

# Power Quality RTU

## QWave Light

Providing automated Power Quality Monitoring for power networks

- Records dips, swells and interruptions
- Monitors voltage quality according to EN 50160
- Embedded Modem (Option)
- 1 Digital Input
- 1 Digital output (Relay)
- 1 Analogue Input
- Possibility to manage a large number of devices automatically

### General

#### Measuring System

The **QWave Light** has been especially designed for PQ monitoring applications where numerous instruments have to be installed. It focuses on the main PQ parameters for a very affordable price. Its integration in our fully automated system QIS allows the user to install different equipment ranging from low-end (QWave Light) up to fault recorders (QWave Premium) or even third party manufacturer (PQDIF compatibility).

#### The QWave Light provides

- Voltage quality analysis according to EN 50160
- RMS voltage
- Dips, swells & interruptions
- THD
- (Inter)Harmonics (up to 50<sup>th</sup>)
- Flicker (Pst & Plt)
- Imbalance
- Frequency
- Conformity of signaling voltages

Those parameters will be recorded simultaneously at a 10 minutes interval:

**Incremental recording of dips, swells and interruptions.**



#### Hardware

- 3 Voltage inputs
- 1 Digital Input
- 1 Digital Output
- 1 Analogue Input
- Synchronized sampling
- DIN rail brackets

#### Communication and data transfer

- RS232 & Modem
- MODBUS RTU and ASCII protocols
- optionally RS485 instead of Modem

**The QWave Light has been developed in co-operation with electric power supply companies focusing on field applications and actual operational requirements.**

#### Analysis towards EN50160 standard

**EN 50160:** Voltage characteristics of electricity supplied by public distribution networks (applies to LV and MV networks)

The **QWave Light** automatically measures all the EN50160 parameters, including flicker and every single harmonic up to 50, and provides summarised compliance reports.

The QWave assesses the quality of the supplied electricity. These high accuracy measurements can be used as evidence in case of liability problems.



## Daily Operation

### Short term

Every day, any disturbance on the network is automatically reported to your office, with clear description and graphical recordings of dips, swells and other outages.

### Medium term

Each week, compliance reports towards EN50160 are automatically issued and collected by the central server.

### Long term

Main PQ parameters are recorded at 10 minutes interval.

Separately for the 3 phases: THD, Flicker, Frequency, VRMS  
3 phases together: imbalance

### Automated data management

The data gathered by the different QWaves installed on the power grid can be transferred automatically into one central database. QIS, the management software, allows easy sorting, displaying and comparing data coming from numerous sites. Some examples (not exhaustive) are given here. For more details on QIS, please refer to the QIS brochure.

### Dips and Swells

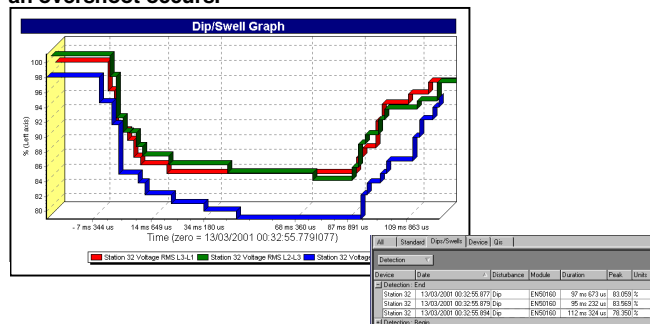
Dips, swells and interruptions are recorded with a resolution of 10 msec.

The QIS software features easy comparison capabilities for events coming from different locations. Synchronization of the devices can be achieved with GPS (option).

### Events List

The event list provides a compact overview of all disturbances that occurred. This representation is particularly compact and quick to be read from the QWave. Polling the events of 10 QWaves installed in the field generally lasts less than 2 minutes.

For each individual harmonic, the level will be compared with the EN50160 threshold and an Event will be generated in case an overshoot occurs.



Voltage data	Unit	Phases	
Rms	Vrms	L1, L2, L3	X
Frequency	Hz	L1, L2, L3, & AVG	X
THD	%	L1, L2, L3	X
Interruptions	N <sub>b</sub>	L1, L2, L3	X
Dips	N <sub>b</sub>	L1, L2, L3	X
Swells	N <sub>b</sub>	L1, L2, L3	X
Unbalance	%	3 ph	x
Flicker short term (10 min) P <sub>st</sub>	-	L1, L2, L3	X
Signalling Voltages (3)	V	L1, L2, L3	X

## Configuration

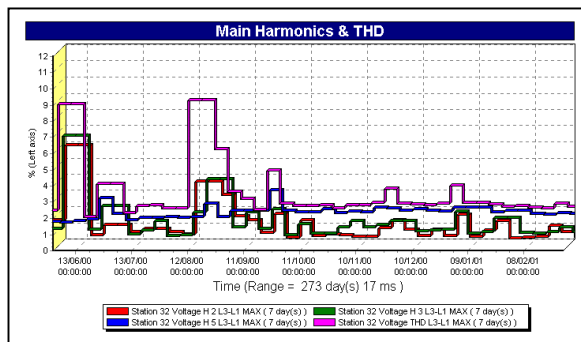
### Hardware settings

Only the communication parameters need to be defined on site. Both protocols MODBUS RTU and ASCII can be used to connect the QWave directly via its embedded modem or a to a GSM with baud rates up to 56700 baud.

### Software settings

Before starting measurements as a data logger, the QWave is configured remotely via a computer.

The only configuration parameters are the nominal voltage and the time interval for data recording. QWave Light is a real Plug and Play PQ monitor.



THD and main harmonics during 6 months.

## General Specification

### Power supply

The instrument is supplied from a wide range power supply and can be operated with the following voltages:

AC-input: 85-265 VAC 45 Hz to 65 Hz, and DC-input: 110-300 VDC, power consumption 20VA

### Analogue inputs

- 3 Voltages, connection type: Star or Delta
- Signals filtered through high attenuation low pass filters with a typical bandwidth of 2500 Hz
- 16-Bit A/D converter
- High precision 10 cycle Fast Fourier Transform (FFT) window capture thanks to Phase-Lock-Loop (PLL – see “Sampling Rate”)

The instrument is basically suited for voltage measurements at the output of voltage transformers.

Reference conditions: 23°C ± 2°C, nominal voltage 230V, no disturbances, no damp

### Voltage Input Specific Ratings

Rated Input Voltage Un: 3 x 0-230V AC, 30...2500Hz  
Overload capacity 460V AC continuous (2 x Un), 3 x Un 1s

Rated input impedance 4.7 MΩ (+/- 10%)  
Max. Input voltage to earth: 300 V CAT III

### Power Connectors

Connectors feature high security fixing of the connecting cables and screw fixing of the connector to the device to avoid accidental opening of the measurement circuit.

### Sampling rate

The sampling rate is synchronised to the actual network frequency by a Phase-Lock-Loop system (PLL). The sampling rate @50Hz is 10240 Hz. Synchronisation is possible in the range from 45-55 Hz (opt. 55-65 Hz) with an accuracy of 3 mHz at 50 Hz.

### Measuring cycles

As per EN 61000-4-7: Frequency 200msec  
RMS volt.: 200msec  
Harmonics 200 ms

As per EN 61000-4-15: Flicker 10 mn

### Calibration

LEM recommends re-calibrating the **QWave Light** every 3 years. Re-calibration can be done on site, provided that properly tooled service is available locally.

### Data storage support

The measuring features an internal 4Mb memory, allowing to store data during minimum 2 months.

### Communication Ports & Interfaces

The instrument has 2 communication ports RS232 on COM1 and either modem or RS485 on COM2. The communication protocol used is MODBUS either in ASCII or in RTU mode. Simultaneous on-line and off-line operation is possible. The instrument is accessed with an MS-Windows compatible computer (Windows 98, NT, 2000, XP) and the network software included in these operating systems.

### Accuracy & applicable metrology standards

The rms measurement error for voltage channels is well within Class 0.5. Harmonic measurements are within Class B accuracy as per standard IEC 61000-4-7. Total error for rms values < 0.5 % of the measured value Bandwidth f < 2500 Hz, full scale, ambient temperature 25°C. Flicker measurements meet requirements of IEC

1000-4-15. The instrument meets requirements of the EN50160, as well as the UNIPED, 230.02 Normcomp - "Measurement guide for voltage characteristics" category 1 (instruments for permanent installation).

#### Safety standards

The QWave conforms to CE Marking requirements and complies with IEC 61010-1/2001 "Safety regulations for electric measuring, control, automatic control and laboratory instruments".

#### Internal Protection

Protection grade IP20 as per EN 60529  
corresponds to Safety class I – protective earth, 300V CAT III

#### Environmental Conditions

0-50°C operating – 0-80% humidity non condensing

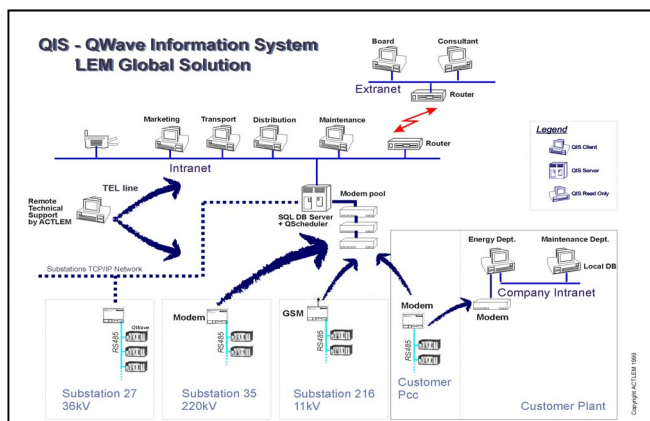
#### Dimensions and weight

H x L x D: 160 mm x 230 mm x 100 mm

Weight: ~1.6 kg

### QIS Power Quality Monitoring Software

QIS or QWave Information System, has been developed to automatically manage a large number of QWaves from a central database. For more details, please refer to the QIS Product Description folder.





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