

THREE-PHASE ELECTRICAL
NETWORKS ANALYSER
IN A FIELD HOUSING

C.A 8435
QUALISTART+



ENGLISH








User's manual

 **CHAUVIN®
ARNOUX**
CHAUVIN ARNOUX GROUP

Thank you for purchasing a **C.A 8435 three-phase electrical networks analyser in a field housing (Qualistar+)**.

To obtain the best service from your unit:

- **read** these operating instructions carefully,
- **comply** with the precautions for use.

| | |
|---|---|
|  | WARNING, risk of DANGER! The operator must refer to these instructions whenever this danger symbol appears. |
|  | Equipment protected by double insulation. |
|  | USB socket. |
|  | Earth. |
|  | The CE marking indicates conformity with European directives, in particular LVD and EMC. |
|  | Chauvin Arnoux has adopted an Eco-Design approach in order to design this appliance. Analysis of the complete lifecycle has enabled us to control and optimize the effects of the product on the environment. In particular this appliance exceeds regulation requirements with respect to recycling and reuse. |
|  | The rubbish bin with a line through it indicates that, in the European Union, the product must undergo selective disposal in compliance with Directive WEEE 2002/96/EC. This equipment must not be treated as household waste. |

Definition of measurement categories:

- Measurement category IV corresponds to measurements taken at the source of low-voltage installations. Example: power feeders, counters and protection devices.
- Measurement category III corresponds to measurements on building installations. Example: distribution panel, circuit-breakers, machines or fixed industrial devices.
- Measurement category II corresponds to measurements taken on circuits directly connected to low-voltage installations. Example: power supply to domestic electrical appliances and portable tools.

PRECAUTIONS FOR USE

This instrument and its accessories comply with safety standards IEC 61010-1, IEC 61010-031, and IEC 61010-2-032 for voltages of 600V in category IV or 1000V in category III.

Failure to observe the safety instructions may result in electric shock, fire, explosion, and destruction of the instrument and of the installations.

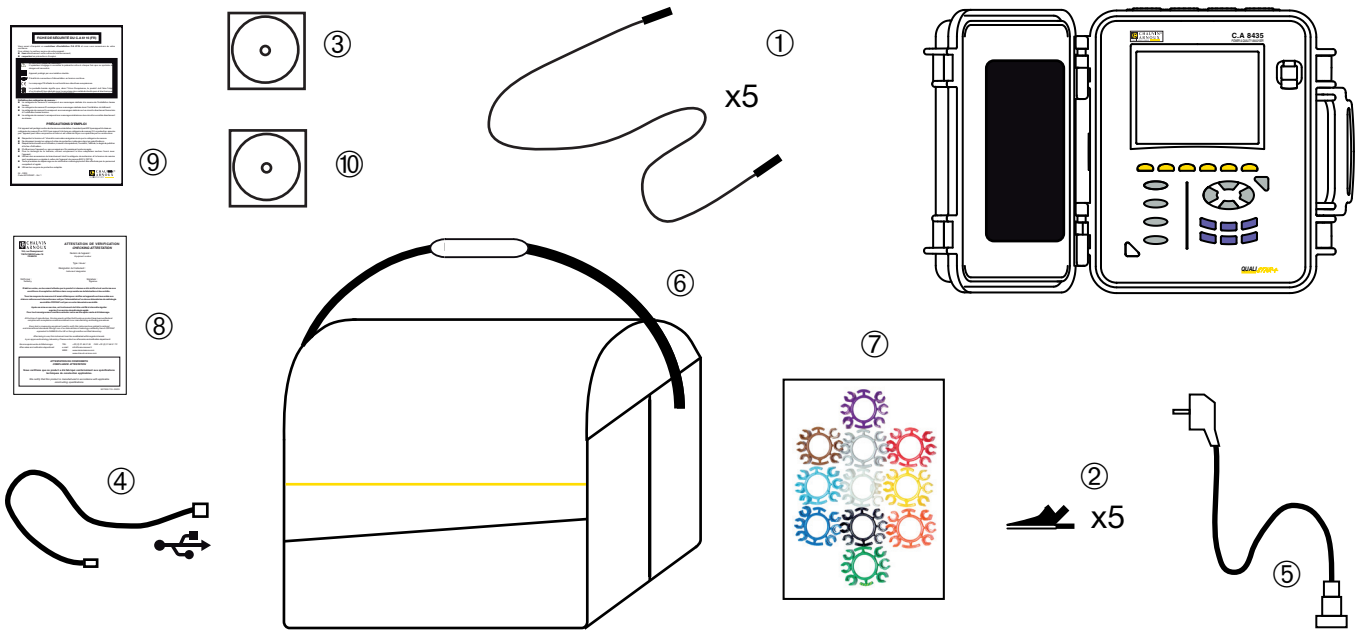
- The operator and/or the responsible authority must carefully read and clearly understand the various precautions to be taken in use. Sound knowledge and a keen awareness of electrical hazards are essential when using this instrument.
- If you use this instrument other than as specified, the protection it provides may be compromised, thereby endangering you.
- Do not use the instrument on networks of which the voltage or category exceeds those mentioned.
- Do not use the instrument if it seems to be damaged, incomplete, or poorly closed.
- Do not use the instrument if the terminals or keyboard are wet. Dry it first.
- Before each use, check the condition of the insulation on the leads, housing, and accessories. Any item of which the insulation is deteriorated (even partially) must be set aside for repair or scrapping.
- Use only the leads and accessories supplied. Using leads (or accessories) of a lower voltage or category reduces the voltage or category of the combined instrument + leads (or accessories) to that of the leads (or accessories).
- Use personal protection equipment systematically.
- Keep your hands away from the terminals of the device.
- When handling the leads, test probes, and crocodile clips, keep your fingers behind the physical guard.
- Use only the mains power adaptor and battery pack supplied by the manufacturer. They include specific safety features.
- Some current sensors must not be placed on or removed from bare conductors at hazardous voltages: refer to the sensor manual and comply with the handling instructions.

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1. GETTING STARTED

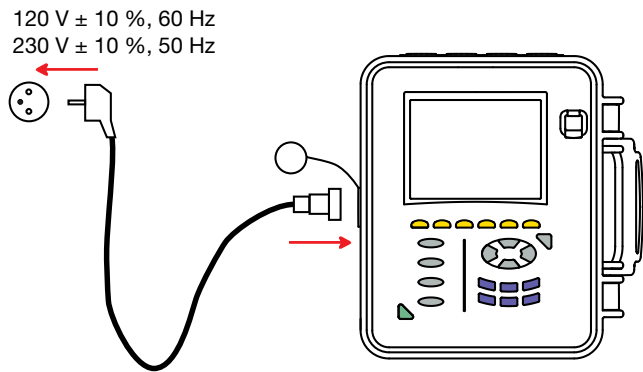
1.1. UNPACKING




| No. | Designation | Quantity |
|-----|---|----------|
| ① | Safety cables, black, banana-banana, straight-straight | 5 |
| ② | Black crocodile clips. | 5 |
| ③ | User's manual on CD-ROM. | 1 |
| ④ | Type A-B USB cord. | 1 |
| ⑤ | Specific mains cord. | 1 |
| ⑥ | No. 22 carrying bag | 1 |
| ⑦ | Sets of inserts and rings for marking the leads and current sensors according to phase. | 12 |
| ⑧ | Verification certificate. | 1 |
| ⑨ | Safety data sheets (one per language). | 5 |
| ⑩ | Power Analyser Transfer (PAT) software on CD-ROM. | 1 |

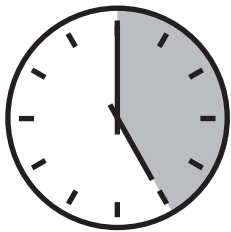
1.2. CHARGING THE BATTERY

Before the first use, start by fully charging the battery.



- Unscrew the cover of the connector to charge the battery in the device.
- Connect the specific mains cord and screw it in place.
- Then connect the cord to mains.

The button  lights; it will go out only when the plug is disconnected.



When the battery is fully discharged, charging takes approximately 5 hours.

1.3. CHOICE OF LANGUAGE

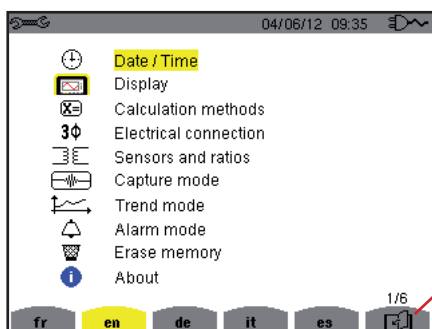
Before using the device, first choose the language in which you want the device to display its messages.



Press the green button to switch the device on.



Press the Configuration key.



Press the yellow key on the device corresponding to the desired language.

This key is used to go to the next page.

Figure 8: Configuration screen

2. DESCRIPTION OF THE DEVICE

2.1. FUNCTIONS

The C.A. 8435 (Qualistar+ in field housing) is a three-phase network analyzer with colour graphic display and built-in rechargeable battery.

It plays three roles, and can be used:

- to measure the RMS values, powers, and perturbations of electric distribution networks.
- to deliver a snapshot of the principal characteristics of a three-phase network
- to track the variations of various parameters over time.

The measurement uncertainty of the device is better than 1% (not counting the uncertainties due to the current sensors). The device is also very flexible, with a choice of sensors allowing measurements ranging from a few milliamperes (MN93A) to several kiloamperes (AmpFLEX™).

The device is water- and air-tight and impact resistant.

The ergonomics and simplicity of its interface make using it pleasant.

The C.A.8435 is intended for the technicians and engineers of electrical installation and network inspection and maintenance teams.

2.1.1. MEASUREMENT FUNCTIONS

The principal measurements made are:

- The RMS values of AC voltages up to 1000 V between terminals. By using the ratios, the device can measure voltages up to hundreds of gigavolts.
- The RMS values of AC currents up to 6500 amperes (neutral included). By using the ratios, the device can measure currents up to hundreds of kiloamperes.
- The DC components of voltages and currents (neutral included).
- Minimum and maximum half-cycle RMS voltage and current values (excluding neutral).
- Peak voltage and current values (neutral included).
- The frequency of 50 Hz and 60 Hz networks.
- Current and voltage peak factors (neutral included).
- Calculation of the harmonic loss factor (FHL), application to transformers in the presence of harmonic currents.
- Calculation of the K factor (KF), application to transformers in the presence of harmonic currents.
- Measurement of total harmonic distortion with respect to the fundamental (THD in % f) of the current and of the voltages (excluding neutral).
- Measurement of the total harmonic distortion with respect to the RMS AC value (THD in % r) for the current and the voltages (neutral included)
- Active, reactive (capacitive and inductive), non-active, distortion, and apparent power, by phase and cumulative (excluding neutral).
- Power factors (PF) and displacement factors (DPF or $\cos \Phi$) (excluding neutral).
- Measurement of the RMS distortion values (d) for the current and the voltages (excluding neutral).
- Short-term voltage flicker (PST) (excluding neutral).
- Measurement of the long-term flicker of the voltages (PLT) (excluding neutral).
- Active, reactive (capacitive and inductive), non-active, distortion, and apparent energy (excluding neutral).
- Current and voltage harmonics (excluding neutral) up to order 50: RMS value, percentage referred to the fundamental, (%f) (excluding neutral), or the total RMS value (%r), minimum and maximum and sequence harmonics.
- Apparent power of each harmonic up to order 50 (excluding neutral): value, percentage referred to the fundamental apparent power (%f) or the total apparent power (%r), minimum and maximum.
- Inrush currents, starting of motors.

2.1.2. DISPLAY FUNCTIONS

- Display of waveforms (voltages and currents).
- Inrush Current function: displays parameters useful for study of the starting of a motor.
 - Instantaneous current and voltage at the instant designated by the cursor.
 - Maximum instantaneous absolute value of the current and of the voltage (over the entire starting time).
 - RMS value of the half-cycle (or lobe) of the current and voltage (excluding neutral) on which the cursor is positioned.
 - Maximum half-cycle RMS current (over the entire starting time).
 - Instantaneous network frequency at the instant designated by the cursor.
 - Maximum, mean, and minimum network frequencies (over the entire starting time).
 - Time at which starting of motor commenced.
- Screen captures (50 maximum).
- Transients function. Detection and recording of transients (up to 210) between user-defined start and stop dates and times. Recording of 4 complete cycles (one before the triggering event and three after) in the 8 acquisition channels.
- Trend recording (data logging) function. 2GB memory with date-stamping and user-defined start and stop dates for recording, with a maximum of 100 recordings. Display, in bar chart or curve form, of the means of many parameters vs. time, with or without minima and maxima.
- Alarm function. List of recorded alarms (up to 16,000) exceeding thresholds defined in the configuration menu. User-defined alarm monitoring start and stop times.

2.1.3. CONFIGURATION FUNCTIONS

- Date and time settings.
- Screen brightness and contrast settings.
- Choice of curve colours.
- Choice of management of switching off of the screen.
- Choice of calculation methods (non-active quantities broken down or not, choice of the unit of energy, choice of the coefficients of calculation of the K factor, choice of reference for the level of harmonics, PLT calculation (sliding or not)).
- Choice of distribution system (single-phase, two-phase, three-phase with or without neutral) and of the connection method (standard, 2-element method or 2½-element method).
- Configuration of recording, alarms, inrush currents, and transients.
- Erasure of data (total or partial).
- Display of software and hardware version numbers.
- Choice of language.
- Display of current sensors detected or simulated (2-element connection method) and voltage and current ratio settings.

2.2. OVERALL VIEW

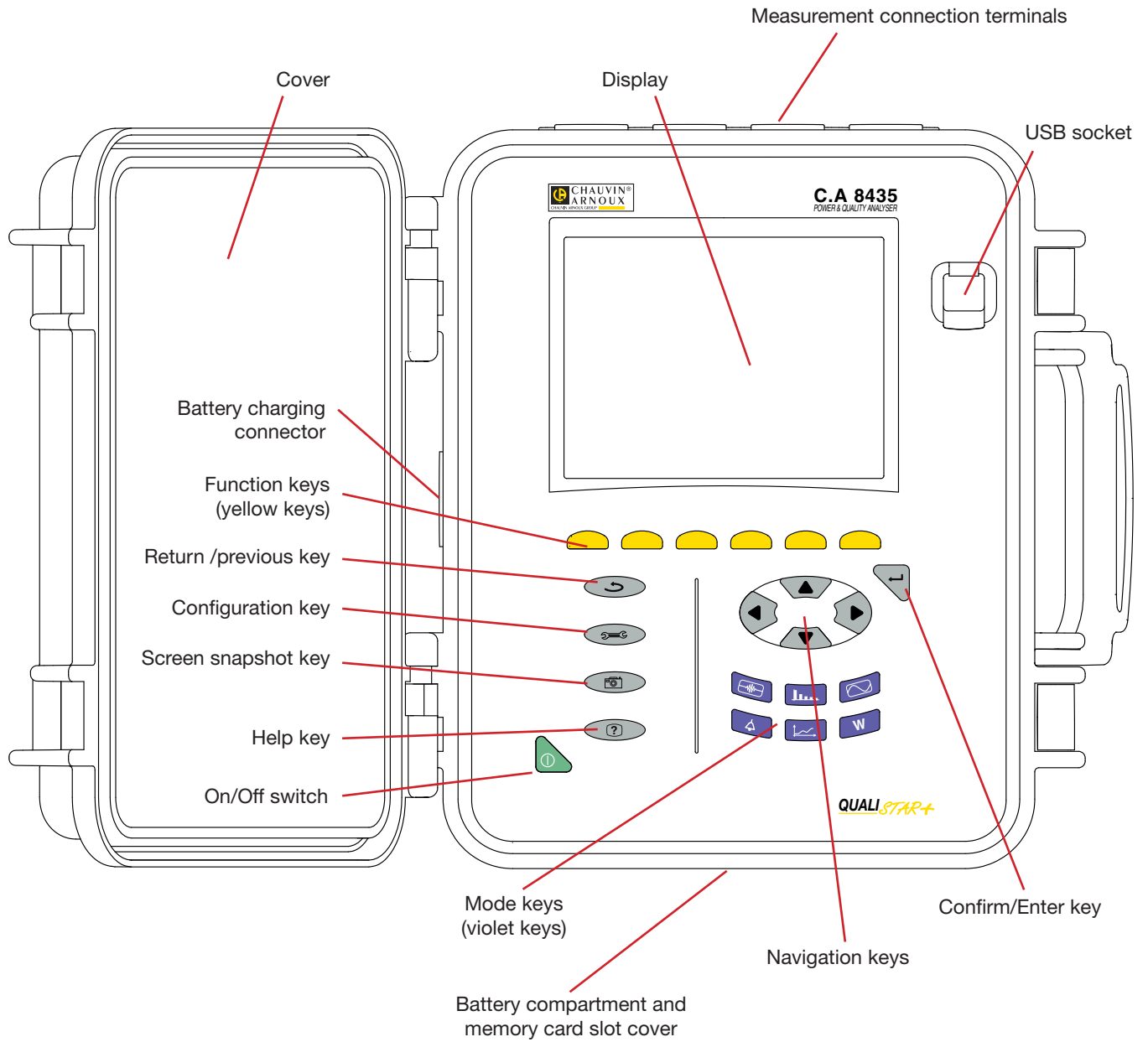


Figure 1: Overall view of C.A 8435

2.3. CONNECTION TERMINALS

These are located on one side of the housing. Each terminal is protected by a plug. The plugs must be removed to connect the leads, then stowed in the pouch in the cover of the device.

In order to keep the device water- and air-tight and the terminals clean, put the plugs back on the unused terminals.

The terminals let the operator:

- screw special leads in place to ensure total water-tightness
- or to connect standard leads that are slightly less water-tight.

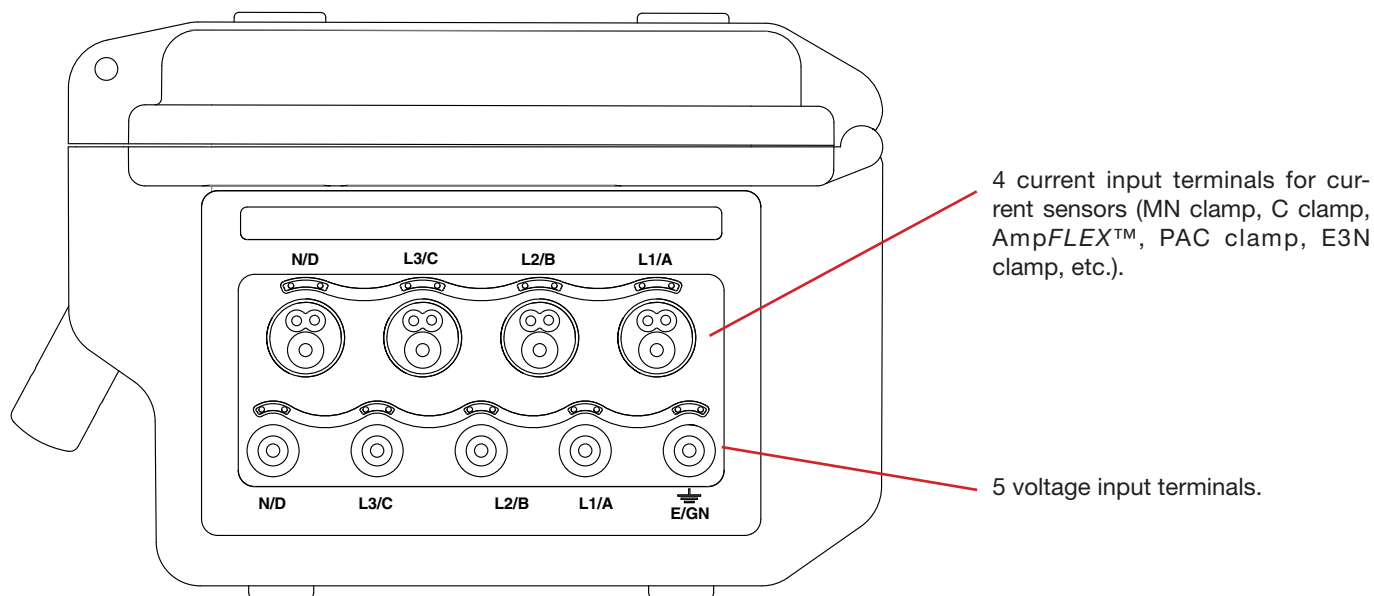


Figure 3: the connection terminals

3. USE

For the operation and use of the device, refer to the user's manual of the C.A 8335 on the CD.

4. SPECIFICATIONS

For the electrical characteristics of the device, refer to the user's manual of the C.A 8335.
The only difference between the C.A 8335 and the C.A 8435 is the field housing.

4.1. MECHANICAL CONDITIONS

| | |
|------------------------|---|
| Dimensions (L x W x H) | 270 mm x 250 mm x 180 mm |
| Weight | approximately 3.7 kg |
| Screen | 118 mm x 90 mm, diagonal 148 mm |
| Ingress protection | IP 67 as per EN 60529 with the housing closed and the protecting plugs on the terminals. IP 54 with cover open, instrument not in operation (terminals not connected and nothing pressed on the keyboard). IP 50 with cover open and instrument in operation. |
| Fall | 100 mm on each edge as per IEC 61010-1 |

4.2. COMPLIANCE WITH INTERNATIONAL STANDARDS

The device is compliant with IEC 61010-1 600 V category IV or 1000 V category III.

- the use of AmpFLEX™ or of MiniFLEX or C clamps keeps the “device + current sensor” system at 600 V category IV or 1000 V category III.
- the use of PAC, MN93, MN93A, or E3N clamps downgrades the “device + current sensor” system to 300 V category IV or 600 V category III.
- the use of the 5 A adapter unit downgrades the “device + current sensor” system to 150 V category IV or 300 V category III.

Double insulation between the inputs/outputs and earth.

Double insulation between the voltage inputs, the power supply, and the other inputs/outputs.

4.3. ELECTROMAGNETIC COMPATIBILITY

Emissions and immunity in an industrial setting compliant with IEC 61326-1.

5. MAINTENANCE

⚠ Except for the battery and the memory card, the instrument contains no parts that can be replaced by personnel who have not been specially trained and accredited. Any unauthorized repair or replacement of a part by an “equivalent” may gravely impair safety.

5.1. CLEANING THE CASING

Disconnect the unit completely and switch it OFF.

Use a soft cloth, dampened with soapy water. Rinse with a damp cloth and dry rapidly with a dry cloth or forced air. Do not use alcohol, solvents, or hydrocarbons.

5.2. MAINTENANCE OF SENSORS

Current sensors must be maintained and calibrated as follows:

- Clean with a sponge and soapy water, rinse with a sponge and clean water, and dry rapidly.
- Keep the air gaps of the clamps (MN93, MN93A, C193, PAC93 and E3N) perfectly clean using a cloth. Lightly oil visible metal parts to avoid rust.

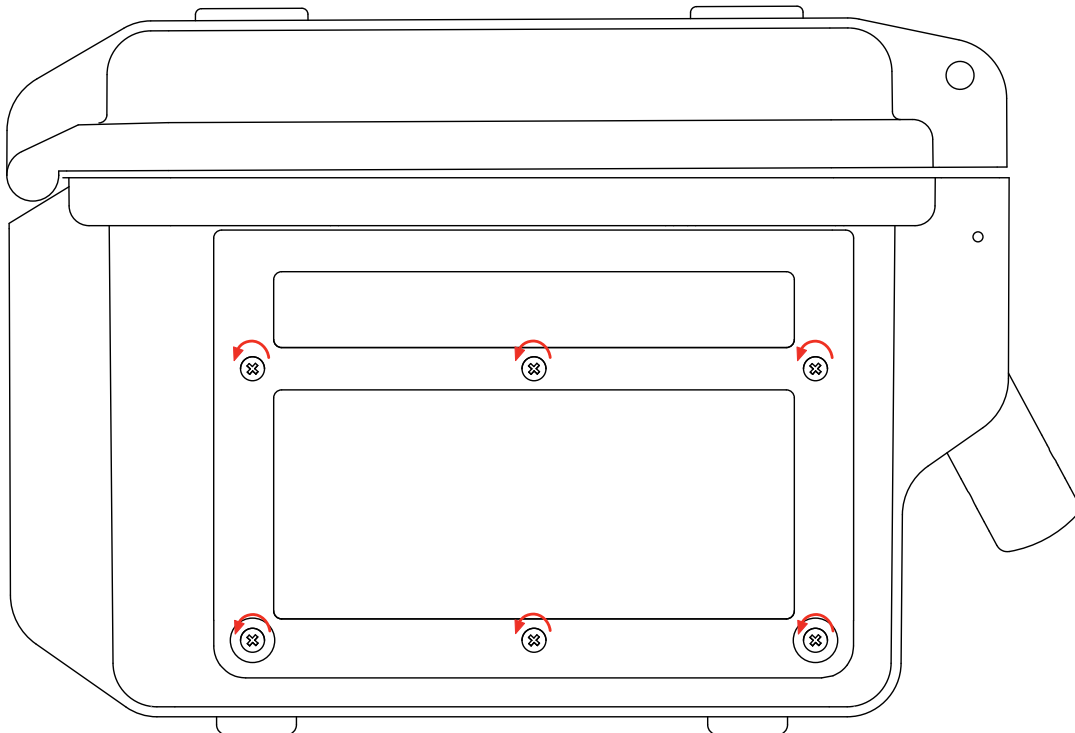
5.3. REPLACING THE BATTERY

⚠ For safety reasons, replace the battery only with the original model (see §7.3).

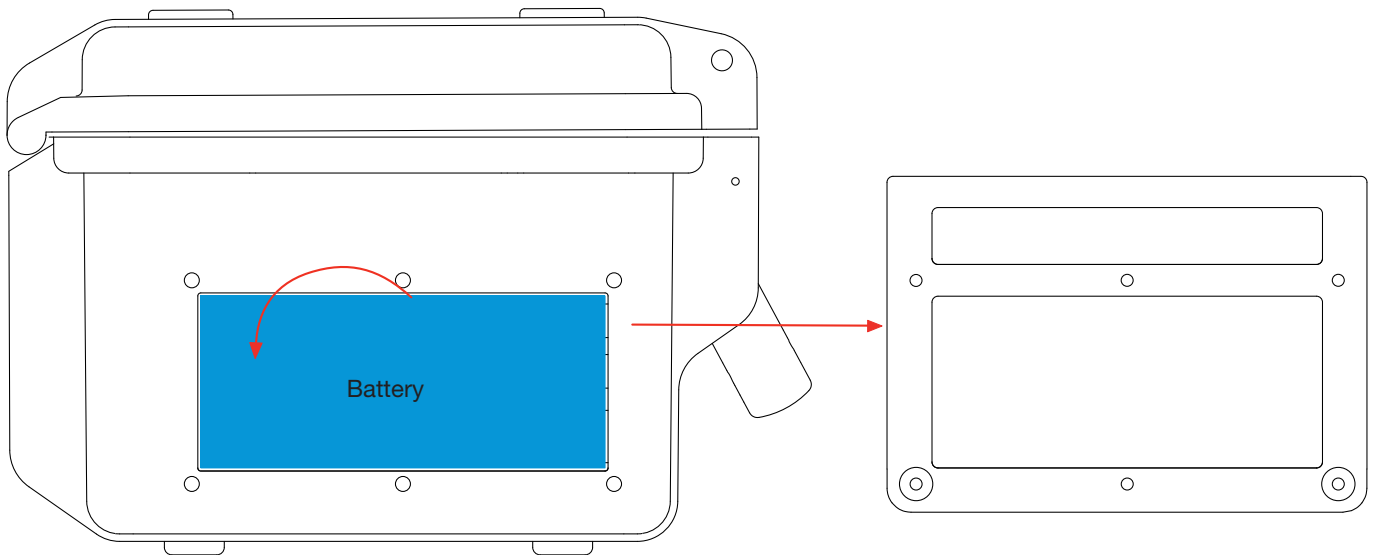
- **Do not throw the battery into a fire.**
- **Do not expose the battery to a temperature in excess of 100°C.**
- **Do not short-circuit the terminals of the battery pack.**

Remove the old battery.

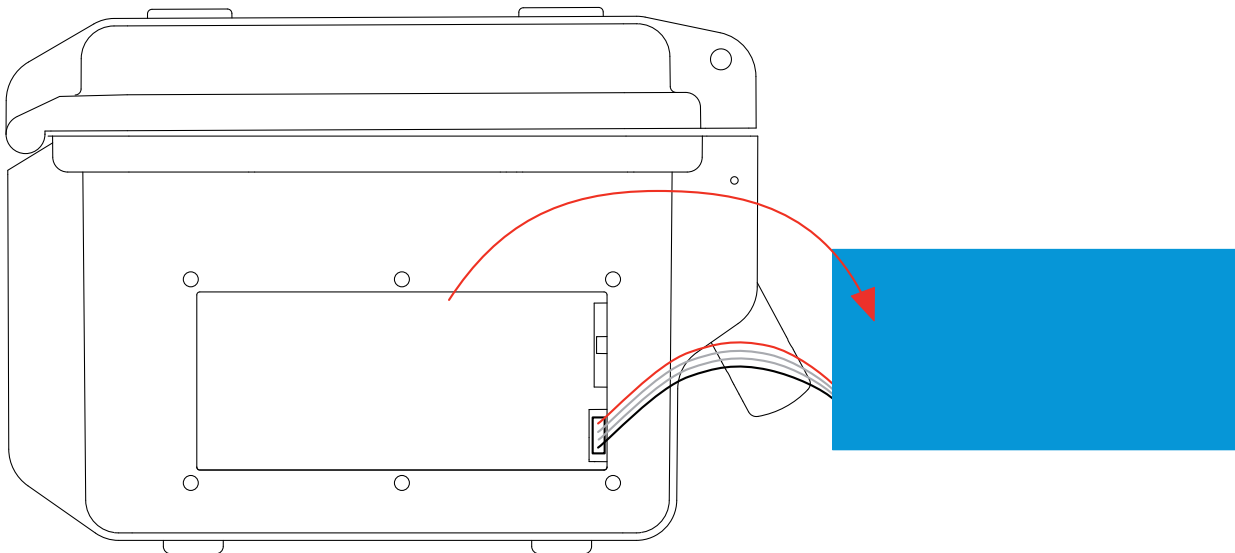
- **⚠** To eliminate all risk of electric shock, disconnect the power supply cord and measurement leads of the device.
- Using a cross-headed screwdriver, unscrew the 6 screws of the battery compartment cover.



- Withdraw the cover.



- Tilt the top of the battery outward and withdraw it from its compartment.



- Disconnect the battery connector without pulling on the wires.

Note: The C.A 8435 preserves the date-time function for approximately 24 hours without the battery.



Spent batteries must not be treated as ordinary household waste. Take them to the appropriate recycling collection point.

Fitting the new battery.

- Connect the new battery. The connector is error-proofed to prevent reversals of polarity.
- Place the bottom of the battery in its compartment then the top. Arrange the wires so that they do not protrude.
- Put the battery compartment cover back in place and screw the 6 screws back in.

Warning: If the battery is disconnected, it must then be fully recharged, even if it is not replaced, so that the device will know the battery charge condition (this information is lost when the battery is disconnected).

5.4. REPLACING THE SCREEN FILM

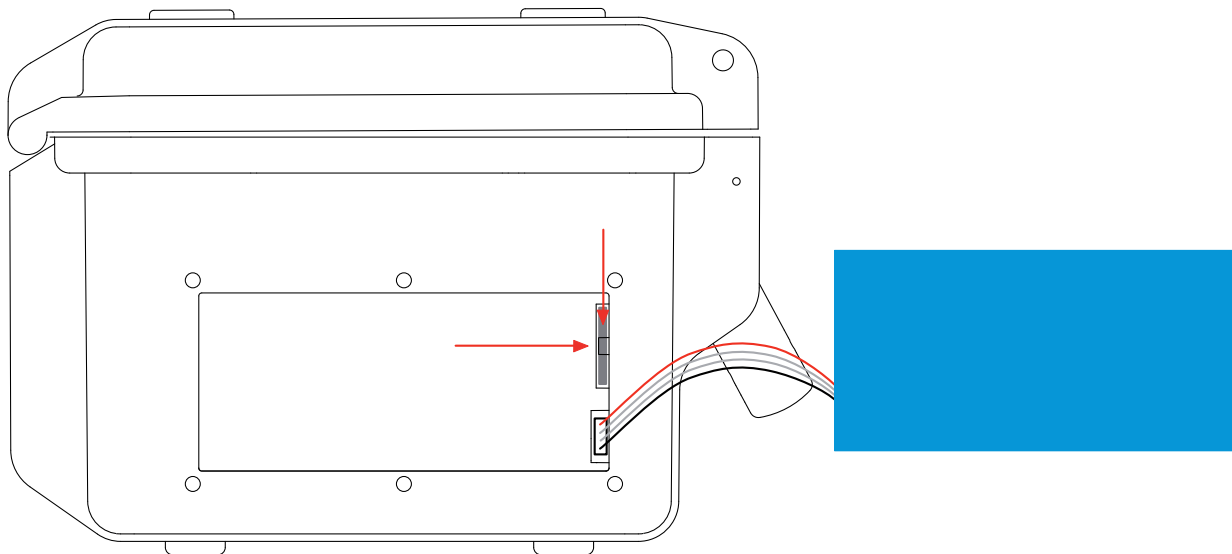
Proceed as follows to replace the screen film of the device:

- Remove the old screen film.
- Remove the protection plastic film from the new screen film using the white tab.
- Place the adhesive side of the film against the screen of the device. Smooth the film with a clean cloth to remove any air bubbles.

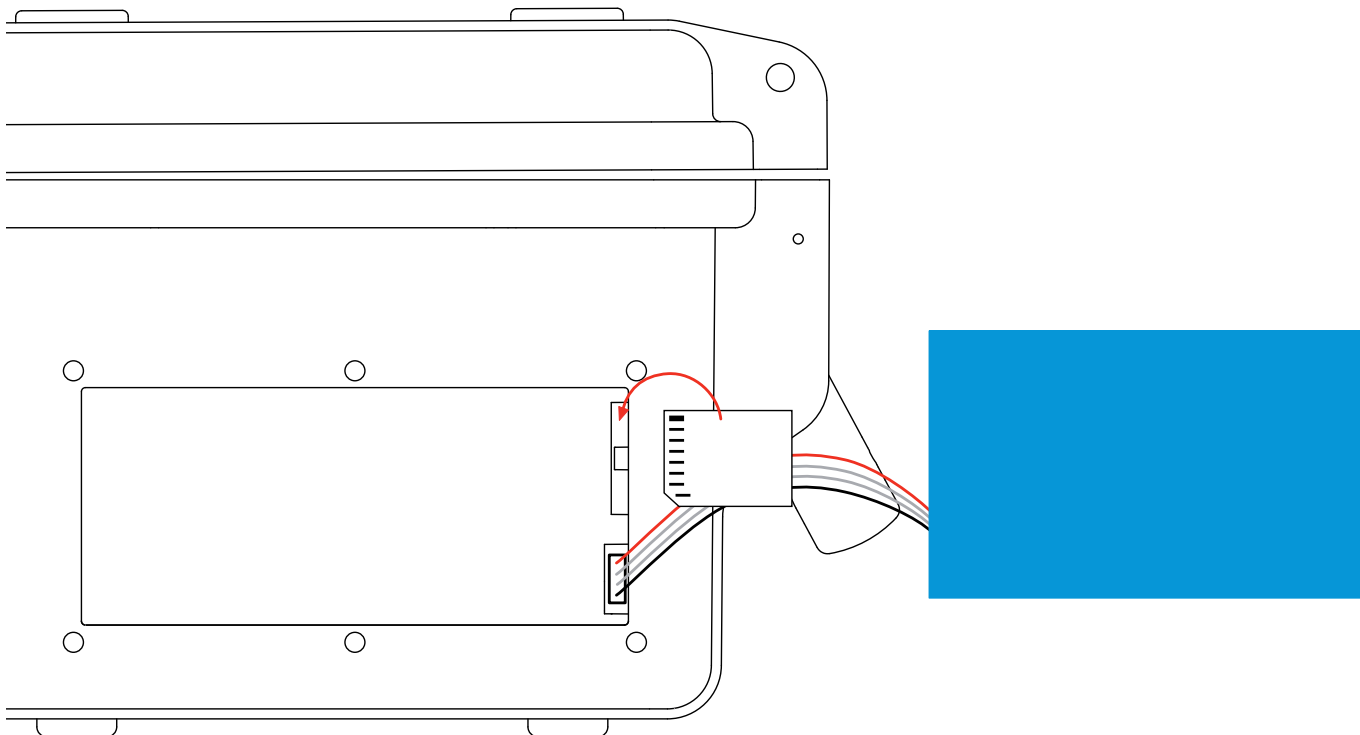
5.5. MEMORY CARD

To access the memory card, proceed as for the replacement of the battery.

- Make sure that the device is disconnected and off.
- Remove the cover and withdraw the battery from its compartment without disconnecting it.
- Press on the memory card to release it, then press on the protecting tab to withdraw it from its slot. You can then grip the card.



- When you replace the memory card, the contacts must be on the left side and the locator down.



- Slip it into its slot until you hear it snap into place. The protecting tab is at the top of the card.
- Put the battery back in its compartment and screw the cover back on.

5.6. METROLOGICAL CHECK

 Like all measuring or testing devices, the instrument must be checked regularly.

This instrument should be checked at least once a year. For checking and calibration, contact one of our accredited metrology laboratories (information and contact details available on request), at our Chauvin Arnoux subsidiary or the branch in your country.

Remark: The *Information* sub-menu of the *Configuration* menu displays the date of adjustment and the date of the next adjustment, as in the example below:

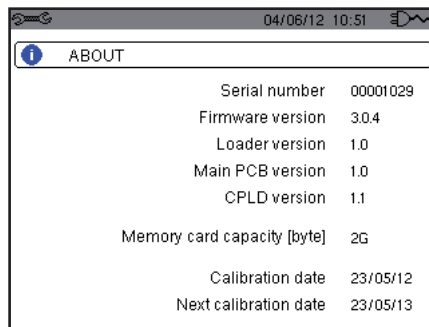


Figure 36: the About menu

5.7. REPAIR

For all repairs before or after expiry of warranty, please return the device to your distributor.

5.8. UPDATING OF THE INTERNAL SOFTWARE

With a view to providing, at all times, the best possible service in terms of performance and technical upgrades, Chauvin Arnoux invites you to update the embedded software of the device by downloading the new version, available free of charge on our web site.

Our site:

<http://www.chauvin-arnoux.com>

Sign in and open your account.

Then go to “Software support space”, then “Freely available software”, then “C.A 8335”.

Connect the device to your PC using the type A-B USB cord provided.

The embedded software update requires compatibility with the hardware version of the device, indicated in the *About* sub-menu of the *Configuration* menu (see figure 36 above).

Warning: the update of the embedded software erases all data (configuration, alarm campaigns, snapshots, inrush current capture, transient detection, trend recordings). Save any data you want to keep to a PC using the PAT software before updating the embedded software.

6. WARRANTY

Except as otherwise stated, our warranty is valid for **three years** starting from the date on which the equipment was sold. Extract from our General Conditions of Sale provided on request.

The warranty does not apply in the following cases:

- Inappropriate use of the equipment or use with incompatible equipment;
- Modifications made to the equipment without the explicit permission of the manufacturer's technical staff;
- Work done on the device by a person not approved by the manufacturer;
- Adaptation to a particular application not anticipated in the definition of the equipment or not indicated in the user's manual;
- Damage caused by shocks, falls, or floods.

7. TO ORDER

7.1. C.A 8435 THREE-PHASE ELECTRICAL NETWORKS ANALYSER IN FIELD HOUSING

| | |
|------------------------------|-----------|
| C.A 8435 without clamp | P01160585 |
| C.A 8435 A196 AMP450 | P01160587 |

The device is delivered with:

- 1 no. 22 shoulder bag
- 5 black straight-straight safety cables 3 m long.
- 5 black crocodile clips.
- 1 specific mains cord.
- 1 set of 12 inserts and rings to identify voltage phases and leads and current phases and leads.
- 1 USB A/B cord, 1.80m long, with ferrite.
- 1 Power Analyser Transfer (PAT) software.
- 1 calibration certificate
- user's manuals on CD (one per language)
- safety sheets (one per language)

and, when clamps are included:

- 4 water- and air-tight AmpFLEX™ A196 450 mm current sensors.
- 5 water- and air-tight black banana/screw-lock banana straight-straight safety cables 3 m long.

7.2. ACCESSORIES

| | |
|---|------------|
| 5 A adapter unit (three-phase) | P01101959 |
| MN93 clamp | P01120425B |
| MN93A clamp | P01120434B |
| PAC93 clamp | P01120079B |
| C193 clamp | P01120323B |
| AmpFLEX™ A193 450 mm | P01120526B |
| AmpFLEX™ A196 450 mm water- and air-tight | P01120552 |
| AmpFLEX™ A193 800 mm | P01120531B |
| MiniFLEX MA193 200 mm | P01120580 |
| E3N clamp | P01120043A |
| E3N clamp adapter | P01102081 |
| Mains power unit + E3N clamp | P01120047 |
| Dataview software | P01102095 |

7.3. SPARE PARTS

| | |
|--|-------------------|
| 9.6 V 4 Ah NiMH battery pack | P01296024 |
| USB-A USB-B cord | P01295293 |
| Specific mains cord | P01295477 |
| Screen protection film | P01102059 |
| No. 22 carrying bag..... | P01298056 |
| No. 21 carrying bag..... | P01298055 |
| Set of 5 water- and air-tight black banana / screw-lock banana straight-straight safety cables | P01295479 |
| Set of 5 black crocodile clips | Please consult us |
| Set of 12 inserts and rings to identify voltage phases and leads and current phases and leads | P01102080 |
| Set of 5 plugs for the voltage terminals and 4 plugs for the current terminals | P01102117 |



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