UPM6100

Portable power meter

- 4 MB removable memory card for data logging
- Large grapahic LCD display with excellent visibility
- Graphic representation of voltage and current waveforms, harmonic spectrum and phasor diagrams
- FFT harmonic analysis up to 50th order
- Sags and swells detection
- Power and current demand calculation
- Compact and rugged case carrying accessories
- Included DEDALO software

» General description

UPM6100 is a portable analyser suitable for electrical parameters measurement on single- and three-phase systems, as well as on direct current systems.

The instrument performs the following functions:
- wattmeter / energy meter
- harmonics analyser
- historical data logger
- network anomalies recorder
- calculation of Power Factor compensation

Via communication port it is possible to read and log on a PC all the readings and download the stored data.
A simple menu structure makes the instrument easy to use and it allows a quick check of the instrument set-up and memory status.
Five languages can be selected easily: English, German, Italian, French and Spanish. The LED backlighted display is highly efficient therefore it guarantees perfect visibility in all light conditions. The instrument offers a wide range of graphic functions: waveform, phasor diagram, harmonic content and profiles of the daily energy consumption with min / max values. This instrument is the portable solution suitable for utilities, industry and domestic customers.

» Benefits

- The instrument is suitable for low, medium and high voltage measurement. It can be connected directly up to 600 V_{AC} L-L or through PTs for higher voltage.
- The measurement current inputs flexibility allows the instrument to connect any type of current tranducers, including flexible Rogowski coils.
- The instrument offers complete and accurate information about circuit loading; it calculates neutral current and performs load trending. All this data is essential for network overloads detection and circuit optimization.
- Once the target Power Factor value is set, the instrument calculates the capacitor bank value necessary for compensation on real time.
- The instrument includes 4 MB nonvolatile memory for metered parameters, min/max values, energy consumption and harmonics. The recorded data allows to generate on a PC consumption profiles, logged values trends, cost allocation and reports as well as to identify critic values.

» Applications

- Individual machine load profiling
- Power demand analysis and management
- Harmonics, sags and swells monitoring
- Capacitor bank sizing
- Power distribution circuits monitoring
- Energy audits

» Related Products

- Rogowski Coils - 60cm lenght 3000A
- C1K 1000A/1V
- C20/2H 20-200A/2V
- Advanced Dedalo Software

» Main features

Measurements

- Three-phase 3-wire or 4-wire unbalanced load operation, single-phase and direct current.
- Direct measurement up to 600 (750) V_{AC}
- The instrument can accept different signals from any type of measuring transducer, including flexible Rogowski transducers. The required current channel type is easily selectable by the instrument menu. This flexibility allows to connect the following current transducers:
  - voltage output clamps (1, 2, 3 V_{AC-DC} full scale)
  - current output clamps (1, 5 A_{AC} full scale)
  - Rogowski flexible clamps (40 or 100 mV/kA)
  - direct insertion up to 600 VAC (1, 5, 20 A_{AC} full scale)
  - current tranducer signals (1, 2, 3, 10 V_{AC-DC} full scale)
- A fourth current input is also provided specifically for the measurement of earth leakage current.
- True rms metering provides accurate measurement even by distorted waveform.
- Fully bi-directional, four-quadrant readings. 10 energy counters are available, the apparent power/energy is splitted in four counters: import lagging, import leading, export lagging, export leading.
- Volts, Amps, Power, PF, Frequency, Energy, Min/Max values, Demand, Harmonics, etc. The full version instrument provides more than 600 measured/calculated parameters and shows on the LCD more than 30 graphical pages

Power quality

- Individual & total harmonic distortion for voltage and current up to the 50th order. The harmonic content is represented like even, odd and total.
- CPU2 option - the co-processor board perfoms the simultaneous high-resolution sampling of voltage and current, allowing the
- cycle-by-cycle power analysis for 50/60 Hz lines. The CPU2 board supports different application like: VDROP, VMAX, WCAP... (see below). The instrument with CPU2 board performs at the same time the wattmeter functions, the harmonic analysis, the basic recording function and the selected cycle-by-cycle power analysis function.
- VDROP option - sags & swells detection on L-N voltages with half cycle resolution (10ms @ 50Hz). Pre- and post-trigger logging (100 +100 half cycles RMS values). The detected events are recorded and a relay output can be activated when a voltage anomaly occurs. The data is viewed on the PC according EN50160 standard.
- VMAX option - two functions are selectable: VDROP (previous paragraph) and Min/Avg/Max values calculation and recording with one cycle resolution (20ms @ 50Hz).
- This function allows to record up to 10 parameters selected among voltage, current, power, PF and frequency. The data is viewed on the PC according to EN50160 standard.
- WCAP option - advanced waveform capture function on currents and L-N voltages. The instrument can store up to 10 + 200 waveforms before and after a threshold overcome, with a resolution from 8 to 32 samples (depending on the number of waveforms). The WCAP option includes a second selectable function: Min/Avg/Max values calculation and recording (see previous paragraph).

Recordings

- 4 MB removable flash card memory for data storage.
- Up to 10 programmable recordings with different start and stop time. Different type of recordings can be chosen:
  - import/export active, reactive and apparent power demand with programmable average time. The average period can be syncronized by a digital input.
  - instantaneous read values selected between the main parameters. The recording interval time is programmable between 1 and 9999 seconds.
  - instantaneous min/max values measured during the recording interval time. The recording interval time is programmable between 1 and 9999 minutes.
  - voltage and current harmonic values measured during the recording interval time. The recording interval time is programmable from 1 to 60 minutes.
- Time-of-Use (TOU) programmable data recording. The TOU function stores the energy consumption in different registers according the programmed time-scheme. A group of 120 registers give the situation of the previous and current day, and of the previous and current month. This feature is designed to fit different tariff structures. It's possible to program up to 10 daily tariff schedules containing up to 3 tariffs and 8 tariff changes. Each schedule can be assigned to the days of the week and months as requested. Up to 20 holidays can be assigned to the lowest tariff. A diagnostic algorithm checks and notifies any setup overlapping.
- Event, alarm and digital outputs ON/OFF recording. The instrument records the status change of 8 programmable set points, the digital outputs ON/OFF and the instrument supply ON/OFF. All the events are integrated by date and time reference. The CPU2 option includes 1 MB non-volatile data memory. Depending on the CPU2 configuration the following information (already described in the "Power Quality" paragraph) can be recorded:
  - sags and swells events (VDROP option). The occurring dips and overvoltage over a programmable threshold are detected and the instrument records the date and time of the event, the lenght and the RMS value of 100 +100 half-cycles before and after the event.
  - min / avg / max values of the main measured parameters with continuous sampling and 1 cycle minimum resolution for RMS calculation. The resolution is programmable between 1 and 99 cycles to simulate the recorder response time as needed. The programmable average time defines the time interval between recordings.

- more than 200 waveforms when a programmable threshold is overcome (WCAP option). The instrument records up to 10 + 200 waves before and after the trigger, with the time reference. The resolution is programmable from 8 to 32 samples / cycle.

Communication

- No.1 RS232 communication serial port.
- Communication speed programmable up to 57600 bps.
- The software enables remote viewing of measured values or data download using an external PSTN / GSM modem or an Ethernet adapter.

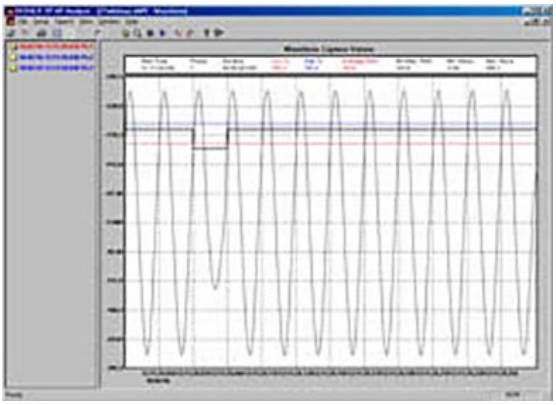
Inputs & outputs

- No.1 digital output for alarm tripping or • energy pulsing. The digital output can be programmed as alarm signal when an overvoltage or a dip occurs (VDROP).
- No.1 active analog output 0-20 or 4-20mA. The output is programmable as requested for the re-emission of one of the main measured parameters.
- Four optoisolated digital inputs for pulse counting or triggering.

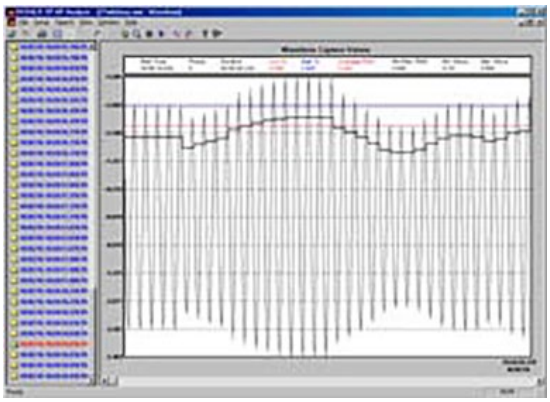
Power supply

- 85÷250 V_{AC} or 90÷250 V_{DC} without any need for operator to change the voltage selection.
- Internal battery allows more than 3 hours operation.

» WCAP - Waveform capture examples

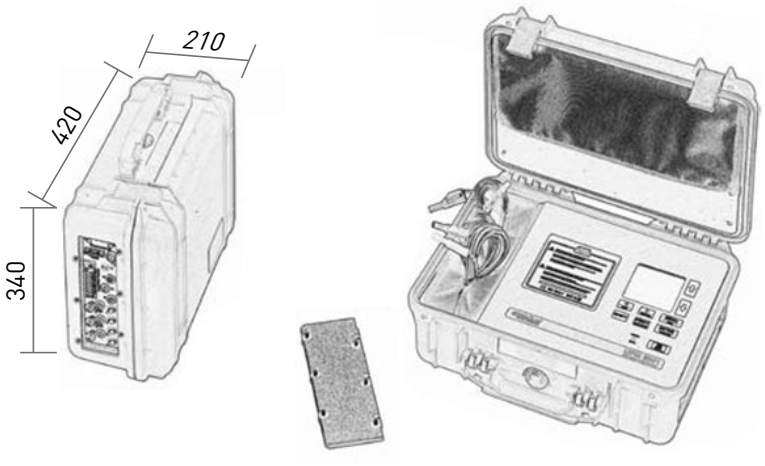


Voltage drop - The trigger is on voltage RMS value, the resolution is 1 cycle. 2+10 waves before and after the trigger are represented, the sampling is 32 samples / cycle.



Current load variation - The trigger is on current RMS value, the resolution is 1 cycle. 5+30 waves before and after the trigger are represented, the sampling is 8 samples / cycle.

» Technical drawing



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INSTANTANEOUS MEASUREMENTS		
PHASE VOLTAGE	V_{L1-N} - V_{L2-N} - V_{L3-N} [V]	●
LINE VOLTAGE	V_{L1-L2} - V_{L2-L3} - V_{L3-L1} [V]	●
SYSTEM VOLTAGE	V [V]	●
LINE CURRENT	I_{L1} - I_{L2} - I_{L3} - I_N [A]	■
SYSTEM CURRENT	I [A]	■
POWER FACTOR	PF_{L1} - PF_{L2} - PF_{L3}	●
SYSTEM POWER FACTOR	PF	●
COS Ø	DPF_{L1} - DPF_{L2} - DPF_{L3}	●
APPARENT POWER	S_{L1} - S_{L2} - S_{L3} [VA]	■
SYSTEM APPARENT POWER	S [VA]	■
ACTIVE POWER	P_{L1} - P_{L2} - P_{L3} [W]	■
SYSTEM ACTIVE POWER	P [W]	■
REACTIVE POWER	Q_{L1} - Q_{L2} - Q_{L3} [var]	■
SYSTEM REACTIVE POWER	Q [var]	■
FREQUENCY	f [Hz]	●
DEMAND PAV	P_{AV} - Q_{AV} - S_{AV} - I_{AV} - I_{L1AV} - I_{L2AV} - I_{L3AV} - I_{NAV}	●
THERMAL CURRENT	I_{L1} - I_{L2} - I_{L3} [A^2s]	□
VOLTAGE THD (Total, Even, Odd)	THD_{L1} - THD_{L2} - THD_{L3} [%]	●
CURRENT THD (Total, Even, Odd)	THD_{L1} - THD_{L2} - THD_{L3} [%]	●
FFT ANALYSIS 50th	V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3} [%, V, A]	●
FFT ANALYSIS 50th + VOLTAGE AND CURRENT THD (Total) I_N [%, V, A]		□
UNBALANCE	V,I [%]	□
PHASE REVERSAL	123 / 132	●
REAL TIME CLOCK	Date, Time	●
EARTH LEAKAGE	[A]	●
TEMPERATURE	[°C, °F]	●

STORED DATA		
SYSTEM ACTIVE ENERGY	[Wh]	■
SYSTEM APPARENT ENERGY (LAGGING)	[VAh]	■
SYSTEM APPARENT ENERGY (LEADING)	[VAh]	■
SYSTEM LAGGING REACTIVE ENERGY	[varh ind]	■
SYSTEM LEADING REACTIVE ENERGY	[varh cap]	■
MIN / MAX VALUES WITH TIME REFERENCE	[V, A, W, VA, var, PF]	■
PEAK VALUES WITH TIME REF.	P_{AV}-Q_{AV}-S_{AV}-I_{AV}-I_{L1AV}-I_{L2AV}-I_{L3AV}-I_{NAV}	■

PROGRAMMABLE RECORDINGS		
POWER DEMAND (BI-DIRECTIONAL)	P_{AV} - Q_{AV} - S_{AV}	●
INSTANTANEOUS VALUES	[V, A, W, VA, var, PF, DPF, Hz, THD, ...]	●
INSTANTANEOUS MIN/MAX VALUES	[V, A, W, VA, var, PF]	●
HARMONIC	[V, A - up to 50th]	●
EVENT CAPTURE	8 threshold, outputs, aux power supply [ON/OFF]	□
SAGS AND SWELLS (VDROP)	[V - 10ms resolution]	○
MIN/AVG/MAX VALUES (VMAX)(1)	[V, I, P, Q, S, f - 20ms resolution]	○
WAVEFORM CAPTURE (WCAP)	V_{L1-N} - V_{L2-N} - V_{L3-N} or I_{L1} - I_{L2} - I_{L3}	○

ADVANCED FEATURES		
TIME OF USE (TARIFF REGISTERS)	[Wh, VAh, varh]	■
CALCULATION OF PF COMPENSATION	Capacitor bank [kvar]	●
DIGITAL INPUTS COUNTERS	[Wh, VAh, varh, m^3, litres, ecc.]	○

LEGEND

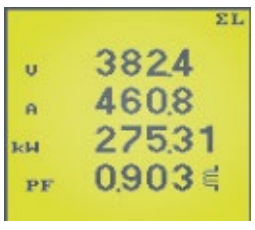
● = Standard
○ = Optional
■ = Bi-directional values
□ = ENH version

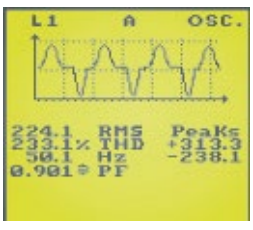
(1) Programmable every 1, 5, 10, 15, 30, 60 min
Maximum 10 parameters selected among voltage, current, power, PF, frequency

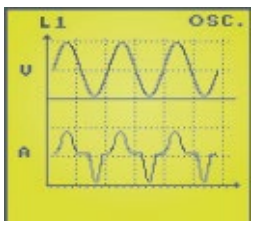
Programmable recordings detail

(1) It is possible to set 10 different start/stop corresponding to 10 different recordings
(2) The measurements are carried out with continuous sampling

	TYPE OF RECORDED DATA	RECORDING INTERVAL	START/STOP RECORDING (1)	RECORDED PARAMETERS
BASIC VERSION	POWER DEMAND	1, 5, 10, 15, 30, 60 minutes	PROGRAMMABLE	Active, Reactive Inductive, Reactive Capacitive, Apparent (IMPORT)
	MINIMUM / MAXIMUM VALUES	from 1 to 9999 minutes	PROGRAMMABLE	V - V_{L1-N} - V_{L2-N} - V_{L3-N} - I - I_{L1} - I_{L2} - I_{L3} - P - S - Q - PF - Demand values
	INSTANTANEOUS VALUES (SNAPSHOTS)	from 1 to 9999 seconds	PROGRAMMABLE	V - V_{L1-N} - V_{L2-N} - V_{L3-N} - V_{L1-L2} - V_{L2-L3} - V_{L3-L1} - I - I_{L1} - I_{L2} - I_{L3} - I_N PF - PF_{L1} - PF_{L2} - PF_{L3} - Cosø - $Cosø_{L1}$ - $Cosø_{L2}$ - $Cosø_{L3}$ - S - S_{L1} - S_{L2} - S_{L3} P - P_{L1} - P_{L2} - PL_3 - Q - Q_{L1} - Q_{L2} - Q_{L3} - F - THD V - THD I - P_{AV}
	HARMONICS	1, 5, 10, 15, 30, 60 minutes	PROGRAMMABLE	V - V_{L1-N} - V_{L2-N} - V_{L3-N} - I - I_{L1} - I_{L2} - I_N
OPTIONS	SAGS AND SWELLS 10MS-VDROP (2)	When event occurs	CONTINUOUS	V - V_{L1-N} - V_{L2-N} - V_{L3-N}
	MIN/AVG/MAX VALUES 20MS-VMAX (2)	from 1 to 999 seconds	PROGRAMMABLE	Max 10 values selected among voltage, current, power, frequency
	WAVEFORM CAPTURE 20MS-WCAP (2)	When event occurs	CONTINUOUS	V - V_{L1-N} - V_{L2-N} - V_{L3-N} or I_{L1} - I_{L2} - I_{L3}





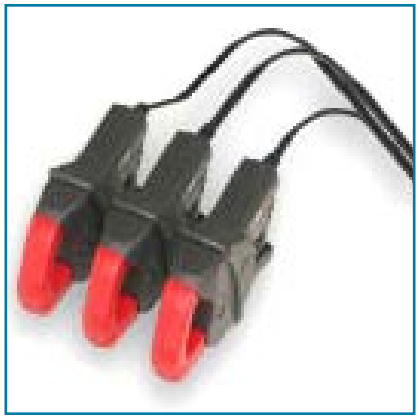


» Specifications

POWER SUPPLY	
Rated voltage:	85÷250 V_{AC} / 90÷250 V_{DC}
Backup battery:	rechargeable NiMh battery 12 V 1.5 Ah approx.
VOLTAGE INPUTS	
Maximum measurable voltage:	600 (750) V_{AC} max L-L
Input impedance:	›1,3 MOhm
Burden:	max 0,15 VA per phase
Frequency:	45 - 65 Hz + direct current
CURRENT INPUTS	
From isolated tranducers: 1, 2, 3, 10 VAC-DC programmable	1, 2, 3, 10 V_{AC-DC} programmable
	input impedance: ›150 kOhm
Direct inputs:	1, 5, 20(25) A_{RMS} programmable
	minimum measurable current: 20 mA
	input impedance: 0.05 Ohm approx.
	insulation voltage: 600(750) V_{RMS} max L-L
From Rogowski coils:	700, 3000 A_{RMS} programmable (40mV/kA)
	input impedance: 15 kOhm
TYPICAL ACCURACY	
Voltage:	±0.2% reading ±0.05% full scale
Current:	±0.2% reading ±0.05% full scale
Active power:	±1% reading ±0.1% full scale (PF=1)
Power factor:	1% reading (0.5 inductive - 0.8 capacitive)
Active energy:	1% reading (0.5 inductive - 0.8 capacitive)
Frequency:	±0.05% reading ±2 digits from 45 to 65 Hz
Temperature:	±20C @ 0÷550C - 10 min after turn-on
DISPLAY AND OPERATING CONTROLS	
Display:	backlighted graphic LCD display 128x128 dots
Keypad:	8 functional push-buttons + ON/OFF
DATA MEMORY	
Type:	4 MB removable Flash Card
	1 MB non-volatile (CPU2 option)
COMMUNICATION PORT	
Type:	RS232, optoisolated, 300 to 57600 bps
REAL TIME CLOCK	
Type:	Twith battery backup
Accuracy:	± 30 ppm
DIGITAL OUTPUT	
Type:	1 isolated optomos (50V - 300mA_{AC-DC})
ANALOG OUTPUT	
Type:	1 isolated configurable 0÷20 or 4÷20mA
	maximum load = 300 Ohm
Resolution:	16 bits
Accuracy:	typical accuracy of the instrument (see above)
DIGITAL INPUTS	
Type:	4 isolated, for voltage-free contacts
ENVIRONMENTAL CONDITIONS	
Operating temperature:	from -10°C to +55°C
Storage temperature:	from -20°C to +70°C
Relative humidity:	80% max. without condensation
MECHANICAL CHARACTERISTICS	
Material:	ABS shock-proof
Protection degree:	carrying case: IP54, measuring sockets: IP21
Size:	420x340x210 mm
Weight:	6 kg approx. without accessories
STANDARDS COMPLIANCE	
Safety:	73/23/EEC, 93/68/EEC directives, EN61010.1
EMC:	89/366/EEC directive and following modifications
	93/31/EEC and 93/68/EEC, EN50081-2, EN50082-2,
	EN61326/A1

» Accessories

1000A Clamps



20 / 200A Clamps

700 / 3000A Clamps

» Connection panel

Auxiliary power supply
85÷250 V_{AC} or 90÷250 V_{DC}

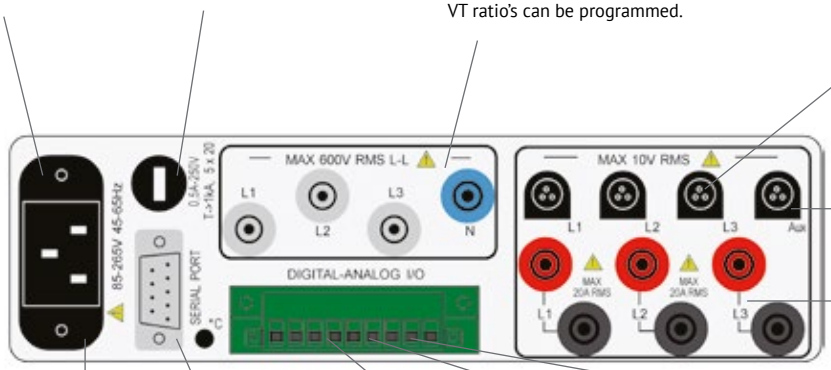
Fuse
Instrument power supply circuit protection.

Voltage inputs
Direct connection up to 600 (750) V_{AC}. Above this value the use of voltage transformers is necessary. VT ratio's can be programmed.

Current inputs
The instrument can process measurements from current clamps or other transducers with 1, 2, 3 or 10V full scale outputs. Inputs are not isolated; it is always necessary to connect transducers with double insulation according EN61010-1 safety standard. Flexible Rogowski transducers can be directly connected to the inputs without adaptors. The programmable full scales are 700 and 3000A.

Earth leakage input
A dedicated input, for measurement of earth leakage current by 0-1V clamps or directly from 1000 turns split-core CT.

Inputs for direct connection
Isolated inputs for direct connection of voltages up to 600(750) V L-L. Maximum current 20 (25)A_{RMS}. These inputs can be programmed for use with transducers with 1 and 5A output value (clamps or current transformers).



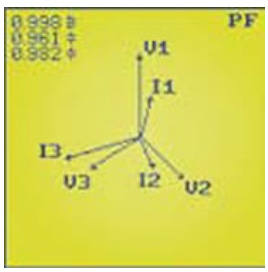
Serial interface RS232
The instrument is provided with serial communication port RS232 to connect to a PC, modem or Ethernet gateway.

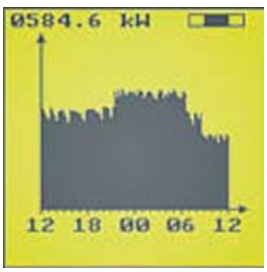
Temperature sensor
Detects and displays the environmental temperature.

Digital output (option)
No. 1 optoisolated output that can be programmed for energy pulse emission or alarm.

Analog output (option)
No. 1 optoisolated active output that can drive the load with no need for an external power supply. It can be programmed as 0-20 or 4-20mA and associated to one of the main instantaneous values.

Digital inputs (option)
No. 4 isolated inputs for voltagefree contacts. Can be used for energy pulses counting, demand syncronization or status indication (according to installed options).





» Dedalo

DEDALO is a software which enables the instrument to be connected to a PC. It allows to download, to display, to collect and analyse all electrical parameters. It is an easy and fast tool for direct or remote connection. It allows to connect to the meter by RS232 serial communication port or by external devices such as PSTN / GSM / GPRS modems or Ethernet/ Internet networks. This remote monitoring function allows to carry out all the functions from instrument setup to data monitoring or downloading.

» Main features

Real time data viewing

The software can display real-time readings from the instrument. The collected data can be displayed numerically, graphically or on a trending and moving chart.

Depending on the instrument and software configuration the available information may include:
- All real time values (voltage, current, power, PF, ...)
- Total energies, and energies divided into tariff registers
- Harmonics up to the 64th order
- Actual voltage & current waveforms
- Trending of measured values
- Sags and Swells analysis
- Indication by analogue meter display

Quick connection & instrument setup

A Search command allows to establish a link without setting-up the connection parameters: a smart procedure automatically checks and finds the connected instrument and the baud rate. Due to its intuitive approach, the analyzer can be configured more quickly by the software than by using keypad.

Overvoltage and dips analysis

The data stored using VDROP option can be displayed on extremely clear graphics. These screens give a picture of the events on the monitored line. For each recorded event are displayed 100 + 100 RMS half-cycle values before and after the event. The data can be viewed in tabular or graphic form.

Alarms and limits

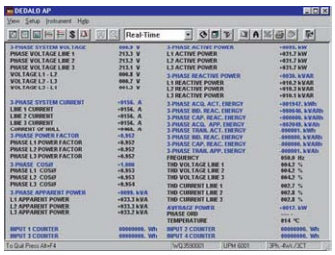
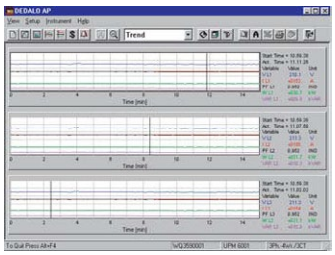
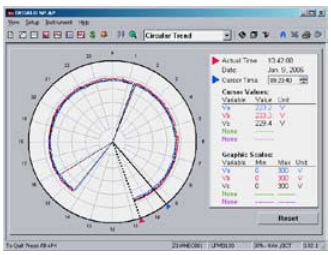
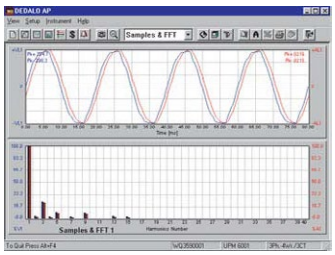
The software allows to set thresholds, which if exceeded will trigger a graphic and acoustic alarm or send an e-mail. The events are logged and listed by alarm type, date, time and value. All can then be printed in different formats.

File recording & printouts

The software in the version with Analysis allows to set up to 5 historical files on the hard disk. This data can then be processed or printed.

Export data file

Data is compatible with and can be exported to word processors or spreadsheets for further processing.

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15 DIGIT ORDER CODE

UPM6100 — ALX

Labelling
A = Algodue
C = Custom

Language
I = Italian
U = English
D = German
E = Spanish

Communication protocol
B = A2 ASCII — B

Aux power supply
A = 85 ÷ 250V_{AC}/ 90 ÷ 250V_{DC} — A

Serial port
2 = Basic version - RS232 — 2

Memory
E = 4 MB flash card — E

Firmware options
3 = Basic version
4 = ENH version

Hardware options (CPU2) - only with Firmware option 4
X = None
2 = VDROP - sags and swells detection
3 = VMAX - sags and swells detection + MIN/MED/MAX recording
5 = WCAP - dual trigger waveform capture + MIN/MED/MAX recording

Digital outputs
X = None
1 = MIX11 output (50V - 300mA_{AC-DC}) (only with analog output 1)

Analog outputs
X = None
1 = MIX11 output programmable 0-20 or 4-20mA (only with digital output 1)

Input
X = None
4 = 4 DI4-TR digital inputs for voltage free contacts

Accessories
C = Basic version (4 voltage cables+4 alligator clips)
D = 3 C20/2H current miniclamps (20-200A / 2V)
G = 3 C1K current clamps (1000A / 1V)
N = 3 Rogowski coils - 60cm length, 3000A
M = G+N
V = Additional kit 4 voltage cables + 4 alligator clips

NOTE:
- Subject to change without notice
- The code made up of 15 digits including the X

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ISO 9001:2008
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