UPM3100
DIN 144x144 quality power meter

- Highly sofisticated power meter providing advanced functionality features
- Large graphic LCD display with excellent visibility
- Infrared communication port (IR)
- THD even, odd and individual FFT harmonic analysis up to 50th order
- Power and current demand calculation
- On-board memory up to 2 MB
- Up to 10 programmable recordings with different start and stop time
- Event and alarm recording, sags and swells, waveform capture, hystorical trend of consumption, TOU and more…
- Accuracy according to EN 62053 (ex EN 61036)

» General description

UPM3100 is a multifunction metering device with advanced functionality features, suitable for electrical parameters measurement and power quality analysis. UPM3100 is able to store the measured values according to a programmable rate and the events when they occur. UPM3100 main feature is its flexibility: in the rear side of the instrument it is possible to plug in up to four add-on option boards. The modularity and the upgrade path allow a low initial investment but as well to meet future needs. These features allow to build specific meter configurations as required.

The basic unit includes RS232 / RS485 switchable communication port and one front panel infrared port. On request, an RS232 port is available instead of infrared port. UPM3100 provides accurate True RMS values on graphic LCD display, or via communication port. Four or more parameters displayed simultaneously give the complete situation of the electrical line at first sight. The WINTOOL software can be downloaded for free from Algodue web site and allows to show on a PC all the measured values and to carry out settings in a faster way.

It performs clear graphical functions such as: waveforms of voltage and current, harmonic spectrum, trends of measured values and consumption profiles. The backlighted LCD display is highly efficient therefore it guarantees perfect visibility in all light conditions. A simple menu structure makes the instrument easy-to-use and allows a quick check of the instrument set-up and memory status. Five languages can be selected easily: English, German, Italian, French and Spanish.

» Benefits

- UPM3100 is suitable for low, medium and high voltage measurement. It can be connected directly up to 600 (750)VAC L-L or through PTs for higher voltage.
- It provides peak average current and power demand information. This data is essential to work out proper strategies aimed at avoiding uncontrolled power peaks and consequent penalties.
- 2 MB data memory allows a long-term data recording without connection to a computer for downloading.
- Via communication port it is possible to read and log on a PC all the readings and download the stored data.
- The recorded data allows to generate on a PC consumption profiles, logged values trends, event and alarm reporting, cost allocation and reports as well as to identify critical values.

» Applications

- Switchboards, gensets, motor control centers, etc.
- Power monitoring & control systems
- Individual machine load monitoring
- Power demand analysis and management
- Harmonics monitoring
- Remote metering and cost allocation
- Motor inrush current studies

» Related Products

- Dedalo Software
- Wintool Software
- AO plug-in board (2 Analog Outputs)

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» Main features

Measurements

- Three-phase 3-wire or 4-wire unbalanced load operation, bi-phase and single-phase.
- Direct measurement up to 600 (750) VAC.
- Programmable 1A / 5A current full scale.
- 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 VMAX and 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.
- VMAX option - two functions are selectable:
  1) 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. This data is viewed on the PC according EN 50160 standard.
  2) 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 EN 50160 standard.
- WCAP option - advanced waveform capture function of currents and L-N voltages. In case of single trigger the threshold mode is programmable as voltage or current; in dual trigger the threshold mode is fixed including both parameters (voltage&current), allowing the waveform capture in case of threshold overcoming both for voltage and current. 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

- 2 MB non-volatile 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.
  - 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 present day, and of the previous and present month. This feature is designed to fit different tariff structures. It is 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. 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. 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.

Modularity

- Four slots for optional AO plug-in boards (up to no. 2 analog outputs 0-20 or 4-20 mA).

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Communication
- Both RS232 and RS485 selectable by dip-switches.
- MODBUS or A2 ASCII protocol.
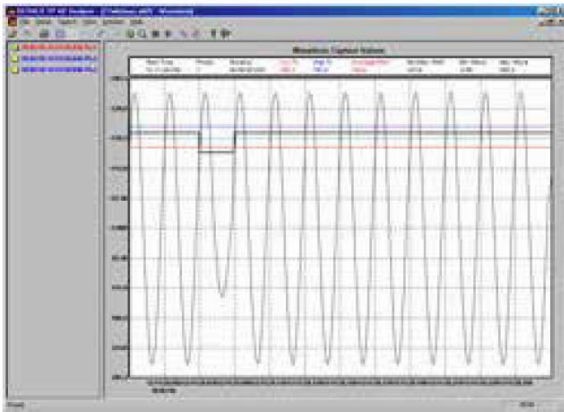- Communication speed programmable up to 57600 bps.

Digital & analog outputs
- Two digital outputs for energy pulsing or for alarm tripping.
- Up to 4 analog outputs 0-20 or 4-20 mA.

Other
- Real time clock with battery backup.
- Calculation of capacitor bank value for PF compensation.
- Protection from undesired access to setup.

» 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.
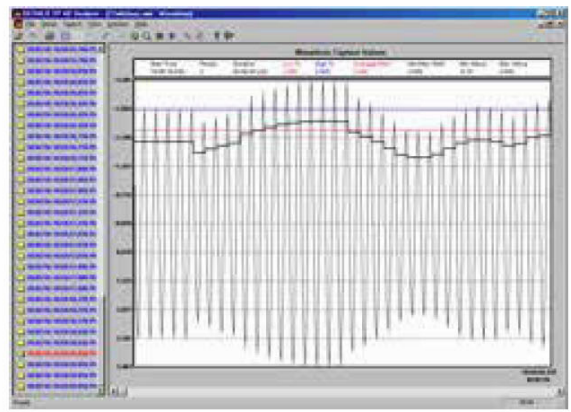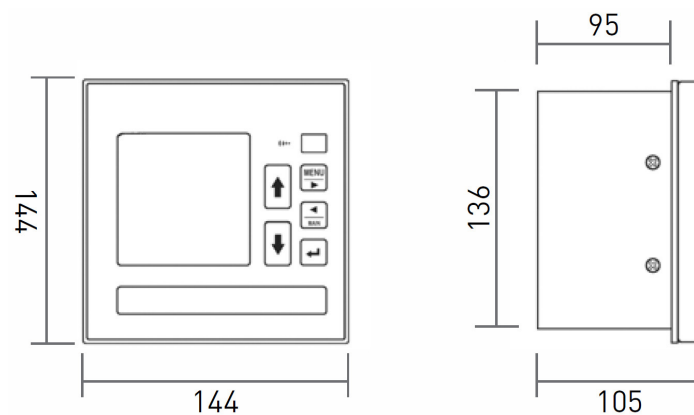

Current load variation - The trigger is on current RMS value, the resolution is 1 cycle. 5+30 waves before and after the trigger are represented, the sampling is 8 samples / cycle.

» 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	●
DISPLACEMENT POWER FACTOR (COSØ)	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 (AVERAGE VALUES)	I_{AVG} - $3xI_{L AVG}$ - $I_{N AVG}$ - S_{AVG} - P_{AVG} - Q_{AVG}	●
THERMAL CURRENT	I^2S_{L1} - I^2S_{L2} - I^2S_{L3} [A^2s]	□
K FACTOR	K_{L1} - K_{L2} - K_{L3}	□
VOLTAGE THD (Total)	$THDV_{L1-N}$ - $THDV_{L2-N}$ - $THDV_{L3-N}$ [%]	●
CURRENT THD (Total)	$THDI_{L1}$ - $THDI_{L2}$ - $THDI_{L3}$ [%]	●
NEUTRAL CURRENT THD (Total)	$THDI_N$ [%]	□
VOLTAGE THD (Even, Odd)	$THDV_{L1-N}$ - $THDV_{L2-N}$ - $THDV_{L3-N}$ [%]	●
CURRENT THD (Even, Odd)	$THDI_{L1}$ - $THDI_{L2}$ - $THDI_{L3}$ [%]	●
FFT ANALYSIS 50th	V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3} [%, V, A]	●
FFT ANALYSIS 50th	I_N [%, A]	□
UNBALANCE	V_{ub} - I_{ub} [%]	□
PHASE SEQUENCE	123 / 132	●
REAL TIME CLOCK	Date, Time	●

STORED DATA

SYSTEM ACTIVE ENERGY	[Wh]	■
SYSTEM APPARENT ENERGY	[VAh]	■
SYSTEM LAGGING REACTIVE ENERGY	[varh ind]	■
SYSTEM LEADING REACTIVE ENERGY	[varh cap]	■
PEAK VALUES	$3xI_{L AVG}$ - $I_{N AVG}$ - S_{AVG} - P_{AVG} - Q_{AVG}	●
MIN/MAX with time reference	4xV - 4xI - PF - S - P - Q	●

PROGRAMMABLE RECORDINGS

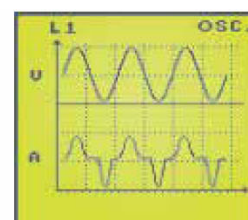|		
POWER DEMAND	S_{AVG} - P_{AVG} - Q_{AVG}	●
INSTANTANEOUS VALUES	[see table below]	●
MIN/MAX VALUES	4xV - 4xI - PF - S - P - Q	●
HARMONICS	V - I [up to 50th]	●
ALARM/EVENT LOG	8 Set Points, Outputs ON/OFF, Instrument ON/OFF	□
SAGS&SWELLS	V [10ms resolution]	○
MIN/AVG/MAX VALUES max 10 param. [20ms resolution] Programmable every 1, 5, 10, 15, 30, 60 min		○
WAVEFORM CAPTURE	$3xV_{L-N}$ - $3xI_L$ [20ms resolution]	○

ADVANCED FEATURES

TIME OF USE (TARIFF REGISTERS)	[Wh, VAh, varh]	●
CALCULATION OF PF COMPENSATION	Capacitor bank [kvar]	●

LEGEND

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

Programmable recording 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	S_{AVG} - P_{AVG} - Q_{AVG}
	MIN/MAX VALUES	From 1 to 9999 minutes	PROGRAMMABLE	V - V_{L1-N} - V_{L2-N} - V_{L3-N} - I - I_{L1} - I_{L2} - I_{L3} - PF - S - P - Q
	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} - DPF_{L1} - DPF_{L2} - DPF_{L3} - S - S_{L1} - S_{L2} - S_{L3} - P - P_{L1} - P_{L2} - P_{L3} - Q - Q_{L1} - Q_{L2} - Q_{L3} - F - $THDV_{L1-N}$ - $THDV_{L2-N}$ - $THDV_{L3-N}$ - $THDI_{L1}$ - $THDI_{L2}$ - $THDI_{L3}$ - ($THDI_N$ □) - S_{AVG} - P_{AVG} - Q_{AVG} - I_{AVG} - I_{1AVG} - I_{2AVG} - I_{3AVG} - I_{NAVG} - (V_{ub} - I_{ub} - I^2S_{L1} - I^2S_{L2} - I^2S_{L3} - K_{L1} - K_{L2} - K_{L3} □)
	HARMONICS	1, 5, 10, 15, 30, 60 minutes	PROGRAMMABLE	V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3} - (I_N □)
OPTIONS	SAGS&SWELLS (2)	When event occurs	CONTINUOUS	V - V_{L1-N} - V_{L2-N} - V_{L3-N}
	MIN/AVG/MAX VALUES (2)	From 1 to 999 seconds	PROGRAMMABLE	Max 10 parameters selectable among: 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 - S - S_{L1} - S_{L2} - S_{L3} - P - P_{L1} - P_{L2} - P_{L3} - Q - Q_{L1} - Q_{L2} - Q_{L3} - F
	WAVEFORM CAPTURE (2)	When event occurs	CONTINUOUS	V_{L1-N} - V_{L2-N} - V_{L3-N} or I_{L1} - I_{L2} - I_{L3}

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» Specifications

POWER SUPPLY	
Rated voltage:	65...250 VAC / 90...250 VDC
Consumption:	5 VA max

VOLTAGE INPUTS	
Maximum measurable voltage:	600 (750) VAC max L-L
Input impedance:	›1.3 MOhm
Burden:	0.15 VA max per phase
Frequency:	45 - 65 Hz

CURRENT INPUTS (TRMS)	
Rated current (Ib):	1 / 5 A programmable
Min / max measurable current:	20 mA / 7A
Maximum overload:	10 A continuous - 100 A for 1 sec
Input impedance:	0.02 Ohm approximately
Burden:	0.5 VA max per phase
Insulation voltage:	150 VAC max between phases

TYPICAL ACCURACY	
Voltage:	±0.1% reading ±0.03% full scale
Current:	±0.1% reading ±0.05% full scale
Active power:	±0.5% 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

DISPLAY AND OPERATING CONTROLS	
Display:	backlighted graphic LCD display, 128 x 128 dots
Keypad:	5 push-buttons

DATA MEMORY	
Type:	on-board non-volatile FLASH, 2 MB

COMMUNICATION PORT	
Type:	1 selectable RS232 or RS485, optoisolated
	1 infrared (IR) or RS232 on front panel
Baud rate:	programmable from 300 to 57600 bps
Protocols:	A2 ASCII or MODBUS

REAL TIME CLOCK	
Type:	with battery backup
Accuracy:	±30 ppm

DIGITAL OUTPUTS	
Type:	2 optoisolated (50 V - 300 mADC)

ENVIRONMENTAL CONDITIONS	
Operating temperature:	from -15°C to +60°C
Storage temperature:	from -25°C to +75°C
Relative humidity:	80% max without condensation

MECHANICAL CHARACTERISTICS	
Material:	metal enclosure
Protection degree:	IP54 (front panel); IP20 (terminals)
Terminals:	EU standard pluggable terminals
Size / weight:	144 x 144 x 110 mm / 900 g

STANDARD COMPLIANCE	
Safety:	73/23/EEC and 93/68/EEC directives, EN 61010.1 safety standard
EMC:	89/366/EEC directive and following modifications
	93/31/EEC and 93/68/EEC, EN50081-2, EN50082-2, EN61326/A1

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ORDER CODE	VERSION		POWER SUPPLY	COM PORT (RS232/RS485)		COMMUNICATION PROTOCOL	MEASUREMENTS	MEMORY	CPU2	I/O	
	BASIC	ENH	Auxiliary	IR front	RS232 front	MODBUS (Sign bit)	Harmonics, DPF, THD (V,A)	2MB	Recordings	DO	AO
FOR 1/5A CTs (not included)											
1207.0003.0001	●		65...250VAC/90...250VDC	●		●	up to 50th	●		●	
1207.0004.0001	●		65...250VAC/90...250VDC	●		●	up to 50th	●		●	●
1207.0005.0001	●		65...250VAC/90...250VDC		●	●	up to 50th	●		●	
1207.0008.0001		●	65...250VAC/90...250VDC	●		●	up to 50th	●	VMAX	●	
1207.0009.0001		●	65...250VAC/90...250VDC	●		●	up to 50th	●	VMAX	●	●
1207.0012.0001		●	65...250VAC/90...250VDC		●	●	up to 50th	●	VMAX	●	
1207.0013.0001		●	65...250VAC/90...250VDC		●	●	up to 50th	●	VMAX	●	●
1207.0019.0001		●	65...250VAC/90...250VDC		●	●	up to 50th	●	WCAPs	●	
1207.0020.0001		●	65...250VAC/90...250VDC		●	●	up to 50th	●	WCAPd	●	

LEGEND
BASIC: Reduced parameter set and functions.
ENH: Extended parameter set and functions.
COM PORT: RS232/RS485 user selectable. Another port is available on front panel according to the model (see table).
Recordings: CPU2 recordings. VMAX=sag&swell detection+Min/Avg/Max recording, WCAPs=single trigger waveform capture+Min/Avg/Max recording, WCAPd=dual trigger waveform capture+Min/Avg/Max recording.
DO: 2 digital outputs for alarm or pulse emission.
AO: 2 analog outputs for real time parameter variation transmission.

NOTE: Subject to change without notice