



QUADRENT USER'S GUIDE NETWORK ANALYSIS SYSTEM

Included : Premiers pas avec le logiciel *WINQUAD*

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3 SAFETY INFORMATION

3.1 SAFETY RECOMMENDATIONS :

Please read this guide carefully before unpacking, configuring or using this equipment. Note all indications of danger and other warnings. Failing to observe these recommendations could result in serious injury to the operator or could damage the equipment. To ensure that the protection provided by this equipment is appropriate, do not use or install it other than in accordance with the conditions indicated in this manual.

Dismantling the cases is forbidden. This operation is limited exclusively to personnel qualified by MADE.

Switch off:

Immediately switch off the device from its power supply if any damage to the device, its controls, the cables or any other device connected is detected.

NOTE:

If any doubt remains on the use of the system, immediately switch off the device, secure it against any unexpected start and call a qualified technician.

3.2 Following safety recommendations :

DANGER: Indicates a dangerous or potentially dangerous situation which, if not avoided, could cause serious or deadly injuries.

WARNING: Indicates a potentially dangerous situation which could cause superficial to moderate injuries.

Remark: Information requiring particular attention.

3.3 Warning labels

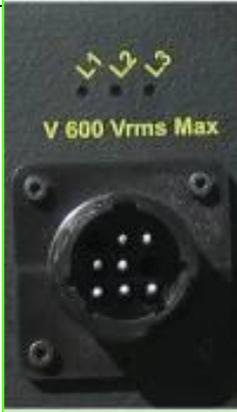
Read all labels and wordings shown on the instrument. Injuries or equipment damage could

occur if these instructions are not respected.

	Symbol requiring reference to the instruction manual for instructions concerning operation or safety recommendations
Cat. III	Category of overvoltage or installation
IP 54	IP standard – Protection against dust and water : RECEIVER

3.4 Safety instructions on the device

The connection to the supply source must always be made within the limits specified on the device:

Type:	QUADRENT	
Supply voltage:	Self-supplied on the measurement Ports: 380Vac/600Vac on the Three phases measurement ports Or 85Vac/250Vac on the single Phase measurement ports	
Frequency:	50Hz	
<u>Measurements</u>		
Nominal voltage:	3 x 230V	
Voltage precision:	0.1%	
Nominal current:	Depends on the chosen range	
Current precision:	1%	

Battery supply:

The battery automatically starts recharging upon start-up.

When disconnected from the external supply, the battery will automatically supply the system for one hour.

Input voltage:

The highest value for the input voltage must not exceed 600V – CAT III.

Input current:

The input current is changed into a voltage through the transducers.

3.5 Endroit dangereux

DANGER:

Even though some of the systems supplied by MADE are designed and certified for an installation in dangerous environments, several MADE systems are not intended for a use in such environments. It is up to those who install these systems in dangerous environments to decide whether the system is adapted or not. Moreover, to guarantee safety, the installation of systems in dangerous environments must be compliant with the order specification of the manufacturer. Any modification of the systems or their installation is not recommended and could cause deadly injuries and/or damage to the equipment.

4 FRONT VIEW OF THE DEVICE



5 CONNECTIONS AND FUNCTIONS

This chapter gives an overview of the connecting cables, communication ports and interfaces of the device, as well as a list of the displays and mobile parts and an introduction to the basic functions of the device.

5.1 Terminals

Mini-USB plug:

To connect the device to a computer, use a cable mini-USB B plug to USB A plug.

Warning:

Always disconnect the USB cable before switching on the system. If the system is started with the USB cable connected, disconnect then reconnect it on the computer.



5.2 Monitoring displays and indications



The various LEDs (Power, Status, Mem and Com) help monitoring the state of the device:

Power LED:

The “Power” LED is **green** when the device is ON. When the device is OFF, all the LEDs switch off.

Status LED:

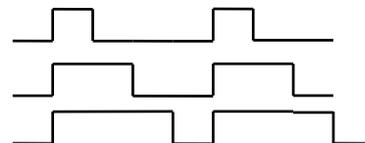
The “Status” LED blinks **orange** when the device is not connected on its voltage inputs to a periodic signal close to 50Hz, and blinks **green** when the device is connected to a periodic signal close to 50Hz (the device is then synchronized through a Phase-Locked Loop)

Memo LED:

The “Memo” LED is off when there is no memorization.

When it flashes **green**, the flashing frequency helps monitoring the state of the recording:

- Flashing at 25%: recording programmed
- Flashing at 50%: currently recording
- Flashing at 75%: recording finished



The “Memo” LED flashed **red** when deleting the data.

Com LED:

The “Com” LED flashed **orange** when the device is communicating.

5.3 Switches



ON-OFF switch:

This switch starts up the device.

To recharge the battery, the device must be ON and be connected through the “Voltage measurement” port (either through the measurement inputs L1, L2 or through the inputs Phase 230 Neutral 230).

“Range select” button:

Pressing briefly the button will change the range: depending on the amperage that needs measurement, the **green** LED corresponding to the range lights up.

- Starting a recording: when you keep the button pressed for three seconds, the LED of the selected range turns off for a second and lights back up. Releasing the button will then start the recording. The flashing Memo LED indicates that the device is still recording.
- Equally, a second long press of the button will stop the recording.
- Checking the connections: see §6.4

5.4 Default settings

0 General settings:

Star connection

Nominal voltage: 230 Vrms

Nominal current: 5Arms

Integration time: 10 minutes

Network frequency: 50 Hz

Voltage transformer: 230/2320

Current transformer: 5/5

Offset of the GPS synchronization: 2h

Voltage hysteresis: 10%

Current hysteresis: 10%

0 Password :

Admin : 00000000

User 1 : 00000000

User 2 : 00000000

0 Power Quality thresholds : EN50160

0 Histograms :

Voltage: 200 to 250Vrms

Power factor: 0.5 to 1

Frequency: 49.5 to 50.5Hz

Other settings: automatic mode

0 Waveform :

Recording started when $U < 90\%U_{nom}$ or when $U > 110\%U_{nom}$

0 Remote signals :

Settings	Telecom n°1 (Pulsadis)	Telecom n°2
Filter	ON	ON
Applied to inputs	V1, V2, V3	V1, V2, V3
Pulse recording	ON	ON
Number of pulses	40	50
Frequency (Hz)	175	188
Bandwidth	5	5
Max low level	0.6	0.6
Min high level	0.9	0.9
High level width of the first pulse	1	2
Low level width of the first pulse	2.75	1
High level width of the following pulses	1	0.5
Low level width of the following pulses	1.5	0.5

6 STARTING THE DEVICE

6.1 Verification upon delivery

Before operating the device, make sure that there are no items missing from the bundling list.

6.2 Handheld device (Quadrent)

- 1 QUADRENT network analysis system
- 1 ABS transport case including:
 - o 1 USB cable
 - o 1 three phase mode voltage measurement cable
 - o 1 single phase mode voltage measurement cable
 - o 1 single phase interface accessory (regular plug to banana socket)
 - o 1 cable ending with 3 flexible clamps used for current measurements (2 types available, specifies upon ordering)
- 1 calibration certificate
- This user's guide
- If delivered with the software:
 - 1 "WINQUAD" CD

Liste des compteurs qualités (1)

Sélection des compteurs à visualiser :

Lieu	Du	Au	Résultat	Commentaire
Exemple 3	16/10/2008	16/10/2008	CONFORME	
Exemple 3	15/10/2008	15/10/2008	CONFORME	
Exemple 3	14/10/2008	14/10/2008	CONFORME	
Exemple 3	13/10/2008	13/10/2008	NON CONFORME	
Exemple 3	12/10/2008	12/10/2008	CONFORME	
Exemple 3	11/10/2008	11/10/2008	CONFORME	
Exemple 3	10/10/2008	10/10/2008	NON CONFORME	

Date : 22/10/2008 CONFORME

RMS Harmoniques Impairs Harmoniques Pairs Creux de tension Surtensions

Nombre de périodes correspondant à une condition normale d'exploitation : Graphique

Nom	V1	V2	V3	Triphasé
10 min	144	144	144	
10 s (fréquence)	8645	8645	8645	
10 min (déséquilibre)				144

Compteurs (%):

	Nom	Voie 1	Voie 2	Voie 3	Triphasé	Limite	Seuils
(2):	Tension	0	0	0		0	230V -15%,+15%
	Triphasé	0	0	0		0	50Hz -6%,+4%
(1):	Tension	0	0	0		5	230V -10%,+10%
	Triphasé	0	0	0		0.5	50Hz -1%,+1%
	Flicker : PLT	0	0	0		5	1
	Thd	0	0	0		5	8%
	Déséquilibre				0	5	1%

6.3 Set up

Before wiring the device, read carefully the specifications described in this section.

Set up

- Follow the safety recommendations concerning the surrounding conditions and the location of the device.
- Place the device on a clean plane surface



Risk of electrocution!

- Follow the instructions listed in the chapter **“Erreur! Source du renvoi introuvable.”**
- Disconnect all pulse, voltage, measurement and power circuits before connecting the device
Never open the circuit of a current transformer. Always short-circuit the inputs of a current transformer before connecting or disconnecting the device.

Never short-circuit the circuit of a voltage transformer.

- Connect the voltage measurement circuits, after making sure that the values of the voltage and the voltage to the earth are not over the maximum threshold. If the voltage connecting cable doesn't fit in the device's receptacle, make sure it is the voltage receptacle and not the current receptacle.
- Connect the current measurement circuits after making sure that the value of the current is not over the maximal threshold.
- Do not use any wire or accessory which does not correspond to the safety standards, as it could result in severe injuries or electrocution!

6.4 Checking the connections

Once the voltage measurement cables (L1, L2, L3 and three phases Neutral) and the current measurement cables (L1, L2 and L3) are connected to the device, LEDs enable a verification of the phase order:

Voltage LEDs:

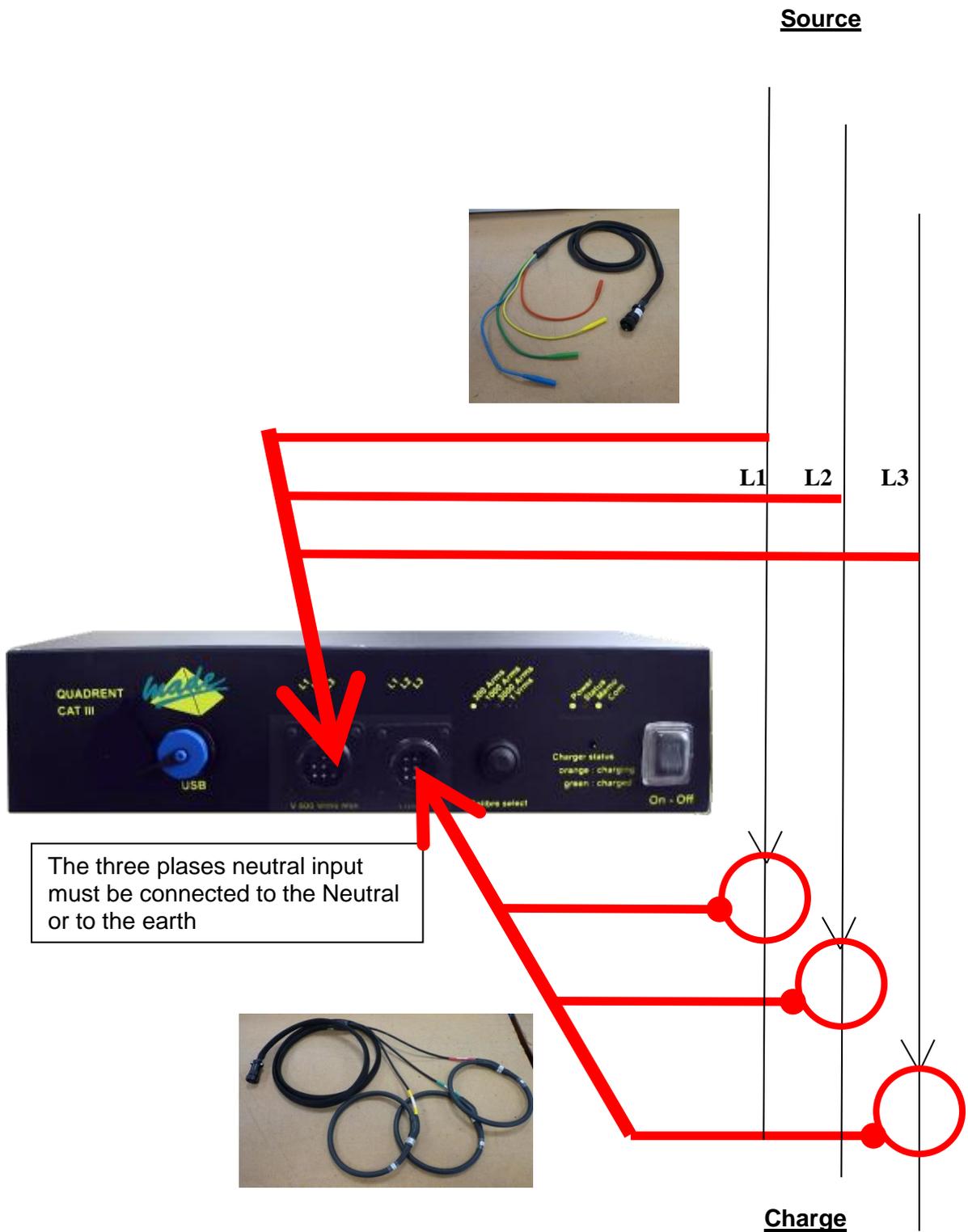
If the voltage LEDs L1, L2 and L3 are flashing regularly in this order, it means that the connection of the voltage inputs has been made correctly.

If the LEDs are flashing in another order or irregularly, some phases have been swapped: the way the LEDs flash indicates which phase has been improperly connected.

Current LEDs:

The same goes for the current inputs: the LEDs L1, L2 and L3 must be flashing regularly in this order.

6.5 Wiring in three phases measurement

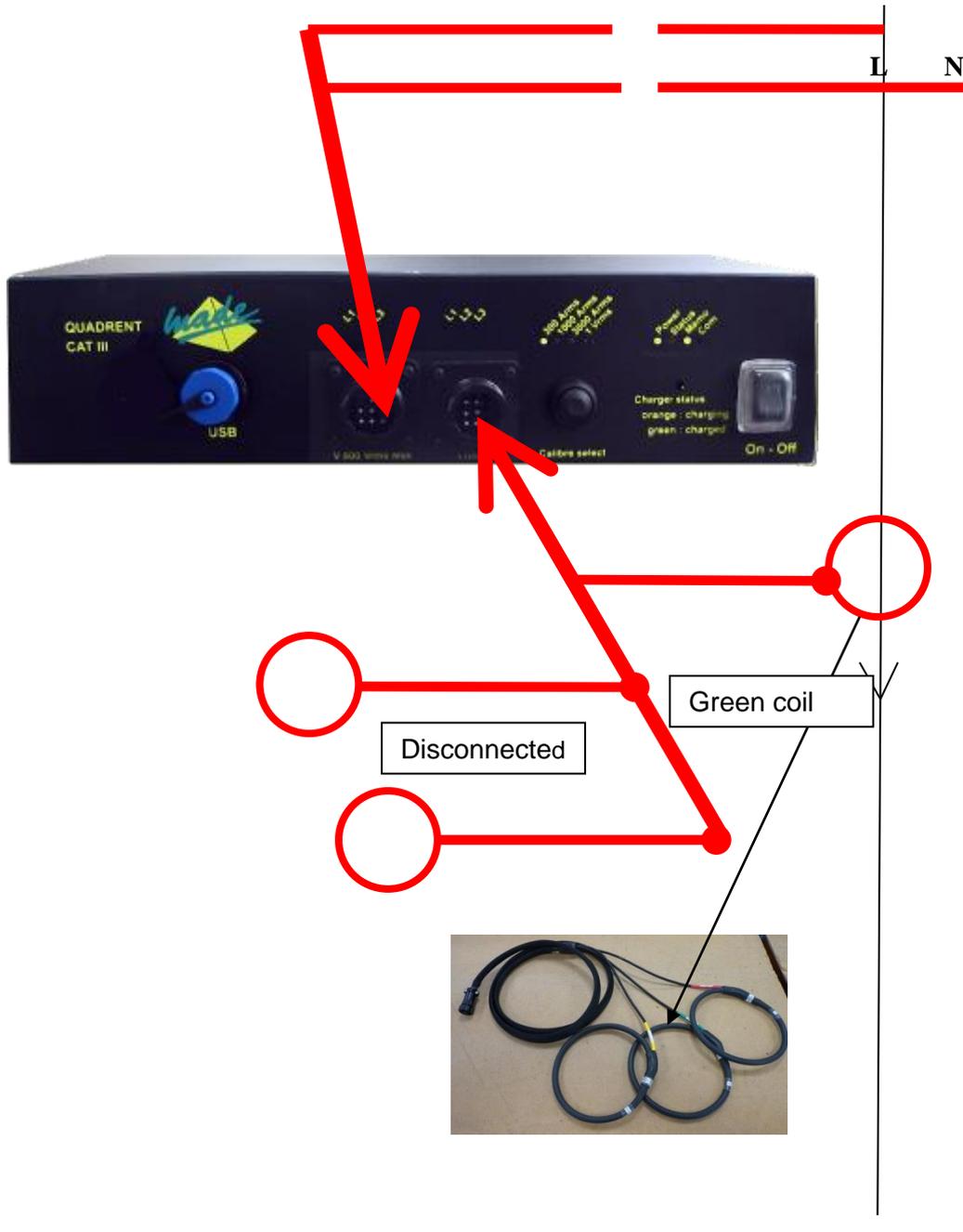


6.6 Wiring in single phase measurement

Source



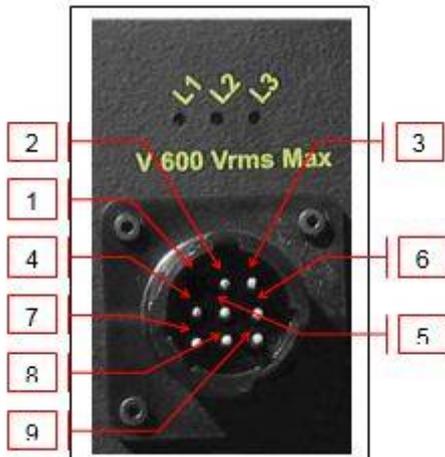
+



Charge

7 DESCRIPTIONS OF THE CONNECTING CABLES

7.1 Voltage measurement connecting cable



N° Pin Voltage connecting cable	Signal name
1	Disconnected
2	L1
3	L2
4	L3
5	Three phases Neutral
6	Transformer automatic output
7	Phase 230V
8	Earth connection
9	Neutral 230V

Power supply/measurements:

The device can be supplied either through the voltage measurement inputs (L1 and L2), or through the dedicated inputs (phase 230 – neutral 230).



Warning:

The voltage on the inputs L1, L2 and L3 must not exceed 600Vrms.

The voltage between the input Phase 230V and Neutral 230V must not exceed 250Vrms

Never connect simultaneously (L1, L2, and L3) and (Neutral 230V, Phase 230V): use 2 different cables to supply the device either through the measurement inputs (three phases cable) or through the 230V inputs (single phase cable).

7.2 Three phases measurements

Voltage measurement:

Use the three phases voltage connecting cable, as explained in paragraph 6.5.

Current measurement:

Use the Rogowski coils measurement cable, as explained in paragraph 6.5.

In order to obtain correct measurements, the three phases Neutral input must be connected to the neutral or to the earth.

The three phases operating mode is automatically selected by the software once it detects the cables.

7.3 Single phase measurement

Voltage measurement:

Use the single phase network connecting cable with the accessory enabling a connection, using crocodile clips if needed.

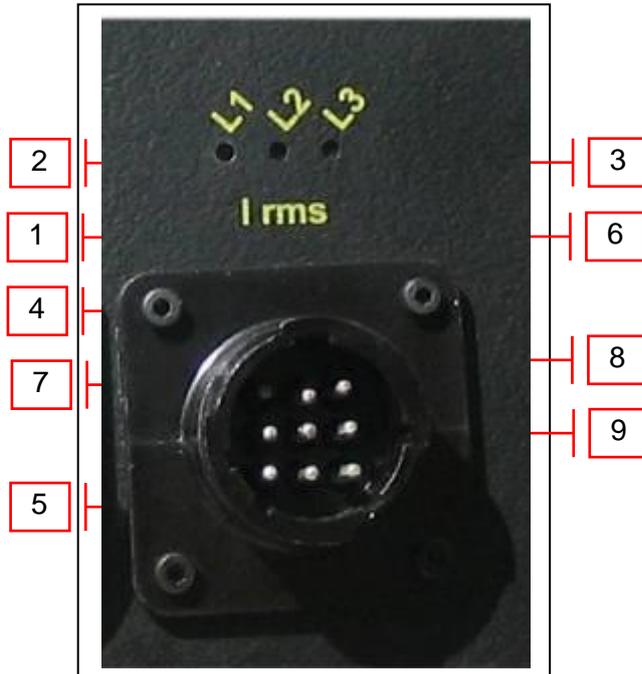
Current measurement:

Use the same measurement cable as for the three phase measurement, while making sure you always use the green Rogowski coil for the measured phase.

See §6.6 for more information.

The single phase operating mode is automatically selected by the software once it detects the cables.

7.4 Current measurement connecting cable



n° Pin Courant	Signal
1	I1+
2	I1-
4	I2+
5	I2-
7	I3+
8	I3-
3	Masse/ R_câble
6	Délect_câble / R_câble
9	Cable screen

Warning:

In order to obtain correct measurements, the Made Flex current clamps must be connected to the device.

Use the corresponding clamps delivered with the device. For any modification or other demand, contact your supplier.

7.5 Wiring of the various communication ports

The communication port and the corresponding cable have to be used in order to establish a communication between the device and a computer, locally or remotely.

USB point to point

- Install the following driver on the computer: FT232BM

You can find this driver on the CD of the software WINQUAD

It is a USB connection 1.1.

Follow the instructions of the document "Erreur! Source du renvoi introuvable" located on the CD of the software WINQUAD.

7.6 Starting the device

Start

- Start the supply circuit of the device, the voltage circuits and the input currents.
- Turn the switch “ON – OFF” of the device on “ON”
The “Power” **green** LED lights up.
- The “Status” LED starts flashing every 30 seconds.

Battery

- The device has an integrated battery
During the first use of the device, the battery needs to be charged.
The battery starts charging immediately after the device has been started.
- The “Status charger” LED is **orange** for the whole charging time, and turns green when the battery is full (~3h).
- If the device is not connected to an external power source, the LED is **green**.
- If the “Charger Status” LED does not light up:
Turn off the device
Check the wiring between the device and the power supply using a calibrated multimeter.

7.7 Required marerial

Installation

- Computer (PC)
- Pentium 600 MHz (minimum)
- 128 MB RAM (minimum)
- USB port
- 10 GB available on the hard-drive
- CD player (for installation)
- Microsoft Windows 2000, NT, XP

7.8 Software installation (CD)

- ▶ Install the software from the CD “WINQUAD software suite”.

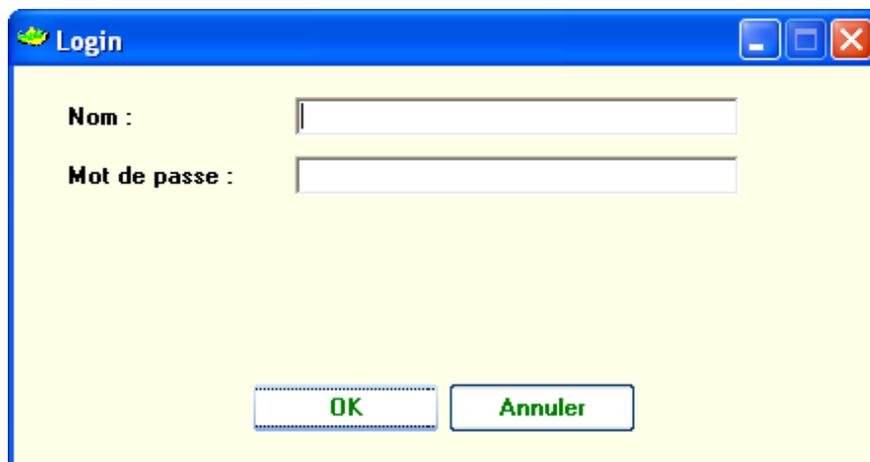
7.9 Starting the software

Login

The “login” option is not activated in the Default settings

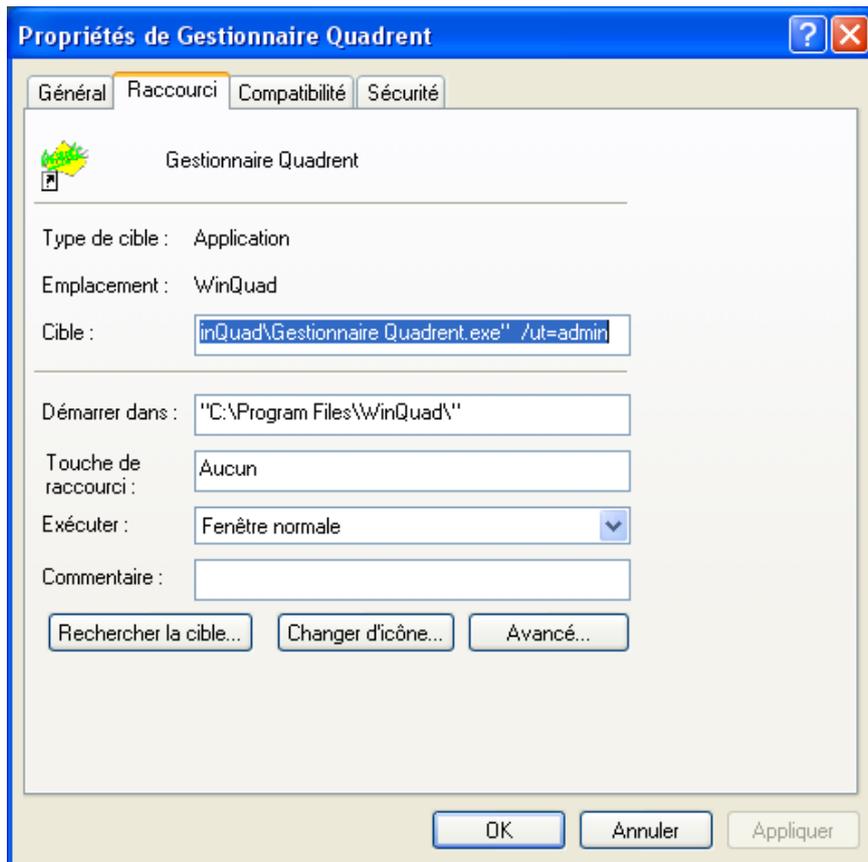
Click on the *Winquad* shortcut  Gestionnaire Quadrent.exe
Gestionnaire Quadrent
MADE

When the Login window appears, write the default name “*admin*”, no password.



The screenshot shows a Windows-style dialog box titled "Login". It has a blue title bar with a small icon on the left and standard window control buttons (minimize, maximize, close) on the right. The main area has a light yellow background. There are two text input fields: the first is labeled "Nom :" and the second is labeled "Mot de passe :". At the bottom, there are two buttons: "OK" and "Annuler".

If you wish to set a login and a password, you need to modify the application's shortcut: (right click on the shortcut and choose properties).

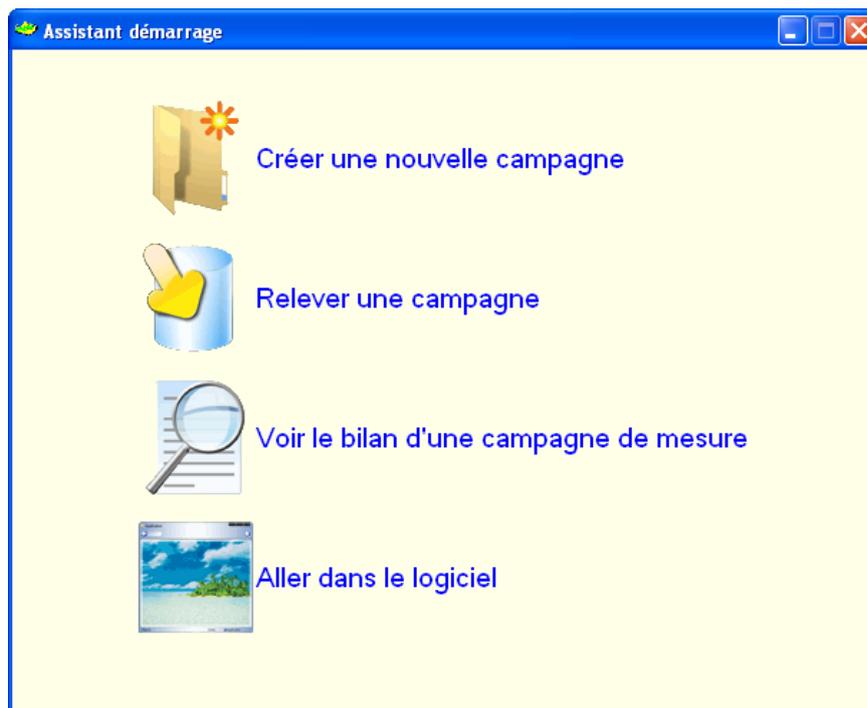


Change the field "Cible" by deleting **/ult=admin**.

7.10 Choosing the language

- In the toolbar *Tools*, choose *Configuration*.
- Select the language before restarting the software.

7.11 Start-up assistant



Just follow the assistant indications and answer the questions, this simplified mode helps getting accustomed to the software very quickly and answers the most frequently asked questions.

7.12 Software without assistant mode

Click on "Access the software" to access the software and all its possibilities. The advanced mode enables to use all the software's functionalities.



7.13 Icons used in the software



: The red arrow in the lower right hand corner shows that there are several options for this function. You can choose these options by right-clicking on the button. Clicking on the button will trigger its main function.



: The black arrow at the bottom indicates that it is a “menu” button. Clicking on the button triggers the opening of the menu below the button.

Pop-up menu: the menu appears after a right click.

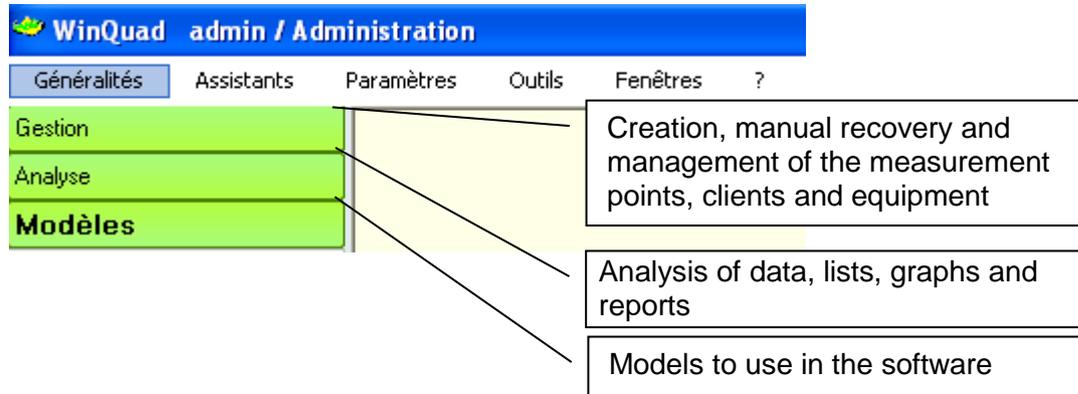
Do not forget to use the pop-up menu, which is often available during an analysis.

A model is a box, reusable at will.



: There are two little arrows and/or a magnifying glass in the column titles of some tables: they are 2 functions available when clicking on it. The little arrows enable to sort the column. The magnifying glass enables to navigate directly to a chosen line: writing a number will move the cursor to the corresponding line.

7.14 List of menus

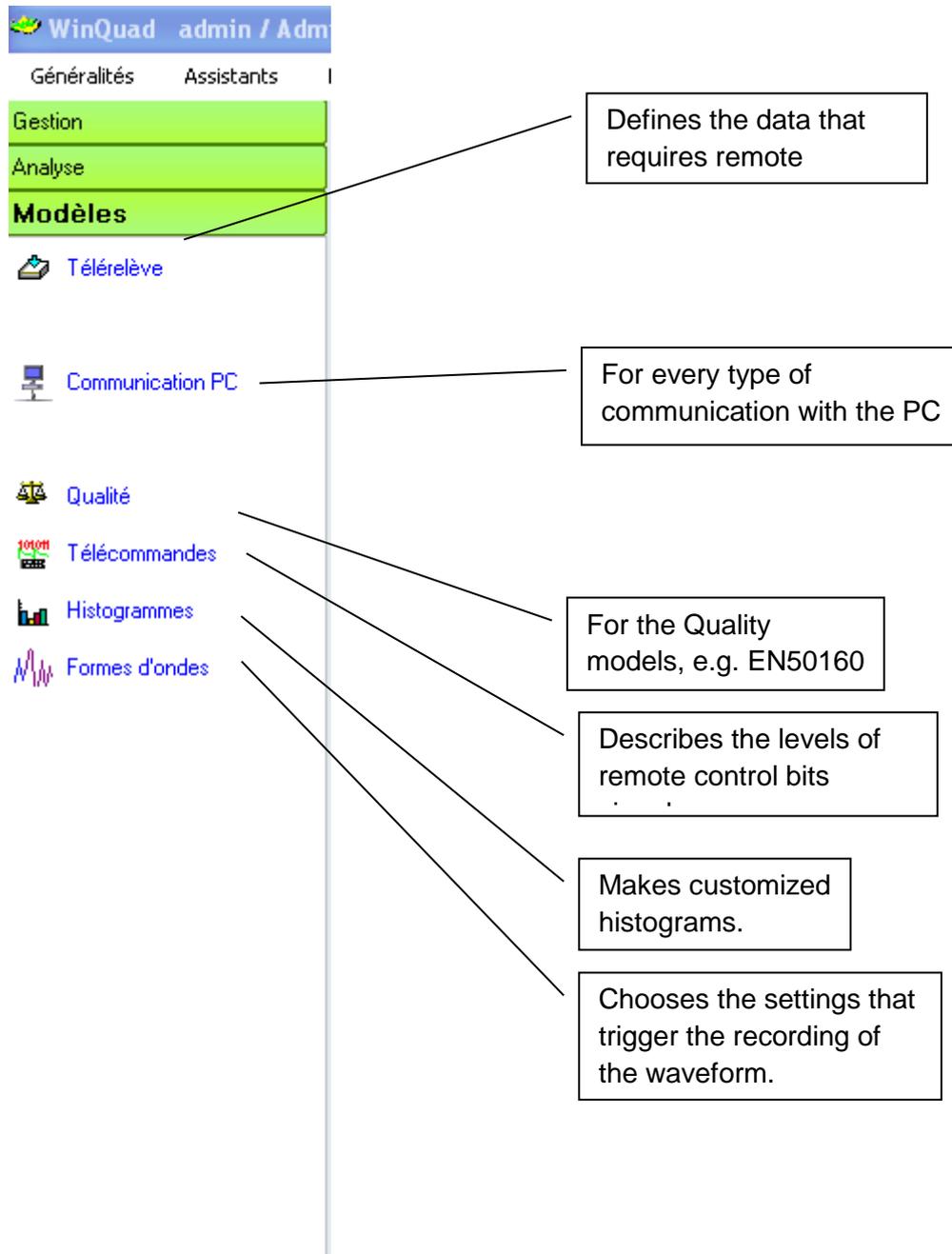


The image shows a screenshot of the WinQuad software's administration menu. The menu bar is blue and contains the following items: WinQuad (with a logo), admin / Administration, Généralités, Assistants, Paramètres, Outils, Fenêtres, and ?. Below the menu bar, three sub-menus are listed: Gestion, Analyse, and Modèles. Each sub-menu is highlighted in green. Three callout boxes with lines pointing to the sub-menus provide descriptions: 'Gestion' is described as 'Creation, manual recovery and management of the measurement points, clients and equipment'; 'Analyse' is described as 'Analysis of data, lists, graphs and reports'; and 'Modèles' is described as 'Models to use in the software'.

Menu Item	Description
Gestion	Creation, manual recovery and management of the measurement points, clients and equipment
Analyse	Analysis of data, lists, graphs and reports
Modèles	Models to use in the software

7.15 List of models

Saved models enable to avoid writing manually repetitive operations.



The screenshot shows the WinQuad software interface with the following menu items and their corresponding descriptions:

- Modèles**: Defines the data that requires remote
- Communication PC**: For every type of communication with the PC
- Qualité**: For the Quality models, e.g. EN50160
- Télécommandes**: Describes the levels of remote control bits
- Histogrammes**: Makes customized histograms.
- Formes d'ondes**: Chooses the settings that trigger the recording of the waveform.

7.16 Icons description

Functions assigned to the icons may vary depending on the selected window.



Icons

Functions description :

Common icons :

-  Add new
-  Copy
-  Modify
-  Delete
-  See details
-  Print preview
-  Print
-  Configure
-  Configurations lists
-  Models/masks list
-  Real time measurements
-  Manual remote reading
-  Reports, history of actions

7.17 Managing the measurement points

A measurement point is where the network analysis system is located. The software downloads the measurement point's data, before storing them in its database.

Each measurement point must first be indicated in WINQUAD.

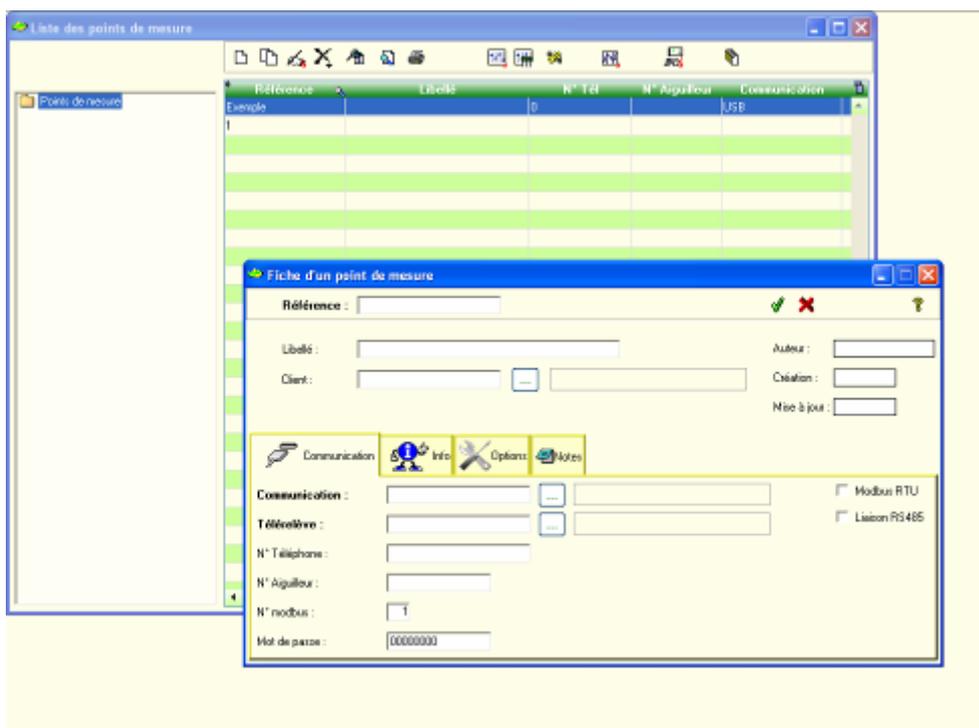
- If you change or modify the device, a new network analysis system can be coupled to an already existing measurement point. The new data will be displayed after the former system's data, thus enabling a chronological analysis of the measurement point.

7.18 New measurement point

Creating a new measurement point:

Follow these steps to indicate a new device to the software:

- In the tab "Management", choose "Measurement points" and then the icon "Add new"



- Write at least a name (Reference), a communication model and a remote reading model.

- The communication model defines the way used by the software to communicate with the measurement point. The model is: **USB**. If necessary, indicate the USB port.
 - o The remote reading model sets the data that have to be downloaded. Different models of remote reading are already available on the software (For example, *Rms 10min* means that the software will make a remote reading of the data every 10 minutes).

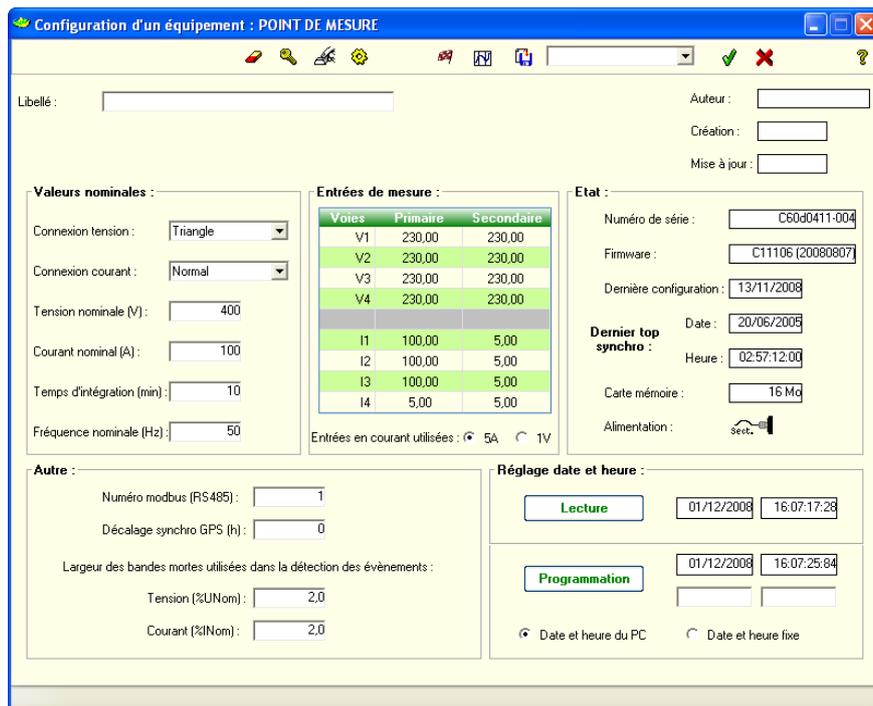
7.19 Configuring a measurement point

Reading and writing the configuration of a device:

This operation is done manually after the creation of a new measurement point.



- In the list of the measurement points, click on the “Configure” icon to access the device configuration window and the configuration settings.



Configuration d'un équipement : POINT DE MESURE

Libellé : Auteur :

Création : Mise à jour :

Valeurs nominales :

Connexion tension :

Connexion courant :

Tension nominale (V) :

Courant nominal (A) :

Temps d'intégration (min) :

Fréquence nominale (Hz) :

Entrées de mesure :

Voies	Primaire	Secondaire
V1	230,00	230,00
V2	230,00	230,00
V3	230,00	230,00
V4	230,00	230,00
I1	100,00	5,00
I2	100,00	5,00
I3	100,00	5,00
I4	5,00	5,00

Entrées en courant utilisées : 5A 1V

Etat :

Numéro de série :

Firmware :

Dernière configuration :

Dernier top synchro : Date : Heure :

Carte mémoire :

Alimentation :

Autre :

Numéro modbus (RS485) :

Décalage synchro GPS (h) :

Largeur des bandes mortes utilisées dans la détection des événements :

Tension (%UNom) :

Courant (%INom) :

Réglage date et heure :

Date et heure du PC Date et heure fixe

- o The software then communicates automatically with the device and reads its configuration.



- Change the configuration if needed, and then click on the “Device configuration” icon to send this configuration to the device.
 - o The device is now indicated and configured. It appears in the device list after its first data download.

7.20 Simple measurements – Cable verification

The real-time measurement of the WINQUAD software enables to check easily the connection and the settings of the device.

- Different types of real-time measurements are available in WINQUAD: RMS graph, RMS tables, Oscilloscope view, and symmetrical components.



- To access the real-time mode, select the measurement point you want to analyze.



- Click on the Real-time Measurement icon: the real-time instruments open with the RMS table and you can start reading the values.

- To change the instrument, first click on **STOP**.
- Then select a new instrument.



- Click on the **GO** icon.

- To stop the real-time remote reading, click on the **STOP** icon.

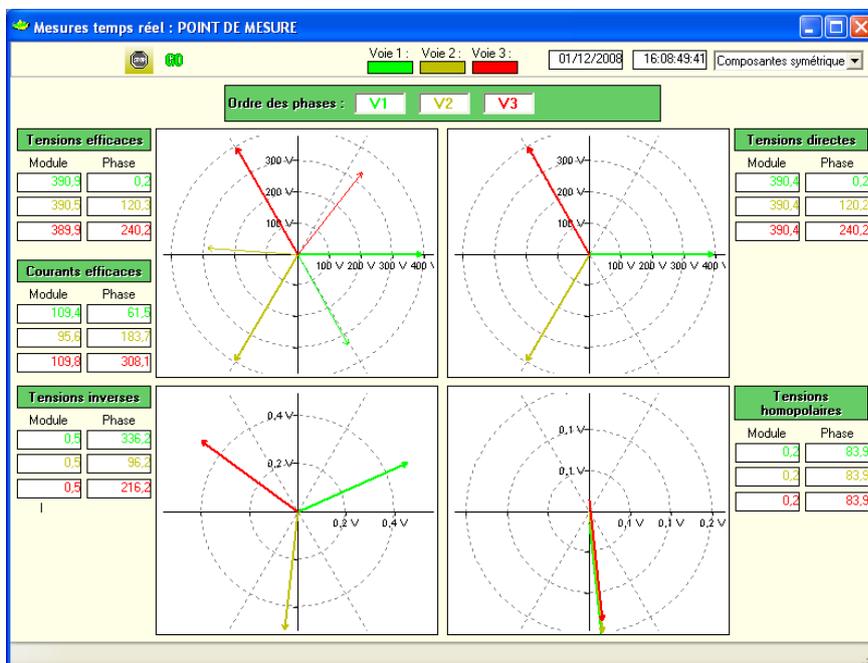
RMS Table:

This instrument is very useful to check the values of the measured currents and voltages. The software displays the RMS values in real-time.



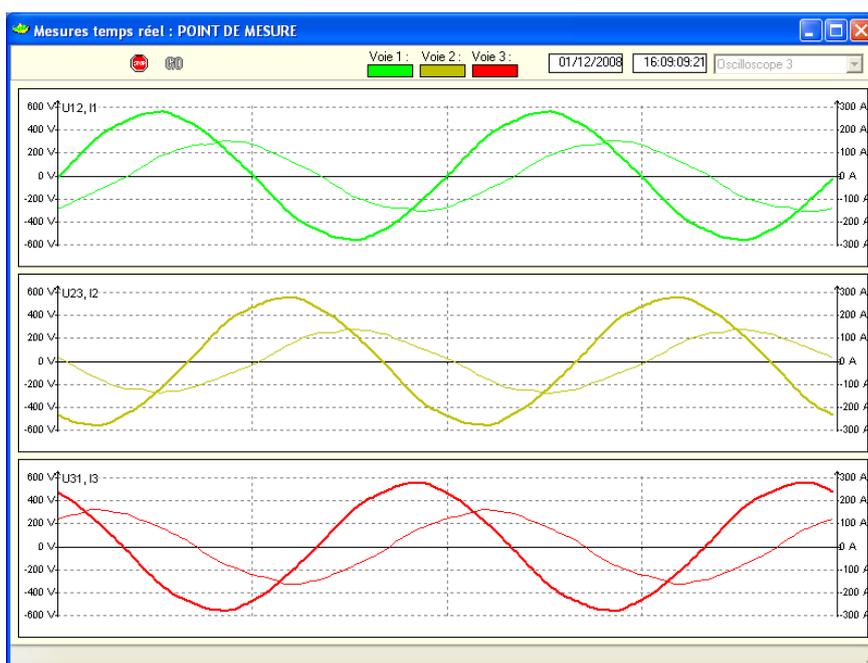
Vector graph:

This instrument is very useful to check the connection direction in the different phases. The software displays in real-time the phase angles on a vector graph (phasor).



Oscilloscope view:

This instrument displays the current and voltage instantaneous waveform (sinusoid). The software displays in real-time the sinusoids on a Time/Amplitude graph.



7.21 Data download

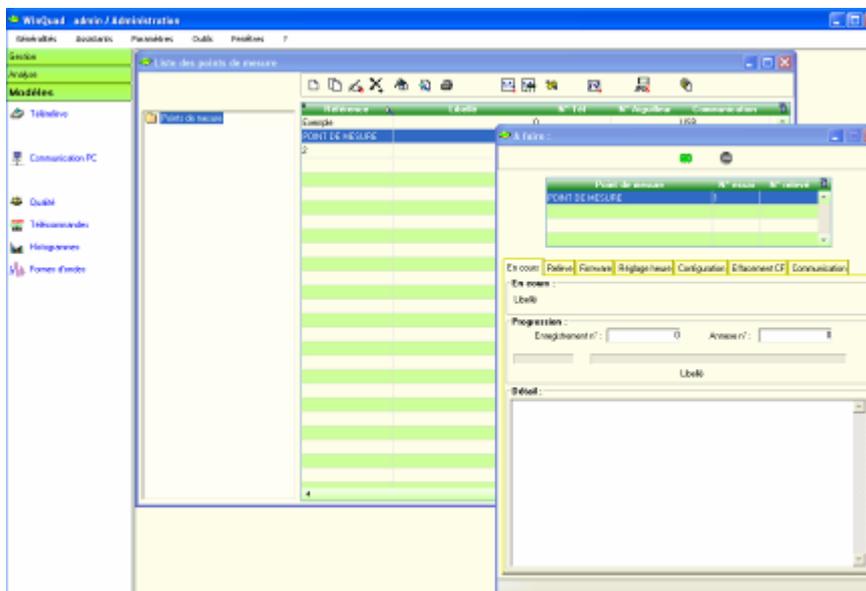
To analyze the device data, they must first be downloaded from the device into the main computer's database.

This download can be done manually at any time.

7.22 Manual download of the data from a measurement point



- In the measurement point list, select the measurement point requiring a remote reading.
- Click on the *Remote Reading* icon.



- In the tab *Recovery*, select the remote reading mode to apply.
- Click on the **GO** icon.

8 DATA ANALYSIS

This guide does not aim at giving an entire description of the data management and analysis. Here are some examples of data analysis.

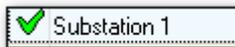
8.1 Events

An event can be a dip, a swell or an interruption; it can also be when a quality measurement system's threshold is exceeded. This data is sorted depending on its measurement point, its type and its time of apparition, its channel, its maximal amplitude and its length.

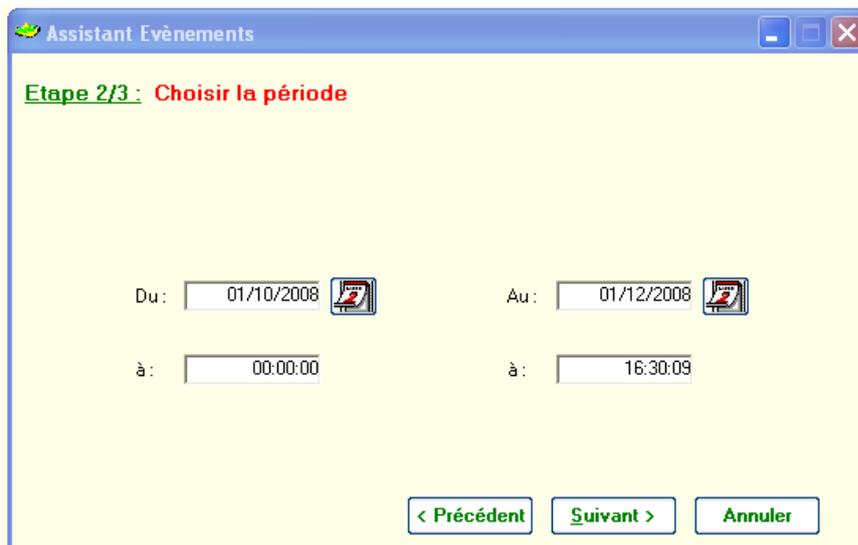
Choosing the data:

Follow these steps to display the events of a measurement point:

- In the tab *Analysis*, choose *Event* and follow these steps:
 - o Select at least one measurement point.



- o Choose an analysis cycle.



- o Choose a type of data display
The data can be displayed following several modes such as simple list, duration/time table, or an ITIC graph.

List

In the “List” mode, the RMS form of the dip, swell or interruption types of events can be displayed in a graph by selecting them in the list.

N°	Sel.	Couleur	Lieu	Type d'évènement	Date	Heure	Voie	Extremum	Temps de l'extremum
1			Exemple 2	Creux de tension	20/10/08	04:56:34.34	12	356,61 V	20m
2			Exemple 2	Creux de tension	20/10/08	04:56:34.33	31	357,9 V	9,766m
3			Exemple 2	Creux de tension	20/10/08	04:56:34.33	23	356,44 V	0m
4			Exemple 2	Tension	10/10/08	19:23:43.64	31	410 V	0m
5			Exemple 2	Creux de tension	10/10/08	19:23:43.63	23	367,61 V	0m
6			Exemple 2	Creux de tension	06/10/08	04:56:42.87	12	358,96 V	0m
7			Exemple 2	Creux de tension	06/10/08	04:56:42.86	23	358,58 V	0m
8			Exemple 2	Creux de tension	06/10/08	04:56:42.86	31	360,49 V	20m

Volt
 % de UNom [UNom=100%]
 % de UNom [UNom=0%]
 Synchronisation
 Marques

A right-click opens a complementary menu where you can configure and modify some settings or displays.

Graphique	
Affichage	▶
Filtre	▶
Document annexe	
Tri Croissant	▶
Tri Décroissant	▶
Couleur des voies	
Commentaire	▶
Supprimer	
Copier dans le presse papier	
Exporter	
Aperçu	
Imprimer	
Aide	
Barre d'outils	

- In the “table duration/depth” mode, each data is sorted according to its duration and depth, and is counted in the corresponding field in the table. The UNIPEDA table indicates only the number of registered events.

Evènements triés par durée et profondeur (1)

Seuils (%/UNom)		Durée du défaut de tension (s)															
UNom = 100% OV = 0%		de	à	de	à	de	de	à	à	de	à	de	ona	bundan	ona	bundan	ona
de	à	0,10	0,30	0,30	0,50	0,50	0,60	0,60	0,70	0,70	0,80	0,80	1,00	1,00	180,00	180,00	>
100,0	90,00	0,0	0,0	0,0	0,0	0,0	0,0	2,0	1,0	3,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
90,0	80,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
80,0	70,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
70,0	65,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
65,0	50,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
50,0	30,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
30,0	10,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
10,0	0,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

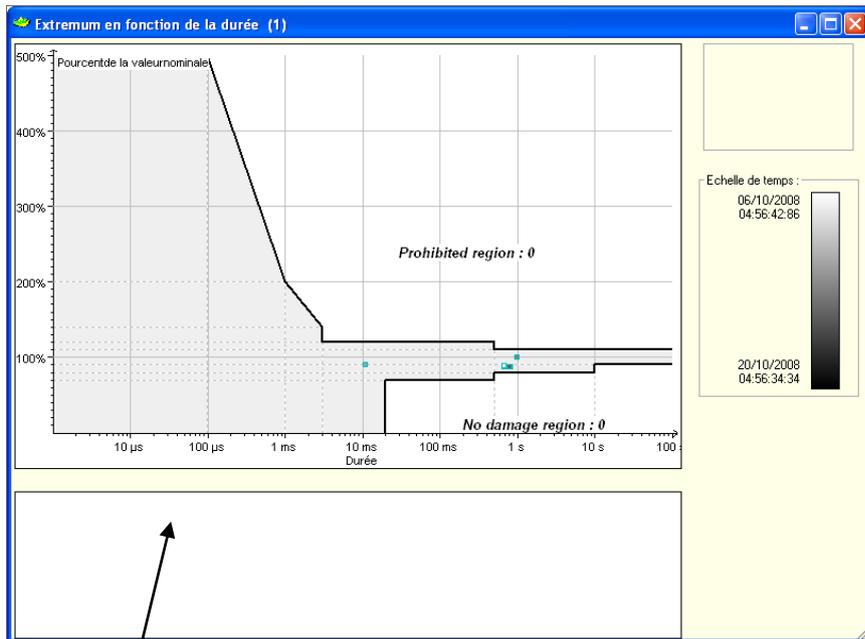
Mode de calcul : Nombre d'évènements
Creux de tension : 7
Surtension : 0
Total : 7

- For instance, a 0.65s dip with a 84.3% depth of nominal U will be registered as “1” dip in the field 0.60/0.70 – 90.0/80.0.

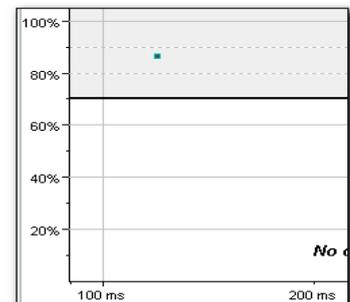
Seuils (%/UNom)		Durée du défaut							
UNom = 100% OV = 0%		de	à	de	à	de	de	à	à
de	à	0,10	0,30	0,30	0,50	0,50	0,60	0,60	0,70
100,0	90,00	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
90,0	80,00	0,0	0,0	0,0	0,0	0,0	0,0	2,0	0,0

ITIC

- In the "ITIC 2000" mode, each data is sorted according to its duration and depth, and is displayed as a dot on the corresponding location on a graph.



- For example, a 120ms dip with a 87% depth of nominal U will be displayed as shown:



It is possible to display a graph of the RMS form of the dips/swells/interruptions by double-clicking on the points representing them.

Points de mesure : Exemple
2
Date : 20/10/2008
Heure : 04:56:34:33
Voie : U31
Extremum : 357,9 V
Durée : 799ms

- Precise information on a particular point is indicated in the upper right hand corner when the cursor is placed on it.

8.2 Quality measurement system

The QUADRENT network analysis systems can make statistical measurement campaigns for the main electrical settings. Once downloaded in the software's database, the data is sorted in daily, weekly or monthly tables, indicating immediately if the electrical values stayed below the acceptability thresholds during this period of time.

These thresholds are defined by the EN50160 standards. However, they can be modified and a new "standard" can be set.

- The conformity threshold is generally limited to 95% of the systems. In most cases, a second threshold is set for the other 5% (RMS voltage and frequency).

The data is sorted into types in the control table: RMS values, harmonic even and harmonic odd.

Dips, swells and interruptions can also be sorted in a "duration /depth" table.

Choosing the data:

Follow these steps to display the quality measurement system of one or more measurement points:

- In the tab Analysis, choose *Quality Measurement* and follow these steps:
 - Select at least one measurement point
 - Choose an analysis cycle
 - Choose the display (list or graph)
 - Choose the sorting method (daily, weekly, monthly)
 - Choose the applicable standards thresholds.

Liste des compteurs qualités (1)

Sélection des compteurs à visualiser :

Lieu	Du	Au	Résultat	Commentaire
Exemple 3	16/10/2008	16/10/2008	CONFORME	
Exemple 3	15/10/2008	15/10/2008	CONFORME	
Exemple 3	14/10/2008	14/10/2008	CONFORME	
Exemple 3	13/10/2008	13/10/2008	NON CONFORME	
Exemple 3	12/10/2008	12/10/2008	CONFORME	
Exemple 3	11/10/2008	11/10/2008	CONFORME	
Exemple 3	10/10/2008	10/10/2008	NON CONFORME	

Date : 22/10/2008

CONFORME

RMS Harmoniques Impairs Harmoniques Pairs Creux de tension Surtensions

Indication de conformité ou de non-conformité par jour, semaine ou mois.

Nombre de périodes correspondant à une condition normale d'exploitation :

Nom	V1	V2	V3	Triphasé
10 min	144	144	144	
10 s (fréquence)	8645	8645	8645	
10 min (déséquilibre)				144

Compteurs [%] :

	Nom	Voie 1	Voie 2	Voie 3	Triphasé	Limite	Seuils
(2) :	Tension	0	0	0		0	230V -15%,+15%
	Triphasé	0	0	0		0	50Hz -6%,+4%
(1) :	Tension	0	0	0		5	230V -10%,+10%
	Triphasé	0	0	0		0.5	50Hz -1%,+1%
	Flicker: PLT	0	0	0		5	1
	Tnd	0	0	0		5	8%
	Déséquilibre				0	5	1%

- % of the time during which the voltage value was out of the authorized The total measurement time is obtained by multiplying the number of measurement intervals by the value of an interval (here, 144 x 10 min)
- Intervals during which an event appears (such as a voltage dip) are not taken into account thresholds.
 - o in the Quality Measurement table.
- These events can be displayed in a graph:

Liste des compteurs qualités (1) *

Sélection des compteurs à visualiser :

Lieu	Du	Au	Résultat	Commentaire
Exemple 3	04/10/2008	04/10/2008	CONFORME	
Exemple 3	03/10/2008	03/10/2008	CONFORME	
Exemple 3	02/10/2008	02/10/2008	NON CONFORME	
Exemple 3	01/10/2008	01/10/2008	NON CONFORME	
Exemple 3	30/09/2008	30/09/2008	NON CONFORME	
Exemple 2	22/10/2008	22/10/2008	CONFORME	
Exemple 2	21/10/2008	21/10/2008	CONFORME	

Date : 30/09/2008

NON CONFORME

RMS Harmoniques Impairs Harmoniques Pairs Creux de tension Surtensions

Graphique Auto Y Menu Y [%]

9 TRANSPORT AND STORAGE

Transport:

- Always transport the device in its original case
- Keep the user's guide with the device for any information
- Keep the device protected from excessive temperatures or humidity; the temperature should be between 0°C and +50°C, with a water content below 85%.
- Protect the device from shocks or heavy weights.

Storage:

- Keep the original case: it can be required for further transports, and is the only adapted protection against mechanical shocks.
- Store the device in a dry location: the temperature should be between 0°C and 50°C, with a water content below 85%.
- Protect the device from direct exposition to sunlight, excessive heat, moist and mechanical shocks.

10 RECALIBRATION

MADE S.A. recommends a system recalibration once every two years. The system can be recalibrated by the aftersales department at MADE S.A.

11 MAINTENANCE

Dismantling the device is forbidden. This operation is limited exclusively to personnel qualified by MADE.

Note : breaking the security seals voids the guarantee.

An annual inspection can be carried out in our premises.

Clean the system using a soft, dry cloth.

Never use solvent, or a solvent-based product, to clean the system and / or its accessories.

11.1 Fault message

Power LED: The “Power” LED flashes **green** when the device is on. When the device is off, all the LEDs are off as well.

Status LED: General state of the system:

- Flashing green: measuring a periodic signal close to 50Hz.
- Flashing orange: full memory – dips recording is deactivated -> **incorrect dip threshold configuration – change the system settings**

Memo LED: State of the memory interface.

- The “Memo” LED is off when there is no recording.
- When it flashes (**green**), the state of the recording can be defined by the flashing speed:
 - o Flashing at 25%: programmed recording.
 - o Flashing at 50%: currently recording.
 - o Flashing at 75%: recording completed.
 - o **Red**: formatting the FLASH Compact memory.

Com LED: **Orange**: sending data to one of the communication ports (USB).

11.2 Changing the batteries

If the system does not record data once the power supply has been disconnected, the battery must be recharged.

Battery type: SAFT Li Ion 8.4V 2S 1P VL18650 battery or equivalent.

- **MADE S.A. recommends changing the battery every two years.**



▶ **The battery change must be made by MADE S.A. personnel only: please ask your supplier**

Do not throw the battery in the fire.

If the date or the device's internal clock seems wrong:

The lithium battery must be changed.

Battery type: Lithium 3 Volts, 130 mAh (CR1632)

The internal clock is supplied by a lithium battery giving an approximate battery life of 10 years.

Please contact MADE S.A. for a battery change.

Using any other batteries than those specified in this guide voids the guarantee.

11.3 Decommissioning

11.3.1 Safety recommendations for the Li-ION batteries

- Quadrent has a Li-ION battery
- In order to improve the battery life, we recommend that you discharge it when the device is stored for a long period of time. To that end, just leave the device on (without power supply) until it goes automatically off (if the battery is full, it can take up to one hour). Once the battery is spent, switch the device back to OFF and store it.
- When the device is used again, it must be connected by the voltage Measurement cable in order to fully recharge the battery.

Do not throw the battery in the fire.

11.3.2 Decommissioning

- Make sure that all the systems connected to the device have been turned off and disconnected from the network.
- Make sure that no voltage is applied to the device on any of its pins.
- Turn off the device
- Disconnect every cable or wire from the device.
- Secure the plugs and wires from an unexpected start.
- Make sure that the user's guide is with the device.

12 RECYCLING

In accordance with the decree n° 2005-829 of July 20, 2005 relating to the waste disposal of electrical equipment and electronic (WEEE), the user ensures and takes responsibility for the collection and the elimination of the WEEE under the conditions of the articles 21 and 22 of this decree.

13 TECHNICAL FEATURES

General features:	Digital Signal Processor (DSP) synchronized by Phase-Lock-Loop (PLL)
Display:	Real-time by direct PC interface.
Configuration:	Through PC connection (USB)
Quality system:	Development, design and manufacturing follow the DIN ISO 9001:2000 standard
Calibration:	Recommended recalibration interval: 2 years.
Precision:	Precision of display for the measured values: +/- 0.1% of the read value from 100V to 600Vrms
Calibration:	23°C +/-1°C 230Vrms / 50Hz +/- 0.1Hz / 3Arms 50Hz +/- 0.1Hz Stabilization time: 10 minutes Star connection
Environment:	Operating temperature: 0°C to 50°C Storage temperature: 0°C to 50°C Water content: 0% to 80% (without condensation)
IP Standard:	IP54

QUADRENT

Dimensions:
292*181*73.5 mm

Weight:
2.1 Kg

EMC

Emission: In accordance with the applicable thresholds

PRECISIONS - MEASUREMENTS

Measured data:	200mSec interval for average values
Recorded data:	10min, 2h, 24h, 7 days
Frequency:	45-57Hz (option 60Hz)
Resolution:	10 mHz
Error margin:	30 mHz Class A following IEC-61000-4-30
Sampling frequency:	10240 Hz synchronized on the network frequency (PLL) Precision 10 cycles Fast Fourier Transform (FFT) Bandwidth 30-2200 Hz
Dips and swells:	RMS measurements of 1 cycle, sliding window of ½ cycle

Reference voltage: U nominal
Error margin: <1% of Unom
Class A following IEC-6100-4-30

Flicker Pst (10 minutes), Plt (2 hours)
Measurements following IEC-6100-4-30
Measurement range: 0-20
Error margin: <5% of Unom
Class A following IEC-6100-4-30

Voltage harmonics: **Measurement range:** H0 – H51
Measured data: 200 mSec
Recorded data: 10min, 2h, 24h, 7 days
Measurements following IEC-61000-4-7-Class 1
Class A following IEC-6100-4-30

Current Harmonics: **Measurement range:** H0-H51
Measured data: 200 mSec
Recorded data: 10min, 2h, 24h, 7 days
Measurements following IEC-61000-4-7-Class 1
Class A following IEC-6100-4-30

Imbalance: Class A following IEC-6100-4-30
Active power: Following IEC-61036 Class 2
Reactive power: Following IEC-61268 Class 2
Distortion power: Following IEC-61036 Class 2

standard references

EN 50160 “Voltage characteristics of electricity supplied by public distribution systems”
UNPEDE, 230.02 “Measurement guide for voltage characteristics, cat 1”.

STANDARD COMPLIANCE

IEC 61000-4-30 “Electromagnetic compatibility (EMC) - Part 4-30: Testing and measurement techniques - Power quality measurement methods”

IEC 61010-1 /2001 “Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements”.

IEC 61000-4-6 “Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.”

IEC 61000-4-7 “Electromagnetic compatibility (EMC) - Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto”.

IEC 61000-4-15 “Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 15: Flickermeter - Functional and design specifications”.

IEC 61036 “Alternating current static watt-hour meters for active energy (classes 1 and 2)”

IEC 61268 “Alternating current static var-hour meters for reactive energy (classes 2 and 3)”

73/23/EEC EC Low Voltage Directive

89/336/EEC EMC Directive

See the “Type test” document for other standards compliance.

14 DEFINITIONS

CBEMA-Curve	In 1977 the Computer and Business Equipment Manufacturers Association provided an energy performance profile for computer equipment known as the CBEMA curve. Revised by the Information Technology Industry Council (ITIC) in 1996 it will continue to be referred to as the "CBEMA Curve". It is a necessary tool in determining the immunity limits in modern office electronic equipment. Voltage levels and durations at the equipment terminals, within the tolerance envelope, represent acceptable energy being Ledivered. http://www.itic.org/technical/iticurv.pdf
ITIC-Curve	See CBEMA-Curve
Coverage (statistics)	The percentage of available data compared to the expected available data for a selected period of time
Device	Any measurement equipment.
DISDIP	DISDIP was initially the name of workgroup of the UNIPEDE that has been working on a classification of dips, swells and interruptions. By extension, the name DISDIP has been given to tables that resulted from this workgroup
Electrical variable	Any parameter that might be used to define the shape of an electrical signal. This might be a long or short-term phenomenon, affecting the wave shape or the RMS values. Ex: Harmonics, dips, flicker...
Event	An event is a short size information provided by a PQ device. Events are usually punctual (dip) but may cover over longer periods (EN50160 report event). Example: * A triggering condition was met (dip, flicker...) OR * A report was issued (EN report, Signaling voltages...) OR * Information from a device following an normal or abnormal behavior (reset, clock synchronization...) * Information provided by the software.
Histogram	An histogram is a graphical representation of the evolution of a parameter where time information is lost and focus is given on the statistical dispersion of the parameter.
Permanent recording	Unconditional/continuous (usually long term) temporal recording of a variable. The permanent recording is logged usually at a defined time interval (typically 10 minutes, one hour...)
Power Quality (PQ)	Any power problem manifested in voltage, current, or frequency deviation that results in failure or misoperation of end-user equipment
Triggered recording	Recording that start and stop when triggering conditions are met. This type of recording is "finite" in time, contrary to the permanent (continuous) recordings (10-Min, statistics, User Recordings). Usually the triggering condition encountered when an electrical variable value overshoots of a threshold.

User	Is a person that will log on the system to use it. It is recommended to use dedicated log ins for each user and to allocate permissions according to the authority of each individual on the system. This enables traceability of all actions and provides security at the same time.
------	---

15 GUARANTEE

MADE guarantees this product, to the initial buyer, against all material or functional failure for a period of one year from the date of delivery, unless otherwise indicated in the product manual. If a defect is discovered during the period of the guarantee, MADE agrees, at its choice, to either repair or replace the deficient part, excluding the expenses of handling and of initial delivery. All parts repaired or replaced under the terms of this agreement will be guaranteed only for the remainder of the period of initial guarantee of the system.

15.1 Limitations

This guarantee does not cover:

- Break of the security seals
- Damage caused by a "cause beyond control", natural disasters, strikes, wars (declared or not), terrorism, social conflicts or any acts under governmental jurisdiction
- Damage due to misuse, to carelessness, to any accident or an unsuitable application or installation
- Damage caused by a repair or an attempted repair not authorized by MADE
- Any product that is not used in accordance with the instructions provided by MADE
- Cost of transport back to MADE
- Cost of transport by express delivery of parts or products under guarantee
- Cost of travel for a repair on site under guarantee

This guarantee constitutes the unique explicit guarantee established by MADE for its products. All implied guarantees, including, but not limited to, guarantees on the commercial value of the product and its suitability for a particular use are positively rejected.

The present guarantee confers certain rights: the legislation of the country or jurisdiction can grant others. This guarantee constitutes the final declaration, complete and exclusive, of the terms of the guarantee and nobody is allowed to give other guarantees or promises on MADE's account.

15.2 Claim limitations

Claims having for object repair or replacement are the only allowable claims in case of the breaking of this guarantee. The MADE Company cannot be held responsible, whether on the basis of strict responsibility or any other legal basis, of any incidental or consecutive damage resulting from a violation of the guarantee or from carelessness.

16 COPYRIGHT

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MADE declines all responsibility for mistakes or inaccuracies that the present document may contain.

17 APPENDIX

17.1 CE conformity

The company :



M A D E

S.A. au capital de 270 130 €
167, Impasse de la garrigue
F 83210 LA FARLEDE

Tél: + 33 (0) 494 083 198 – FAX : + 33 (0) 494 082 879
-mail: contact@made-sa.com - Web : www.made-sa.com



declares by this document that the product described in this manual, that is :

QUADRENT

conforms to the following directives **CE** , including all the applicable amendments :

Reference	Title
73/23/CEE	Low Voltage Directive (LVD)
89/336/CEE	Electromagnetic Compatibility Directive (EMC)

and that the standards and/or technical specifications listed in this manual have been applied.

The designated product has been designed, manufactured and tested in the framework of a Quality Assurance System certified as conforming to the standard:

ISO 9001 : 2008

By the Association Française pour l'Assurance Qualité - AFAQ.

Certificate: QUAL / 2005 / 24473B

Date: 07 / 05 / 2009

M. RIVASSEAU
D.G.D