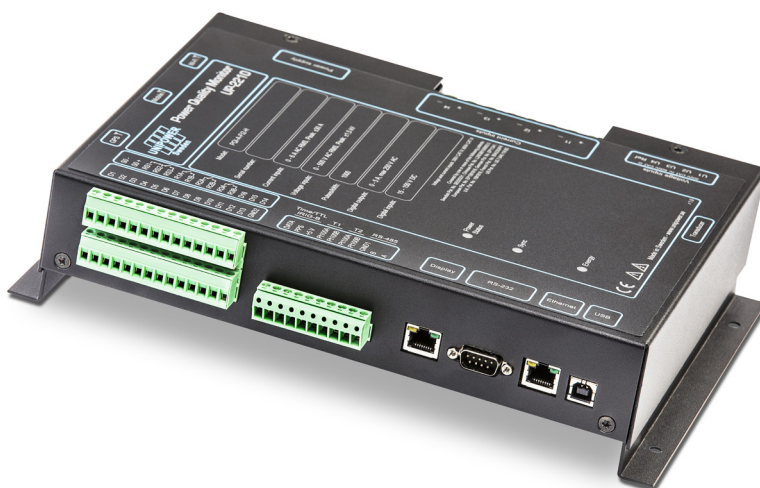




Advanced Power Quality and Disturbance Monitor

UP-2210

UNIPOWER offers a wide range of products for Power Quality Measurements and Smart Grid Solutions. Our product line covers a full range from traditional portable PQ analysers to fully integrated, automated Power Quality Management Systems. All UNIPOWER products are developed and manufactured in Sweden.

www.unipower.se



Permanent recorder UP-2210.

Advanced 3-phase Power Quality and Disturbance Analyser

The UP-2210 Power Quality Monitor is an IED (Intelligent Electronic Device) designed for permanent installation in 50/60 Hz power distribution and transmission systems. It can be installed in any configuration: wye, delta or variants.

All UP-2210 meters measure PQ according to IEC 61000-4-30 class A. The UP-2210 is also an electricity meter complying to IEC 62053-22.

The meter has 4 voltages and 4 current inputs that can be connected directly or via PT or CT circuits.

Transients are measured via separate high-speed transient capture channels.

The heart of the UP-2210 is a 32-bit digital signal processing (DSP) processor enabling all channels to be simultaneously monitored.

A Versatile system

- Power Quality Monitoring
- IEC 61000-4-30 Class A
- Standard sampling rate: 5 000 s/c
- High speed transient capture: 31 000 s/c
- Disturbance tracking
- Temperature Monitoring
- Smart Grid / IED
- Advanced real-time capabilities
- Demand monitoring
- Statistics and trends
- Automatic reports
- IEC 61850
- Preventive alarms and warnings
- 30+ years of experience

UP-2210 Features

High performance

The UP-2210 complies with IEC 61000-4-30 class A for Power Quality Measurements.

All channels are sampled simultaneously at 5000 samples/cycle, which provides accurate and reliable data. The sampling is synchronised using a PLL (phase-locked loop) and each sample is time tagged making advanced applications possible like PMU (Phasor Measurement Unit).

The meters can also be equipped with Harmonic Bandwidth Extension (HBE) to compensate for transformer losses for accurate measurements.

Watchdog

The UP-2210 performs an extensive self-test when starting and regularly when in operation. A watchdog continuously monitors operation so that nothing goes wrong. There is a running status digital output that can be connected to other systems (like SCADA) as a health check signal.

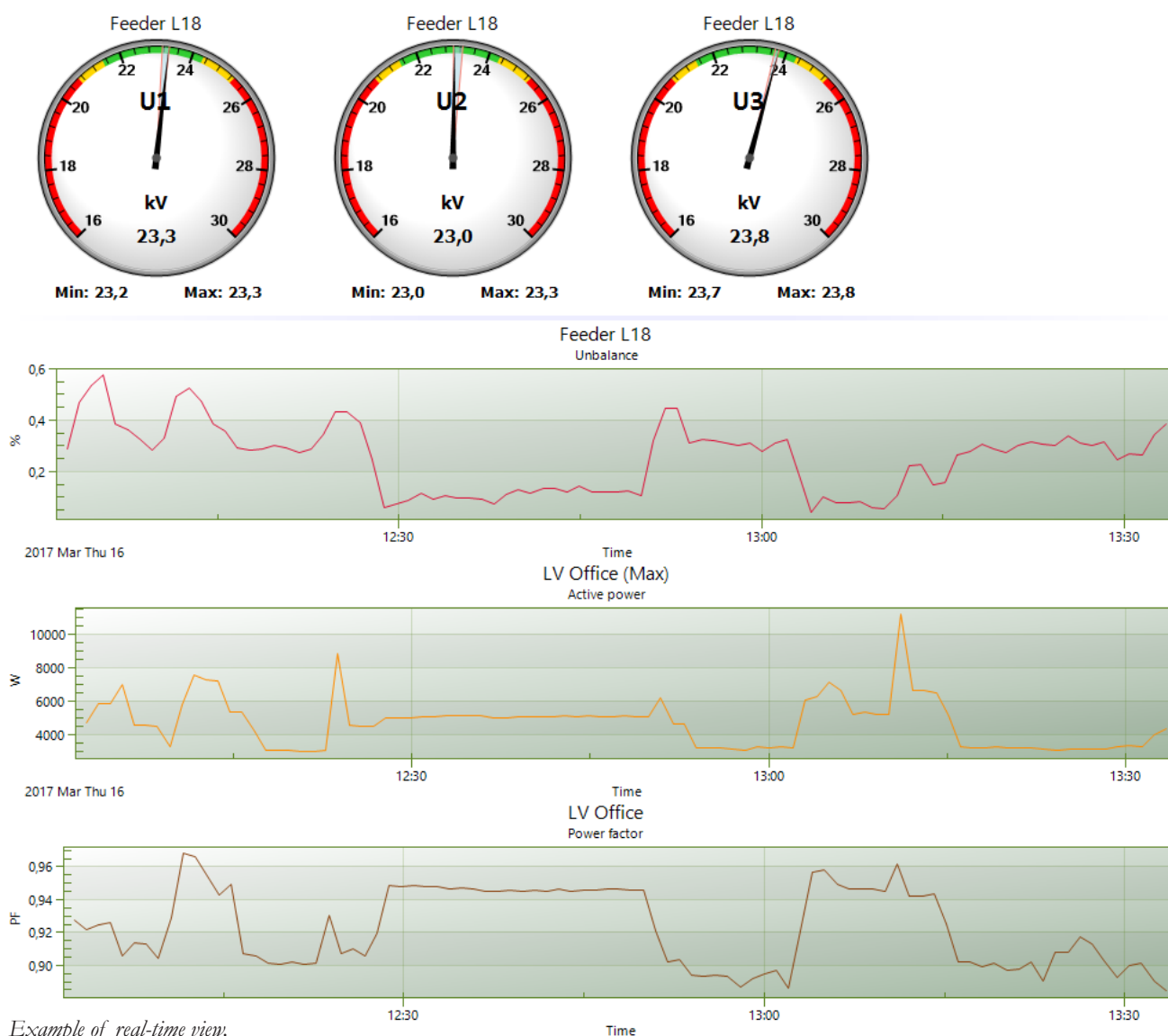
Transient recording

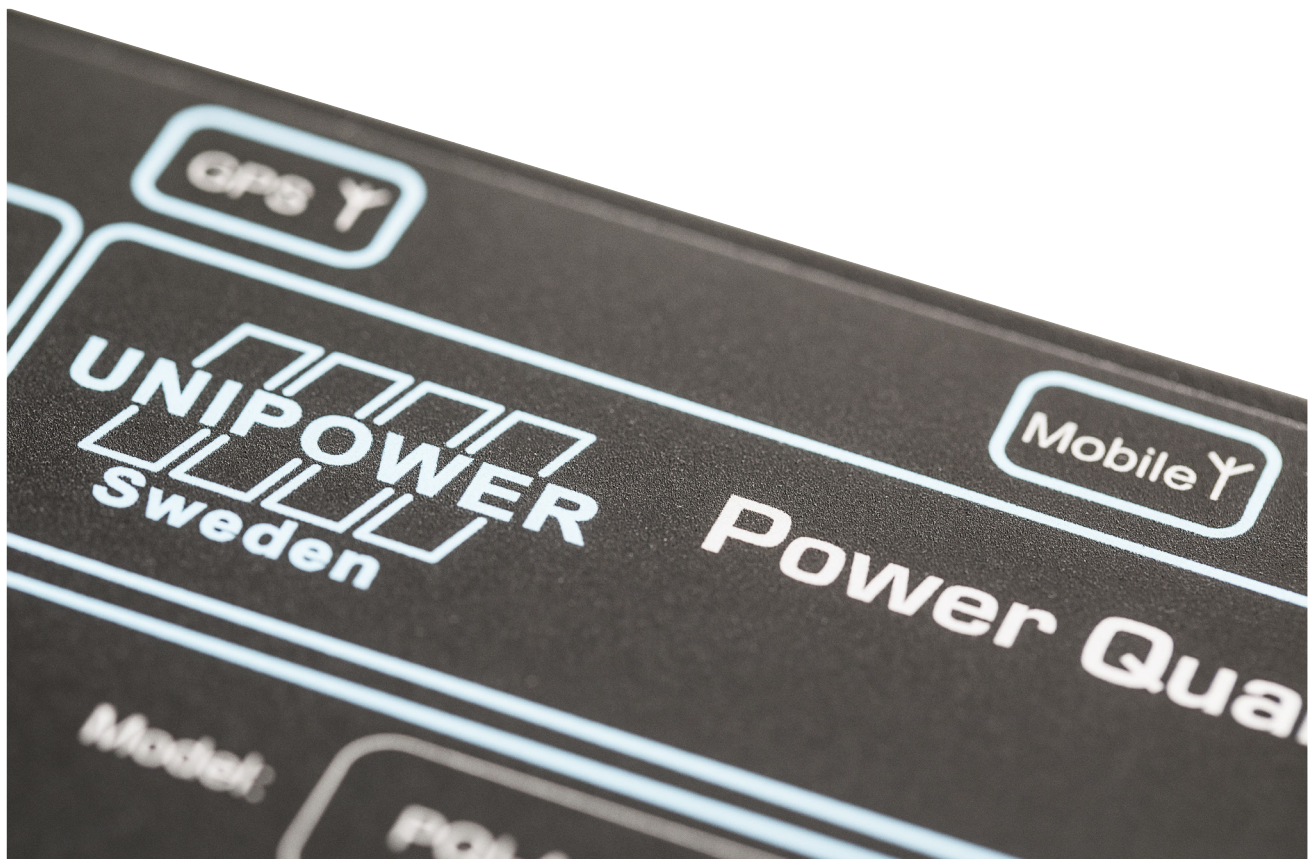
During a high-speed transient the voltage and current waveforms are captured on all channels simultaneously by a separate mechanism at 31.000 samples per cycle. The waveforms of all channels are stored with a user settable pre- and post-trig times to ensure no valuable data of the event is lost.

Real-time

Real-time functions show waveforms, oscilloscope, trend information, vector diagrams and more simultaneously without interrupting the ongoing measurements.

Unique automatic historical trend graph that shows all important values 24 hours back in time in real-time mode. This can also be shown in the optional substation display unit. Other functions include online monitoring of voltage, current, frequency, power, instantaneous flicker, harmonics up to 100th and inter-harmonics. It is also possible for the user to customize a personal view with gauges, trend graphs and counters.





High level of automation

The fundament in PQ Secure is automation. All tasks are fully automated and you will not have to search for the information – the information comes to you. An important interface is the email system, PQ reports and alarms are automatically compiled and sent to selected receivers using emails.

Data download from the meters is done completely automatically with administration functions to maintain and monitor the process.

Data exchange (open format)

The PQ Secure system has several ways of importing data automatically from other systems. Protocols supported includes PQDIF, COMTRADE, text, Excel and more.

It is also possible to export data from PQ Secure using similar protocols. The open MS SQL architecture allows for easy third party connection to the database for a variety of applications.

PQ Control module (instant control)

With PQ Control your Power Quality Management System becomes a natural part in your Smart Grid. It can take actions based on alarms and trig levels you set on different Power Quality parameters. For example, you can switch on or off a filter bank based on THD or individual harmonics values. PQ Control use digital outputs of the meter to operate external breakers or to send signals to other control systems (SCADA).

You can use a variety of parameters like harmonics, flicker, unbalance or voltage levels etc. It is also possible to use statistical triggers like 95%.

Smart Grid and integration

The UP-2210 family of meters are IEDs designed for modern Smart Grid Solutions. A number of protocols are supported including Modbus and IEC 61850. The PQ Secure system is based on standard, open solutions like Microsoft SQL Server, which allow easy integration to other systems like SCADA systems.

Voltage dips(sags) and swells

UP-2210 capture voltage and current on all channels simultaneously in accordance with IEC 61000-4-30 Class A in the event of a voltage dip/swell.

The instrument also automatically registers the disturbance direction. The recording is captured from seconds to minutes with user settable pre- and post-trig time.



Applications

Earth fault recording

The UP-2210 family of instruments are all capable of identifying earth fault both before and as they are appearing. The earth fault module reacts to deviations in voltage or current unbalance. An event is created, and a waveform capture is made. With this module earth faults can be traced, and costly problems prevented before they occur.

Fault recorder

The UP-2210 can also be equipped with a fault recorder module, which activates the unit's digital inputs for supervision of the status of circuit breakers, relays and other external equipment. Whenever there is a disturbance in the electrical grid the unit records voltage and current deviations, together with information about the connected external equipment.

Digital outputs

The digital outputs can be used to synchronise other meters (or UP-2210) to record at an event. A typical application is interface to SCADA or other control systems.

Analogue inputs

The basic model of UP-2210 has 4 voltage plus 4 voltage transient inputs. The bandwidth of each input is adapted to the appropriate application. When measuring harmonics a lower bandwidth is needed than when capturing transients. This is performed automatically in the instrument.

The UP-2210 also has 4 current input channels. In low voltage networks the fourth current channel can be used to measure the neutral current.

Energy metering

The UP-2210 is also suitable for energy metering applications and complies with energy accuracy class 0.2S. Additionally an S0-interface/ pulse output is available.

Slowscan module

Unipower's unique slow scan feature allows capturing of Power Quality events with a recording time of up to several minutes and a rms rate of 10-100 times/second. This feature excels at capturing slow events in the grid.

Statistical PQ analysis

Unipower uses an advanced data compression algorithm which not only assures a reliable collection of data from each PQ meter but also keeps the data growth of SQL data base to a minimum. The result is a superior response time when performing statistical or trend evaluation from multiple meters with many years of recording.

Proven service life

A permanent installed meter is designed for a service life of minimum 15 years in continuous operation.



Substation display connected to UP-2210R.

Substation display

The Unipower substation display is the most high-resolution scalable display on the market. One display easily connects all substation meters to one single display for on-site real-time evaluation.

PQ troubleshooting

Efficient troubleshooting is supported by automatic identification of downstream / upstream source of disturbance from the measurement site. The possibility to import other nearby measurement sites, as well as temporarily portable measurements, into the same analysis window enables presentation of the disturbance propagation and supports source identification.

Time sync

All meters are automatically time synchronised upon data download. If higher accuracy on time stamps are required it's possible to time sync over NTP, GPS or Irig-B. Clock sync can also be achieved with the meter's NMEA support.

Temperature recording

All meters can be equipped with interface for temperature logging, Pt100. With this interface you can continuously log i.e. transformer temperature and correlate with PQ parameters and load situation.

Evaluate with PQ Secure

Innovative solutions

The UP-2210 natively integrates with Unipower PQ Secure (Power Quality Management System) which includes many smart features and an easy top-down perspective of your grid. It's easy to evaluate multiple sites simultaneously, creating more powerful evaluations.

System integration with PQ Secure

The PQ Secure system is designed with system automation in focus. The system automatically downloads measurement data from the meters, stores it in an open database solution and performs automatic reports, alarms and warnings.

The system is equipped with many smart and easy to use features for Power Quality evaluations, automatic reports and alarms in case of Power Quality events. These normative reports are valid evidence in case of claims or disputes.

System profile view

The profile view is a very powerful tool to monitor multiple meters efficiently and simultaneously. All disturbance information, including limits, is displayed in one window for the selected period and meters.

Parameters close to or exceeding the limits are colour coded for quick identification, profile view allow access directly to analyse window for deeper investigation.

Evaluate and confirm disturbances

Keeping track of disturbances in the grid is high priority for both distribution/transmission and industries. PQ Secure gives you all the tools you need to sort and log events in the electrical network

Data compression

Unipower meters and database solution is the most storage efficient solution available on the market. With Unipower solution you will never have to delete measurement data which means you easily have access to over 10 years of trend data and disturbances within seconds.

Compliance Summary

Summary based on 4 sites Start date: / End date:

Number (%) sites fail V unb	Number (%) sites fail V rhd	Number (%) sites fail V mag comp	Number (%) sites fail V mag limit
0 (0,00)	0 (0,00)	0 (0,00)	0 (0,00)

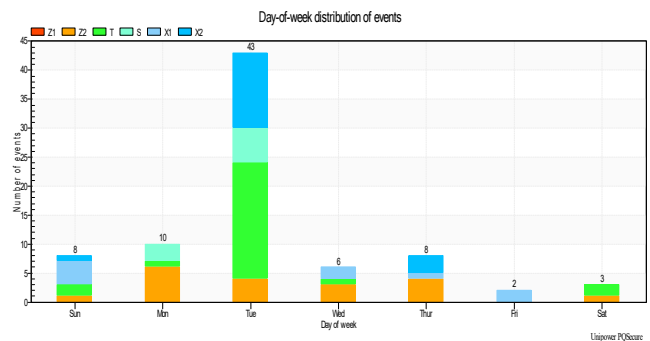
Data Availability

Number of sites expected	Number of sites supplying data	Overall data (%) available (excluding sites not producing data)	Number of (%) sites with < 98% data	Number of (%) sites with < 95% data
4	4	100	0 (0)	0 (0)

Sites not producing data

Site name	Available data (%)	Number of days behind
-	-	-

Day-of-week distribution of events



Power Quality Management report.

PQ Secure Web

Log in

Use your email to login.

Email: admin@unipower.se

Password:

☐ Remember me

Log in

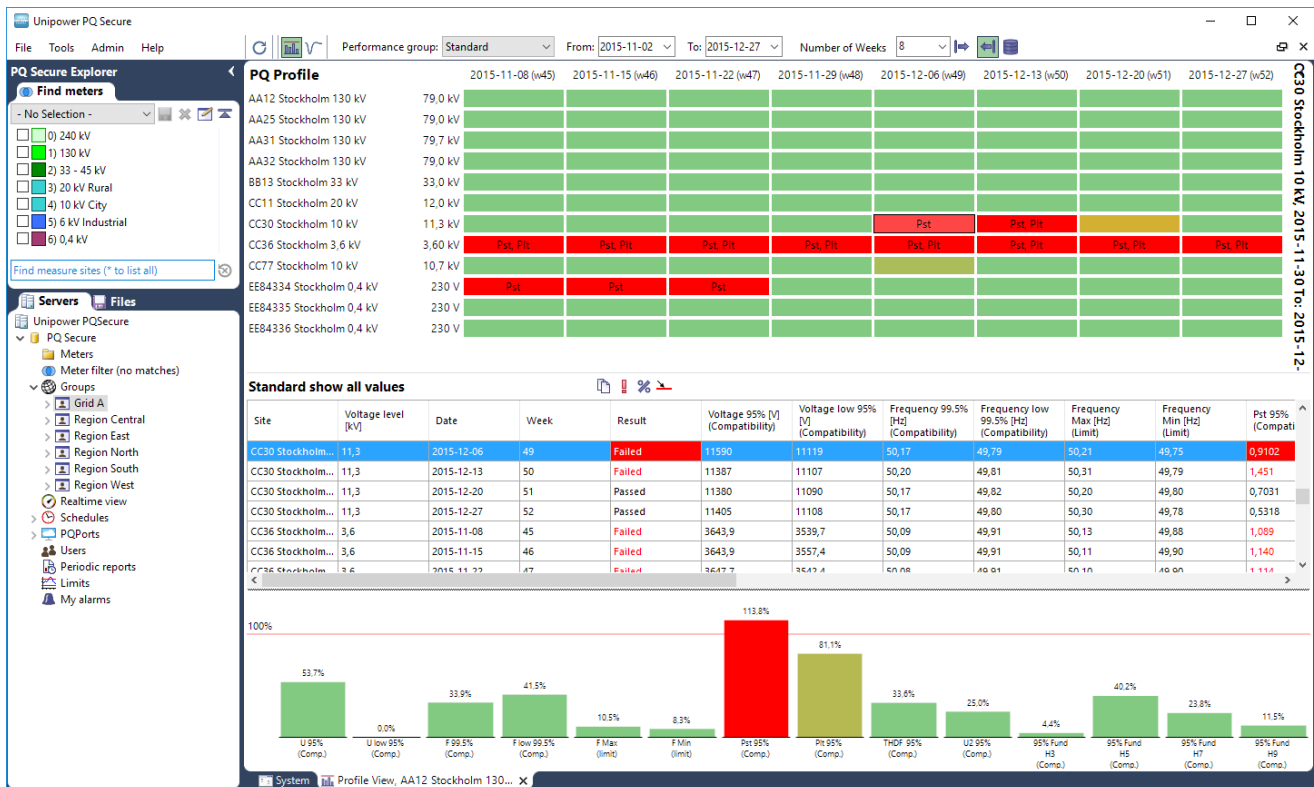
Measured parameters

Over 3 000 parameters stored.
Some examples:

- Voltage, current power, frequency (instantaneous, average, min, max)
- Individual harmonics, inter-harmonics, sub-harmonics, signalling, THD, TDD, odd, even, TID (average, 3-sec max, amplitude, phase)

- Unbalance (positive, negative, zero, amplitude, phase)
- Power and energy (active, reactive, apparent), power factor, DPF
- Flicker (instantaneous, PST, PLT)
- Events (sags, swells, earth faults, interruptions, unbalance Usum/Isum,)

- Waveform capture for events
- High speed transient capture
- Slowscan capture (10 or 100 readings per second)
- Statistical values (min, max, 99%, 95%, 5% and 1%)



System profile and management view.

UP-2210

Versions

All versions of the UP-2210 meters comes equipped with automatic download capabilities and can be included in alarms and reports. All models may also be connected to a substation GPS for highly accurate time stamping of voltage events, like dips and swells. Designed in robust aluminum frame.

Model III, Class A

Our most advanced wall mounted model with all features available, designed for mounting on cabinet doors. Equipped with transient capture, slow scan recording feature, Unipower PQ Control feature and running status outputs. On the front are LEDs indicating operation status.

Model R, Class A

Our most advanced rack mounted model with all features available (like model III) and designed for installation in a 19" rack. The meter has a colour touch screen on the front for displaying real time data and other information.

Model P, Class A

Same functions and connectors as UP-2210R but intended for

panel mounting. The P model allows for class IP51 installations.

Model II, Class A

Norm EN50160 reference instrument in wall mount edition. Equipped with modules to measure all parameters in accordance with the EN 50160 standard (like harmonics, flicker, unbalance, signalling voltage, sags/swells (RMS) etc). Additionally measuring inter-harmonics, power harmonics. High compression data storage allowing 100 days of EN 50160 operation.

Model I, Class S

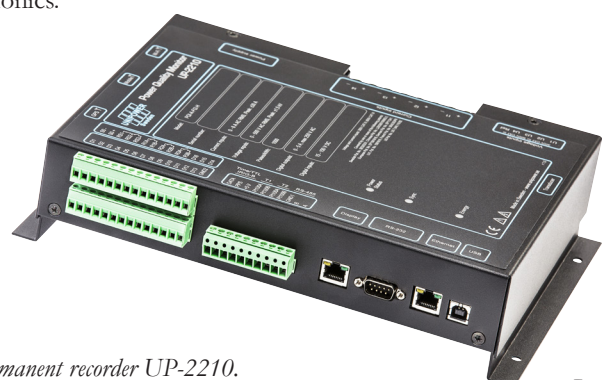
This meter class is primarily used for statistical applications such as surveys or Power Quality assessment, possibly with a limited subset of parameters. The model measures voltage, current, power and energy.

Model U, Class A

Designed mainly for contractual verifications of grid codes, which normally are based on voltage parameters. The meter handles voltage parameters such as flicker, unbalance and harmonics.



Permanent recorder UP-2210R/P with colour touch screen.

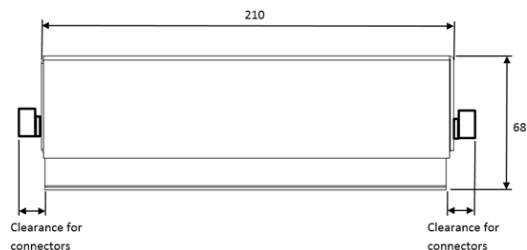


Permanent recorder UP-2210.

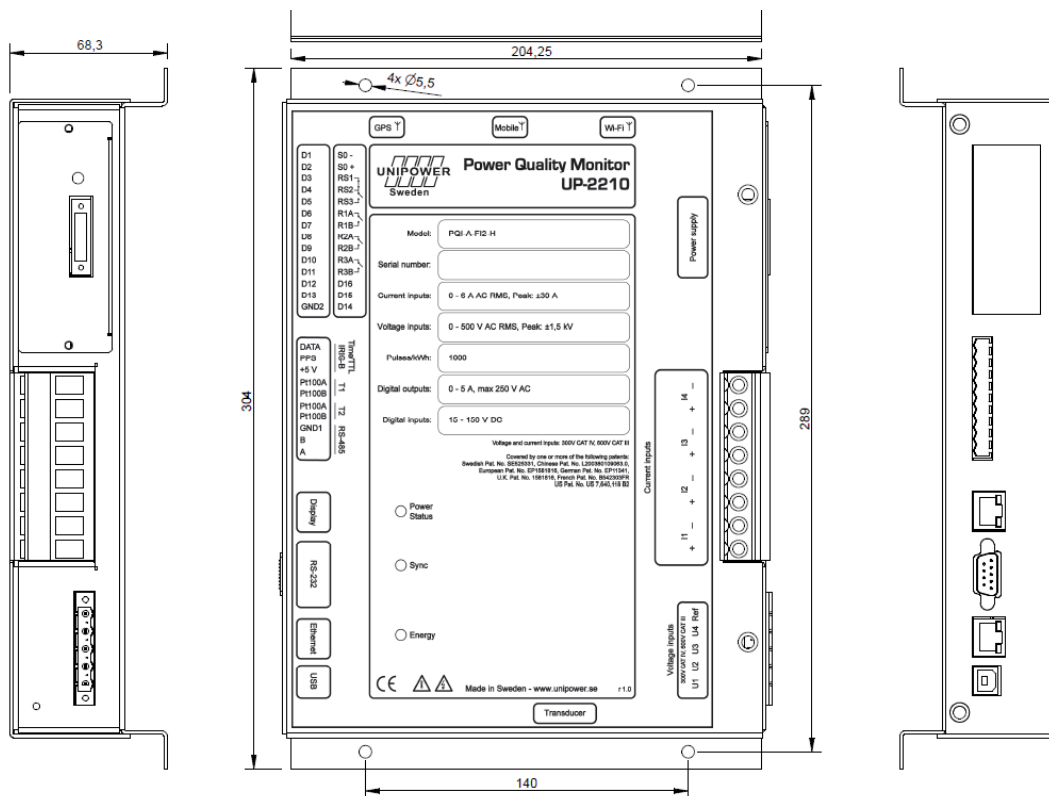
Dimension Data

The UP-2210 is a compact and rugged unit in a metal casing intended to be mounted permanently at site.

The small size makes it ideal for mounting in any substation cabinets. A Minimum 30 mm clearance on each side is required to securely link all connectors.



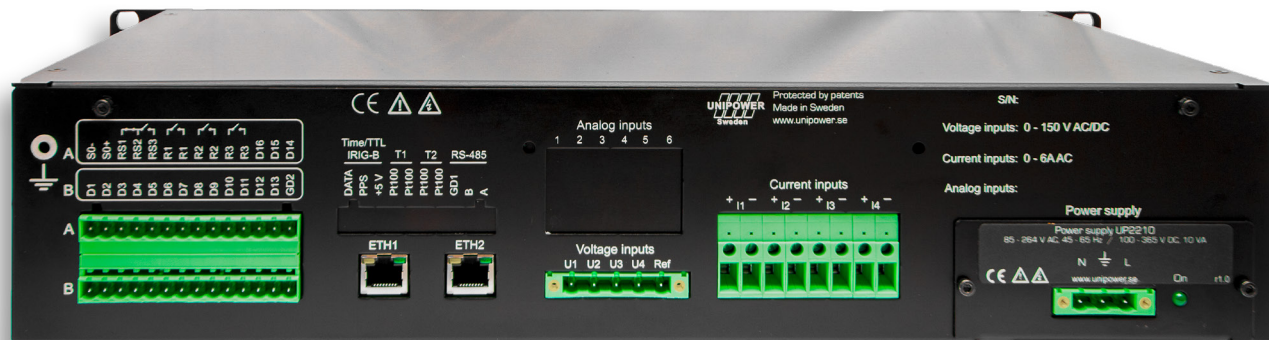
UP-2210, side view.



Dimension diagram UP-2210.

Rack and Panel Mounting

The UP-2210R is a compact, 2 modules, 19" rack version of the UP-2210. The UP-2210P is a variant of UP-2210R adapted for panel mounting allowing for a class IP51 installation.



Back panel of UP-2210R/P.

Technical Specification

Voltage channels

Voltage channels	4 isolated inputs + reference.
Channel input level	UP-2210: 500 V RMS, UP-2210R/P: 150 V RMS Optional ranges up to 1000V available. 300 V CAT IV, 600 V CAT III.
Resolution	24 bits.
Basic sampling rate	5 000 samples/cycle @50Hz.
Input impedance	4 Mohm.
Bandwidth	40 kHz (analogue anti-aliasing filters).
Accuracy	0,1%.

For maximum accuracy, automatic synchronisation to the power frequency is ensured by a phase-locked loop (PLL).

High speed voltage channels

Range	± 2,8 kV peak level.
Transient detection	Fast transients up to 31 000 p/c @50Hz.
Bandwidth	3,1 MHz.
Filters	Analogue anti-aliasing filters.

Current inputs

Current channels	4 isolated inputs.
Channel input level	0-6 A RMS (other ranges available).
Resolution	24 bits.
Basic sampling rate	5 000 samples/cycle @50Hz.
Input impedance	<2 mohm.
Bandwidth	40 kHz (analogue anti-aliasing filters).
Accuracy	0,1%.
Transducers	Available.

Digital inputs/outputs

16 opto-isolated digital inputs (0-250 VDC). 4 solid state relays, including Running Status relay (0-250 VAC, 10/5A resistive/inductive) and SO interface. PQ Control module.

Time synchronisation

IRIG-B, NMEA, PPS supported. NTP, SNTP, server protocol or external GPS module available.

Selected calculated parameters

Power quantities	All 3-phase configurations. Active power [kW], Reactive power [kVar], Apparent power [kVA], Power Factor and cos phi displacement factor, Active Energy [kWh], Reactive energy [kVarh], Apparent energy [kVAh] Energy accuracy class 0.2S (IEC 62053-22).
Frequency	50 or 60 Hz according to IEC 61000-4-30 Class A.
Harmonics	100 individual harmonics of voltage and current in accordance with IEC 61000-4-30 Class A (IEC 61000-4-7 Class I). THD factors (THD-R, THD-F, TDD, THD-I etc), K-factor, 3sec max.
Power harmonics	PFFT. Harmonic power with direction.
Interharmonics	In accordance with IEC 61000-4-30 Class A.
Flicker	IFL, Pst, Plt calculated in accordance with Class F1; IEC 61000-4-30 Class A.
Voltage/Current unbalance	IEC 61000-4-30 Class A. Amplitude and phase angle information.

Signalling voltage	In accordance with EN 50160 and IEC 61000-4-30 Class A.
RVC	Rapid voltage changes in accordance with IEC 61000-4-30 Class A.
Current leakage/ Voltage sum	Isum and Usum parameters for earth fault detection..
Event recording	Slowscan (up to 5 min), sags/swells, interruptions, transients.
Triggers	Waveform compare, rms level, peak level, rate of change etc.

Memory capacity

32 MB – 8 GB built-in flash memory for measure data. All units have a unique data compression mechanism. A unit with standard memory will be able to measure for at least 100 days with normal configuration.
2 GB of memory equals 17 years of internal meter storage.

Communication

Built-in RS-232 (UP-2210 only) and USB. Optional fast ethernet and RS-485. UP-2210R/P has 2 independent fast ethernet ports.
Support for external modems, radio devices, GSM/GPRS-modems.
The meter can interface with other systems using Modbus, PQDif (IEEE 1159.3), IEC 61850 or SmartCom.

Display

UP-2210 has an optional, external display for panel mounting.
UP-2210R/P has a built-in, 3,5" colour touch screen.
All models support Unipower substation display solution and RDF.

Analogue inputs

6 optional analogue inputs for voltage, current or Sense (UP-2210R/P).

Standards compliance

Voltage Quality	EN 50160, IEC 61000-2-2, IEC 61000-2-12, EIFS, NRS 048 and local grid codes.
Power Quality	IEC 61000-4-30 Class A, IEC 62586-2, IEC 61000-4-7 Class I, IEC 61000-4-15.
Energy	IEC 62053-22 class 0.2S, IEC 62053-23
Instrument type	IEC 62586-1: PQI-A-F11-H.

General data

Size W x H x D	UP-2210: 215x310x70 mm. UP-2210R: 430x88x220 mm. UP-2210P: 430x128x220 mm.
Operational temperature	-10 °C to +55 °C (extended range optional)
Humidity	10% - 98% non-condensing.
Weight	UP-2210: 1.4 kg. UP-2210R/P: 2,2 kg.
Climate, Environment	IEC 62586-1.
Safety	IEC 62586-1, IEC 61 010-1.
EMC	EC 62586-1, IEC 61000-6-5, IEC 61000-6-4 and IEC 61000-6-2.

CE-marked according to EC/EEA directives.

Calibration and self-test

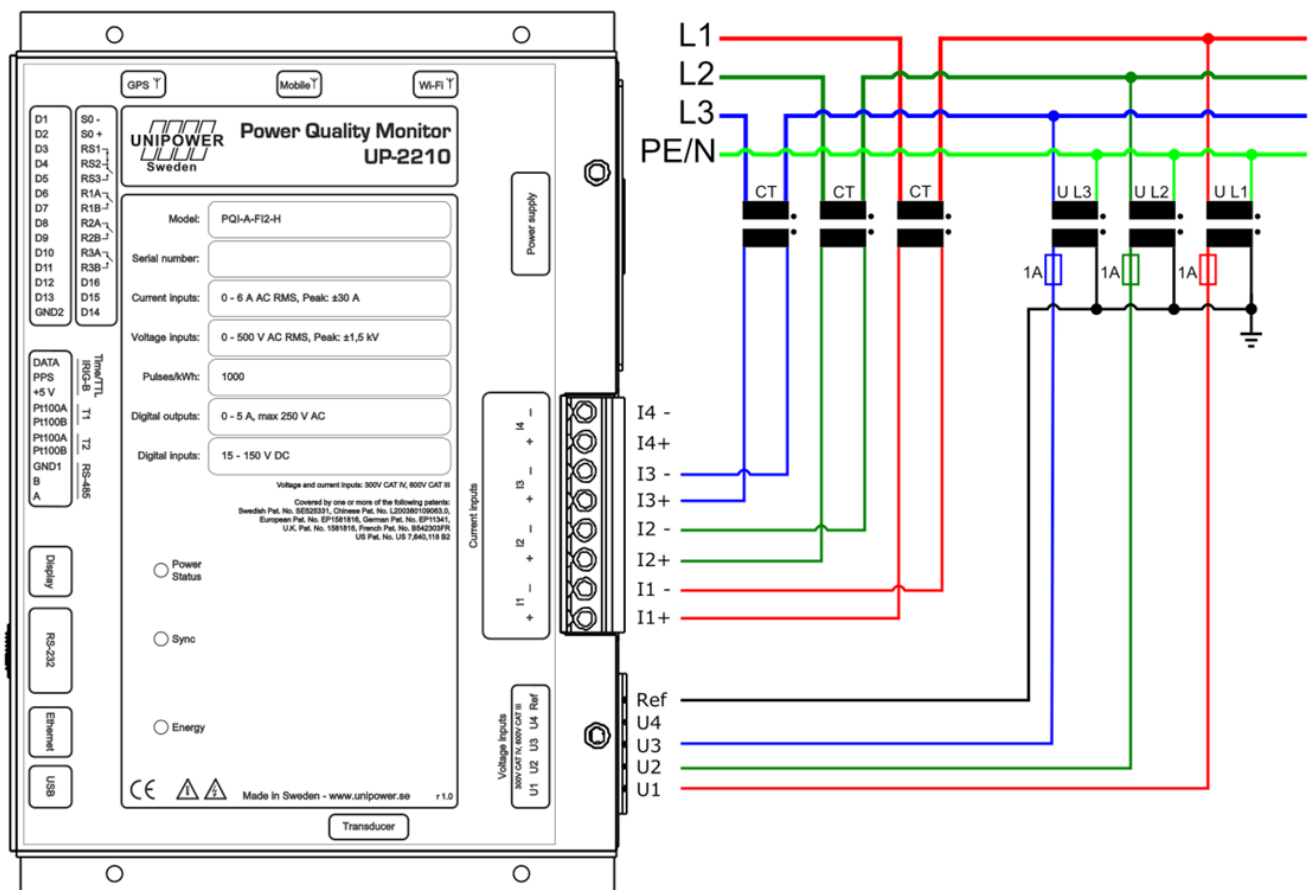
The calibration of UP-2210 is software-based. To assure maximum reliability the UP-2210 always performs an automatic self-test (AST) before measuring.

Power supply

Standard: 85-264 V AC or 95-365 V DC. 150 V CAT IV 300V CAT III. (5W)
Optional 18-75 V DC supply. Optional battery UPS (1,5 hour) available.
Power supply is user replaceable on site.



UP-2210 connected to 3CT and 3PT.



UP-2210 connection diagram, 3CT+3PT.

Product comparison guide - UP-2210

	UP-2210-U	UP2210-I	UP2210-III	UP2210-R/P
Voltage input, 4 pcs	●	●	●	●
IEC 61000-4-30 compliance	Class A	Class S	Class A	Class A
Current inputs, 4 pcs		●	●	●
Anti-aliasing filters	●	●	●	●
V, A, Hz, W, VAR VA, kVA, kVARh, kVAh, PF, Cos		●	●	●
Harmonics, unbalance and flicker	●	●	●	●
3-sec Max harmonics	●		●	●
Sag/Swells	WF+RMS	RMS	WF+RMS	WF+RMS
Fast transients, 31 000 s/c			○	○
Disturbance direction detection		○	●	●
Power harmonics/direction			●	●
Signalling	●	●	●	●
Harmonic phase angles	○		○	○
Individual interharmonics	○		○	○
U-sum, I-sum	U-Sum		●	●
Rapid Voltage Changes, RVC	●	●	●	●
Df/dt			●	●
Slowscan			○	○
Current trigger			●	●
Unbalance, advanced			●	●
PQ Control (DI/DO)		○	○	○
Fault recorder			○	○
GPS/IRIG-B	○	○	○	○
Running status		○	○	○
RS-232 communication	●	●	●	
RS-485 communication	○	○	○	○
USB communication	●	●	●	●
Ethernet communication	○	○	○	○
Dual, independent ethernet				○
Real-time analysis	●	●	●	●
Call-back	○	○	○	○
User replaceable power supply	●	●	●	●
Modbus	●	●	●	●
PQ calculations L-L or L-N selectable	●	●	●	●
Harmonic bandwidth extension	○		○	○
Temperature interface, Pt100	○	○	○	○
SD interface	○	○	○	○
PGDif compliant	○	○	○	○
IEC 61850	○	○	○	○
UPS	○	○	○	○
Colour touch screen				●

● = Standard ○ = Optional

