operation Complete Query | SCPI-99.PDF<br>IEEE 488.2 | |
| ***RST** | Reset Command | SCPI-99.PDF<br>IEEE 488.2 | |
| ***SRE** | Service Request Enable Command | SCPI-99.PDF<br>IEEE 488.2 | |

# Battery power

- Battery
  - Li-Ion technology
  - Autonomy 10 h
  - Charge 8 h
- Battery charger
  - External battery charger (as CA6117)
- Power adapter
  - PA40W-2 (as Scopix IV)
  - PA32ER (by phase – 1000 V ac/dc)

# PA40W-2

PA40W-2 for CA8345

Delivered with :

- Electrical cord
- Safety document

Compatible with :

- CA6116N, CA6117,
- ScopixIV
- CA8345

# PA32ER

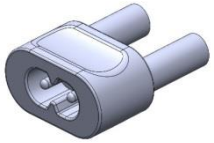
1 000 V Power by phase adapter

- AC and DC
- Magnet box, 53mm
- Power $P_{L1}N$ or $P_{L1}P_{L2}$

Delivered with :

- 2 x 3m banana-banana cords
- 2 x crocodile clamps
- Adapter banana / C8
- C7 cord

*Power adapter*



*Male banana adapter / C8*

# Hook

Magnetic and hook mounting system

# Memory

- All data are save on the SD card
  - Trend
  - Alarms
  - Transient
  - Inrush
  - Screenshot
- Compatible with: SD (→ 2Go), SD-HC (→ 32Go) et SD-XC (→ 512 Go)
- Exclusive access to the SD card (SD access priority):
  1. Copy to USB stick
  2. Consultation of the card content
  3. Remote download
- Memory system
  - FAT32
  - Analysis of the available memory size
  - Formatting and deleting capabilities (except Others)

# PAT3 / DataView softwares

Connection

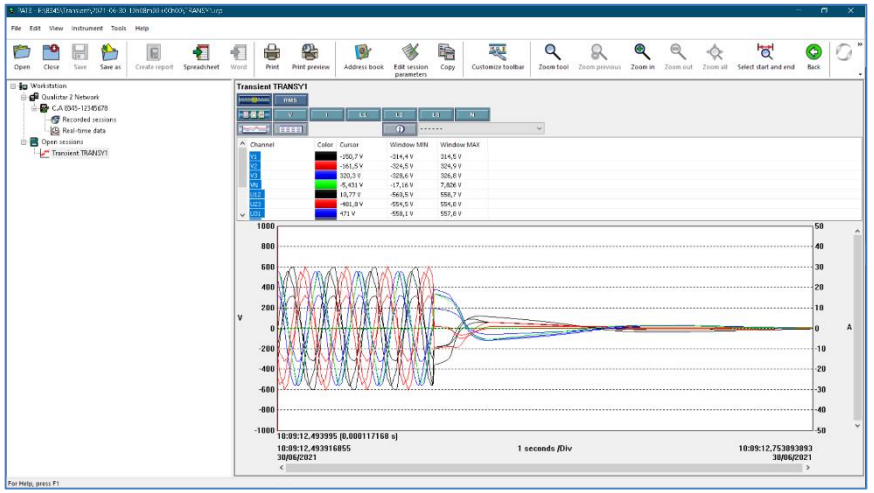
- Reading from SD card or USB stick
- In USB
- Ethernet (with or without IRD)
- Wifi (with or without IRD)

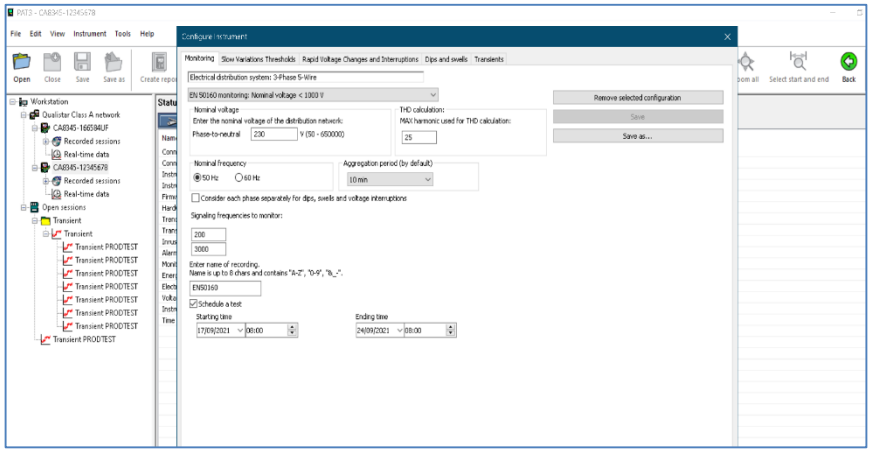
Data download

- Real time
- Export
- Zoom

EN50160

- Simplified and automatic configuration
- Data recovery
- Automatic reporting with analysis of results



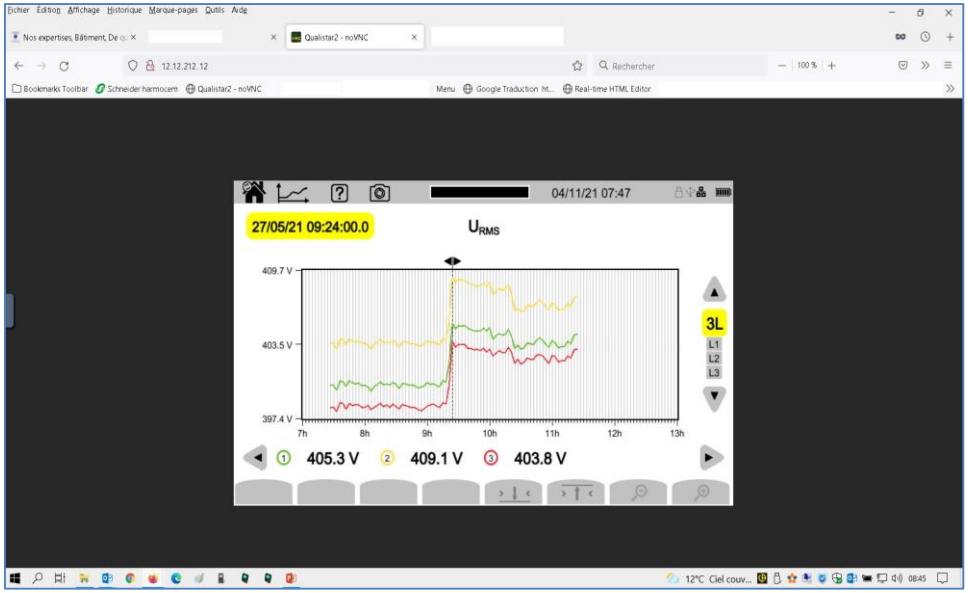


# VNC mode

The devices integrate a VNC mode.

When you know the IP address of the CA8345, from any internet browser (Chrome, Firefox, ..., under Windows, under Android, ..., or under iOs) you can control the device.

On the screen you will find the screen of the device. As this one is touch-sensitive, you can click on the desired icon, and access the various measures and menus.



# Applications

Maintenance

- Power factor studies
- Load balancing
- Overheating of the neutral conductor
- Measurements on photovoltaic installations
- Capacitor bank sizing
- Transformer analysis (derating)
- Load start-up measurements
- Failure of switchgear or its components
- Tripping of circuit breakers
- Tripping of differentials
- Flicker monitoring

Energy efficiency

- Checking power consumption
- Substation metering

EN50160 certification

- Voltage quality analysis

# Highlights

- 1000V three-phase analyser
- IEC 61000-4-30 Class Ed3, IEC 61000-4-7, IEC 61000-4-15
- Internal GPS clock
- Works on all existing electrical networks (single phase, three phase star, delta, ...)
- 7" WVGA colour TFT display with touch screen
- Always easy to use, automatic recognition of current sensors
- Compatible with Qualistar current sensors
- Low level currents: 100mA in miniFlex
- Recorder for EN50160 campaign
- Main signalling detection
- Wifi wireless communication for accessibility issues
- Ethernet communication for real time remote and/or multi-station
- USB communication for local data transfer
- Data saved on SD card for transport flexibility
- Phase powered (option PA32ER)
- Webserver for remote control
- SCPI commands
- Data in JSON format
- Very small enclosure footprint for easy cabinet placement
- Magnetic hook for easy mounting
- IP54 to IEC 60529
- IEC 61010 CAT IV 1000V
- 3 year warranty
- Eco-design

# End

# Questions ?