

# UPM3100

## DIN 144x144 quality power meter

- Highly sophisticated power meter providing advanced functionality features
- Large graphic LCD display with excellent visibility
- Up to four plug-in options
- Infrared communication port
- THD even, odd and individual FFT harmonic analysis up to 50<sup>th</sup> 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, waveform display, phasor diagrams, hystorical trending, TOU and more...
- Accuracy according to EN62053 (ex EN61036)



### » 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. It performs clear graphical functions such as: waveforms of voltage and current, harmonic spectrum, phasor diagrams, trends of measured values and consumption profiles. The backlit 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)V<sub>AC</sub> 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
- Communication Boards
- I/O Boards

## » Main features

### Measurements

- Three-phase 3-wire or 4-wire unbalanced load operation, bi-phase and single-phase.
- Direct measurement up to 600 (750) V<sub>AC</sub>
- 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 50<sup>th</sup> order. The harmonic content is represented like even, odd and total.
- CPU2 option - the co-processor board performs 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: VDROPO, 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.
- VDROPO 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. This data is viewed on the PC according EN50160 standard.
- VMAX option - two functions are selectable: VDROPO (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 EN50160 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 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'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 (VDROPO option). The occurring dips and overvoltage over a programmable threshold are detected and the instrument records the date and time of the event, the length 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.

### Modularity

- Four slots for plug-in options boards.

### Communication

- Both RS232 and RS485 included in the basic unit. The selection is made by dip-switches.

- MODBUS or A2 ASCII protocol.
- Communication speed programmable up to 57600 bps.
- Optional 10/100 Ethernet, Profibus or Lonbus interfaces.
- On-board HTML web page server or direct communication through Ethernet / Internet network using MODBUS or A2 ASCII protocol.

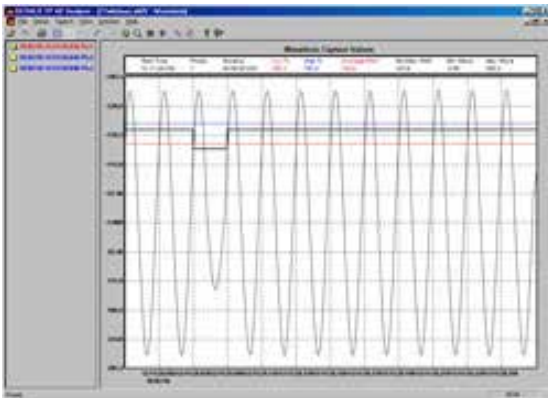
**Inputs & outputs**

- Up to 6 digital outputs for energy pulsing or for alarm tripping. Two digital optomos ML outputs are included in the basic unit.
- Up to 4 analog outputs 0-20 or 4-20 mA.

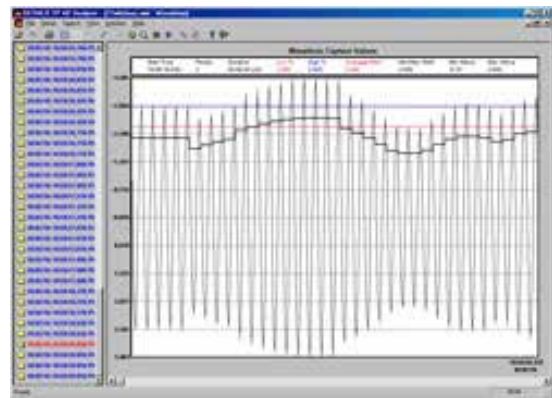
**Other**

- Real time clock with battery backup.
- Calculation of capacitor bank value for PF compensation.
- Five alpha-numeric characters password to avoid unauthorized setup access.

» **WCAP - Waveform capture examples**

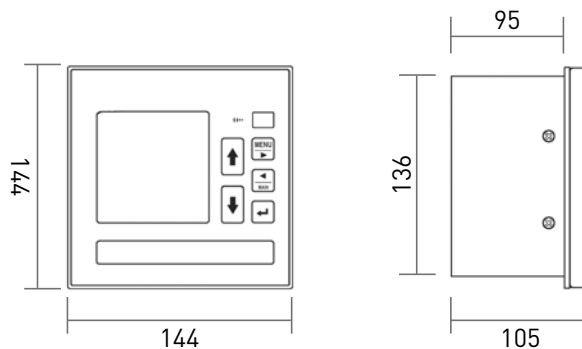


Voltage drop - The trigger is on voltage RMS value, the resolution is 1 cycle. 2+10 waves before and after the trigger are represented, the sampling is 32 samples / cycle.



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**



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 (BI-DIRECTIONAL)	$P_{AV} - Q_{AV} - S_{AV} - I_{AV} - I_{L1AV} - I_{L2AV} - I_{L3AV} - I_{NAV}$ ●
THERMAL CURRENT	$I_{L1} - I_{L2} - I_{L3}$ [A <sup>2</sup> s] □
K-FACTOR & FACTOR K (US & EU)	[K] □
VOLTAGE THD (Total, Even, Odd)	$THD_{L1} - THD_{L2} - THD_{L3}$ [%] ●
CURRENT THD (Total, Even, Odd)	$THD_{L1} - THD_{L2} - THD_{L3}$ [%] ●
FFT ANALYSIS 50 <sup>th</sup>	$V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3}$ [% V, A] ●
FFT ANALYSIS 50 <sup>th</sup> + VOLTAGE AND CURRENT THD (Total)	$I_N$ [% V, A] □
UNBALANCE	V, I [%] □
PHASE REVERSAL	123 / 132 ●
REAL TIME CLOCK	Date, Time ●

STORED DATA	
SYSTEM ACTIVE ENERGY	[Wh] ■
SYSTEM LAGGING APPARENT ENERGY	[VAh] ■
SYSTEM LEADING APPARENT ENERGY	[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.	$P_{AV} - Q_{AV} - S_{AV} - I_{AV} - I_{L1AV} - I_{L2AV} - I_{L3AV} - I_{NAV}$ ■

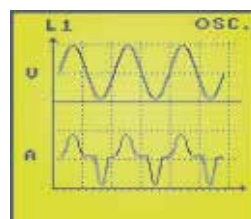
PROGRAMMABLE RECORDINGS	
POWER DEMAND (BI-DIRECTIONAL)	$P_{AV} - Q_{AV} - S_{AV}$ ●
INSTANTANEOUS VALUES	[V, A, W, VA, var, PF, DPF, Hz, THD, ...] ●
INSTANTANEOUS MIN/MAX VALUES	[V, A, W, VA, var, PF] ●
HARMONICS	[V, A - up to 50 <sup>th</sup> ] ●
EVENT CAPTURE	8 threshold, outputs, aux power supply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

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

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

<sup>(1)</sup> 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	$V - V_{L1-N} - V_{L2-N} - V_{L3-N} - V_{L1-L2} - V_{L2-L3} - V_{L3-L1} - I - I_{L1} - I_{L2} - I_{L3} - I_N$ $PF - PF_{L1} - PF_{L2} - PF_{L3} - \text{Cos}\phi - \text{Cos}\phi_{L1} - \text{Cos}\phi_{L2} - \text{Cos}\phi_{L3} - S - S_{L1} - S_{L2} - S_{L3}$ $P - P_{L1} - P_{L2} - P_{L3} - Q - Q_{L1} - Q_{L2} - Q_{L3} - F - \text{THD V} - \text{THD I} - P_{AV} - Q_{AV} - S_{AV}$
	HARMONICS	1, 5, 10, 15, 30, 60 minutes	PROGRAMMABLE	$V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3} - (I_N \square)$
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

<b>POWER SUPPLY</b>	
Rated voltage:	65÷250 V <sub>AC</sub> / 90÷250 V <sub>DC</sub> on request 19÷60 V <sub>DC</sub>
Consumption:	5 VA max
<b>VOLTAGE INPUTS</b>	
Maximum measurable voltage:	600 (750) V <sub>AC</sub> max L-L
Input impedance:	>1,3 MOhm
Burden:	max 0.15 VA per phase
Frequency:	45 - 65 Hz
<b>CURRENT INPUTS</b>	
Rated current (I <sub>b</sub> ):	1 / 5 A <sub>RMS</sub> programmable
Min / max measurable current:	20 mA / 7 A <sub>RMS</sub>
Maximum overload:	10 A <sub>RMS</sub> continuous - 100 A <sub>RMS</sub> for 1 sec.
Input impedance:	0,02 Ohm approximately
Burden:	max 0,5 VA per phase
Insulation voltage:	150 V <sub>AC</sub> max between phases
<b>TYPICAL ACCURACY</b>	
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
<b>DISPLAY AND OPERATING CONTROLS</b>	
Display:	backlighted graphic LCD display 128 x 128 dots
Keypad:	5 push-buttons
<b>DATA MEMORY</b>	
Type:	on-board non-volatile FLASH, 2 MB
<b>COMMUNICATION PORT</b>	
Type:	1 selectable RS232 or RS485, optoisolated 1 infrared port on the front panel
Baud rate:	programmable from 300 to 57600 bps
<b>REAL TIME CLOCK</b>	
Type:	with battery backup
Accuracy:	± 30 ppm
<b>DIGITAL OUTPUTS</b>	
Tipo:	2 isolated optomos (50V - 300mA <sub>AC-DC</sub> )
<b>ENVIRONMENTAL CONDITIONS</b>	
Operating temperature:	from -15°C to +60°C
Storage temperature:	from -25°C to +75°C
Relative humidity:	80% max. without condensation
<b>MECHANICAL CHARACTERISTICS</b>	
Material:	metal enclosure
Protection degree:	IP54 (front panel); IP20 (terminals)
Terminals:	standard pluggable terminals (EU) barrier terminal strips (USA)
Size / weight:	144x144x110 mm / 900 gr
<b>STANDARDS COMPLIANCE</b>	
Safety:	73/23/EEC, 93/68/EEC directives, EN61010.1
EMC:	EMC: 89/366/EEC directive and following modifications 93/31/EEC and 93/68/EEC, EN50081-2, EN50082-2, EN61326/A1

15 DIGIT ORDER CODE

UPM3100

- Labelling**  
**A** = Algodue  
**C** = Custom
- Language**  
**I** = Italian  
**U** = English  
**D** = German
- Communication protocol**  
**B** = A2 ASCII  
**C** = MODBUS  
**L** = LONBUS  
**P** = PROFIBUS  
**E** = ETHERNET\*  
**W** = ETHERNET with web server\* (only with firmware option 3)
- Aux power supply**  
**A** = 65 ÷ 250V<sub>AC</sub> / 90 ÷ 250V<sub>DC</sub>  
**R** = 19 ÷ 60V<sub>DC</sub>
- Serial port**  
**5** = Selectable RS232/485 + infrared port  
**6** = Selectable RS232/485 + front RS232 instead of infrared port
- Memory**  
**6** = 2 MB
- Firmware options**  
**3** = Basic version  
**4** = ENH version
- Hardware options (only with firmware option 4)**  
**X** = None  
**2** = VDROP - sags and swells detection  
**3** = VMAX - sags and swells detection + MIN/MED/MAX recording  
**4** = WCAP - single trigger waveform capture + MIN/MED/MAX rec.  
**5** = WCAP - dual trigger waveform capture + MIN/MED/MAX rec.
- Digital outputs\*\***  
**2** = Basic version with 2 outputs (50V - 300mA<sub>AC-DC</sub>)  
**4** = Basic version + DO2-ML plug-in board  
**6** = Basic version + DO4-ML plug-in board
- Analog outputs\*\***  
**X** = None  
**2** = AO2-0420 plug-in board (2 programmable outputs)  
**4** = 2 AO2-0420 plug-in boards (4 programmable outputs)
- Physical configuration**  
**A** = Standard pluggable terminals (EU)  
**G** = Barrier terminal strips (USA)

		ALZ
		6
		X

\*In case of ETHERNET, default protocol is A2 ASCII. For MODBUS protocol specify it in the order.  
 \*\* Max 4 slots for plug-in optional boards.

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

