# UPM310

## DIN96x96 LED power meter

- DIN 96 cutout for new or retrofit applications
- Fully bi-directional four quadrants readings
- Neutral current monitoring
- Up to 2 plug-in option boards
- Large and bright LED alphanumeric display
- UL recognized under UL61010B-1 and CAN/ CSA-C22.2 no.1010.1-92, file #E231725
- Power and current demand calculation during user-definable time period
- THD and individual FFT harmonic analysis up to 50th order
- On-board memory up to 2 MB
- Programmable Min/Avg/Max & energy data logging
- Event and alarm recording


### General description

UPM310 is a multifunction metering device suitable to measure the electrical parameters.

It provides accurate True RMS measurements on bright LED display, or via serial communication port.

The power meter replaces multiple existing analog meters as well as all single function meters or transducers. The powerful capabilities offered by the instruments make it ideal for stand-alone metering or energy management systems.

UPM310 offers a compact unit together with a variety of mounting combinations making it suitable for new installations as well as retrofit applications. The power meter fits in DIN96 square cutouts. The transducer unit can be mounted on opposite side of the display, on any flat surface or onto a 35mm DIN rail.

VAF version is available on request, without memory. It allows to display and detect only voltage, current and frequency measurements at 400 Hz.

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.

**CONFIGURATIONS**

1) DIN 96x96 compact instrument
2) Transducer without display

### Benefits

- UPM310 provides hundreds of accurate True RMS metering values at low cost.
- 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.
- Being ultra-compact with flexible mounting, UPM310 is suitable for replacing conventional meters. It fits in DIN 96 cutout allowing retrofit to existing equipment.
- UPM310 allow time and cost saving on mounting, compared to many individual single-function instruments.
- 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
- Demand management
- Harmonics monitoring
- Remote metering and cost allocation

## Main features

### Measurements

- Three-phase 3-wire or 4-wire unbalanced load operation.
- True RMS metering provides accurate measurement even for distorted waveform.
- Fully bi-directional, four-quadrant readings.
- Volts, Amps, Power, PF, Frequency, Energy, Min/Max values, Demand and more.
- Individual & total harmonic distortion for voltage and current up to the 50$^{th}$ order.
- Direct measurement up to 600 (750) $V_{AC}$.
- Programmable 1A / 5A current full scale.

### Modularity

- Two slots for plug-in option boards.
- The tranducers version and the compact DIN 96 instrument allow various mounting combinations to fit the requirements of new installations as well as retrofit applications. The "Physical configurations" page shows the mounting combinations.

### On-board memory

- 128 kB or 2 MB non-volatile memory for data storage.
- Programmable start/stop time of recordings.
- Wraparound or Fill (FIFO/Stack) selectable recording mode.
- Min/Avg/Max logging every 1, 5, 10, 15, 30, 60 minutes, programmable up to eight selectable parameters.
- Total and daily energy consumption recording. The individual consumptions are stored more than 300 days.
- Event, alarm and digital outputs ON/OFF recording.

### Communication

- Both RS232 and RS485 included in the basic unit. The selection is made by dip-switches.
- Selectable MODBUS or A2 ASCII protocol.
- Communication speed programmable up to 57600 bps.
- Optional 10/100 Ethernet, Profibus or Lonbus interfaces.

### 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.
- Optional four digital inputs for pulse counting.
- On request input for Rogowski coils.

### Other

- Real time waveform downloading via communication port. This function allows to represent graphically on the PC the three voltages and the three currents with 128 samples per cycle.
- Direct communication through Ethernet / Internet network using MODBUS or A2 ASCII protocol.
- Real time clock with battery backup.

| 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 (AVERAGE VALUES) | $P_{AV}$ - $S_{AV}$ - $Q_{AV}$ - $I_{AV}$ | ● |
| THERMAL CURRENT | $I_{L1}$ - $I_{L2}$ - $I_{L3}$ [$A^2s$] | □ |
| VOLTAGE THD | $THD_{L1}$ - $THD_{L2}$ - $THD_{L3}$ [%] | ● |
| CURRENT THD | $THD_{L1}$ - $THD_{L2}$ - $THD_{L3}$ [%] | ● |
| FFT ANALYSIS 31$^{ST}$ | $V_{L1-N}$ - $V_{L2-N}$ - $V_{L3-N}$ - $I_{L1}$ - $I_{L2}$ - $I_{L3}$ [%, V, A] | ○ |
| UNBALANCE | V, I [%] | □ |
| PHASE REVERSAL | 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] | ■ |
| MIN / MAX VALUES WITH TIME REFERENCE [1] | 7xV, 5xI, f, 4xPF, 6xTHD | □ |
| PEAK VALUES | $P_{AV}$ - $S_{AV}$ - $Q_{AV}$ - $I_{AV}$ | ● |
| **PROGRAMMABLE RECORDINGS** | | |
| DAILY CONSUMPTION (More than 300 days) | [Wh, VAh, varh] | ■ |
| ALARM / EVENT LOG | 4 Set Points, Outputs ON/OFF, Instrument ON/OFF | □ |
| MIN / AVG / MAX VALUES[2] | [2] | ● |

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

(1) Time reference information (date and hour) is available only via serial port.

(2) Programmable every 1, 5, 10, 15, 30, 60 min - Maximum 8 measured parameters.

## Specifications

**Power supply**

| | |
|---|---|
| Rated voltage: | 65÷250 $V_{AC}$ / 90÷250 $V_{DC}$ |
| | on request 19÷60 $V_{DC}$ |
| Consumption: | 5 VA max |

**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 |

**Current inputs**

| | |
|---|---|
| Rated current (Ib): | 1 / 5 $A_{RMS}$ programmable |
| Min / max measurable current: | 20 mA / 7 $A_{RMS}$ |
| Maximum overload: | 10 $A_{RMS}$ continuous - 100 $A_{RMS}$ for 1 sec. |
| Input impedance: | 0.02 Ohm approximately |
| Burden: | max 0.5 VA per phase |
| Insulation voltage: | 150 $V_{AC}$ max between phases |
| Rogowski input: | 200÷49995 A on request |

**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: | high brightness 13,8 mm LED display, three lines, 4 alphanumeric digits |
| Keypad: | 4 push-buttons |

**Data memory**

| | |
|---|---|
| Type: | on-board non-volatile FLASH, 128 kB or 2 MB |

**Communication port**

| | |
|---|---|
| Type: | 1 selectable RS232 or RS485, optoisolated |
| | 1 available for plug-in comm. boards |
| Baud rate: | programmable from 300 to 57600 bps |

**Real time clock**

| | |
|---|---|
| Type: | with battery backup |
| Accuracy: | ± 30 ppm |

**Digital outputs**

| | |
|---|---|
| Type: | 2 isolated optomos (50V - 300$mA_{AC-DC}$) |

**Environmental conditions**

| | |
|---|---|
| Operating temperature: | from -15°C to +60°C |
| Storage temperature: | from -30°C to +75°C |
| Relative humidity: | 80% max. without condensation |

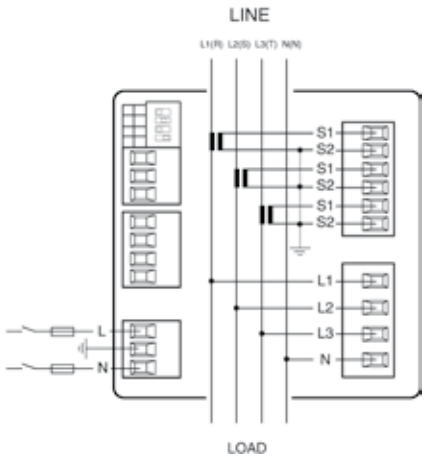
**Mechanical characteristics**

| | |
|---|---|
| Material: | metal enclosure |
| Protection degree: | IP54 (front panel); IP20 (terminals) |
| Terminals: | standard pluggable terminals (EU) |
| | on request barrier terminal strips (USA) |
| Size / weight: | DIN version: 96 x 96 x 130 (mm) / 750 gr |
| | transducer version: 90 x 90 x 130 (mm) / 800 gr |

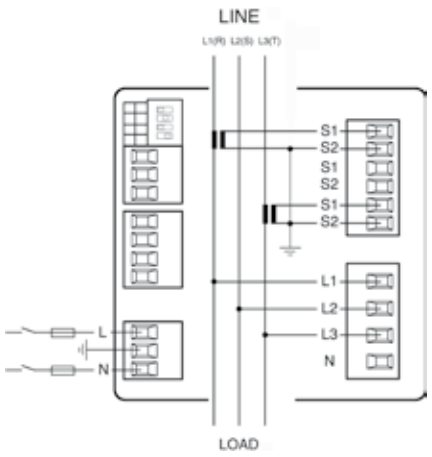
**Standards compliance**

| | |
|---|---|
| Safety: | UL recognized under UL61010B-1 and CAN/CSA-C22.2 No. 1010-1-92 File # E231725, 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 |

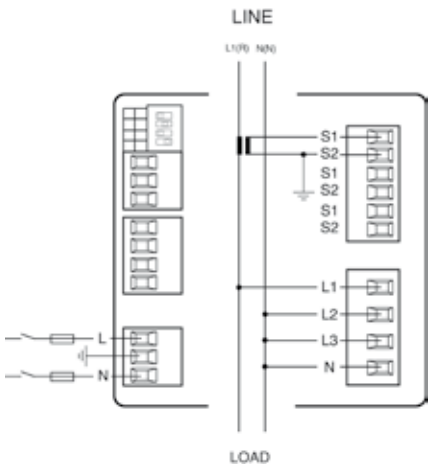
**WIRING DIAGRAMS**




3.4.3 - direct connection



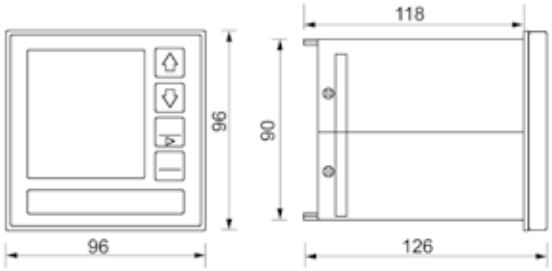

3.3.2 - direct connection

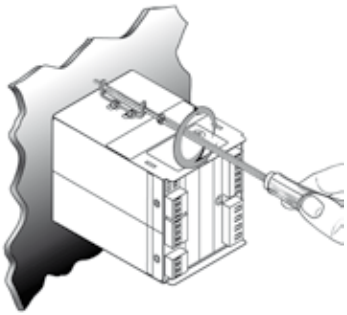



1 phase - direct connection

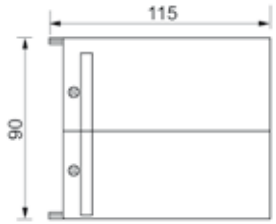
## PHYSICAL CONFIGURATIONS

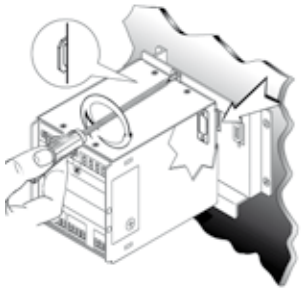
**Compact DIN 96x96 instrument**
Compact version according DIN 96 standard (92 x 92 mm cutout)



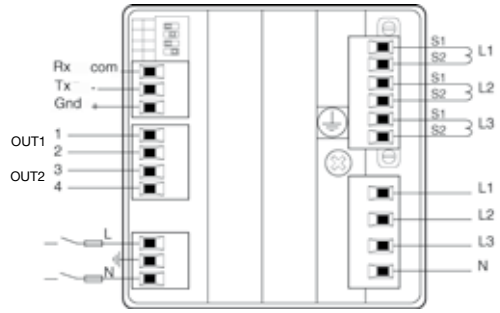



**Transducer**
The transducer can be mounted, using the adapter, on a flat surface or on a DIN rail.

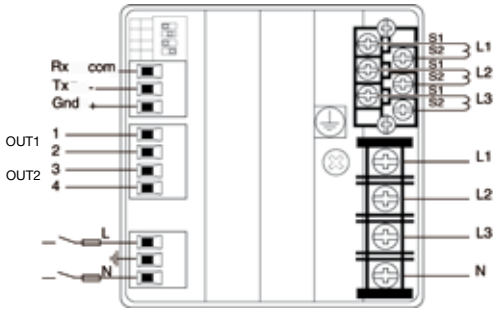


**Rear connections - Standard pluggable terminals (EU)**
The RS232 / RS485 programmable port and the two digital outputs are included in the basic configuration. Two slots are available for option boards.




**Rear connections - Barrier terminal strips (USA)**
The RS232 / RS485 programmable port and the two digital outputs are included in the basic configuration. Two slots are available for option boards.



## ORDER CODE

| ALP | | | | | 5 | | | X | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**UPM310**

**Series**
A = Algodue
C = Custom

**Language**
I = Italian
U = English
D = German

**Communication protocol**
B = A2 ASCI
C = MODBUS
L = LONBUS
P = PROFIBUS
E = ETHERNET*

**Aux power supply**
A = 65 ÷ 250$V_{AC}$ / 90 ÷ 250$V_{DC}$
R = 19 ÷ 60$V_{DC}$

**Serial port**
5 = RS232/485 selectable by dip switch

**Memory**
X = None (VAF version)
1 = 128 kB basic version
6 = 2 MB ENH version (only with firmware option 4)

**Firmware options**
2 = Basic version
3 = Version with harmonics up to 31st + DPF
4 = ENH version with harmonics up to 50th + DPF
(only with memory 6)

**Physical configuration**
STANDARD PLUGGABLE TERMINALS (EU)
A = DIN 96x96 instrument
E = Trasducer + mounting accessories
BARRIER TERMINAL STRIPS (USA)
G = DIN 96x96 instrument
K = Trasducer + mounting accessories

**Inputs****
X = None
4 = DI4-TR plug-in board
R = Rogowski input 200÷49995A
(value to be specified)

**Analog outputs****
X = None
2 = AO2-0420 plug-in board
(2 programmable outputs)
4 = 2 AO2-0420 plug-in boards
(4 programmable outputs)

**Digital outputs****
2 = Basic version with 2 outputs (50V - 300m$A_{AC-DC}$)
4 = DO2-ML plug-in board
6 = DO4-ML plug-in board
R = DO2-R plug-in board
V = DO2-MH plug-in board
W = DO4-MH plug-in board

* In case of ETHERNET, default protocol is A2 ASCII. For MODBUS protocol specify it in the order.

** Max 2 slots for plug-in optional boards.

Subject to change without notice

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