UPM315
DIN 96x96 LCD power meter

- DIN 96 for new or retrofit panels
- Highly sofisticated power meter providing advanced functionality features
- Large graphic LCD display with excellent visibility
- UL recognized under UL61010B-1 and CAN/CSA-C22.2 no.1010.1-92, file #E231725
- Up to two plug-in options
- THD even, odd and individual FFT harmonic analysis up to 50th order
- Power and current demand calculation
- On-board memory up to 2 MB
- Programmable Min/Max & energy data logging
- Event and alarm recording, waveform capture, waveform display, phasor diagrams, historical trending, time-of-use and more...

General description

UPM315 is a multifunction metering device with advanced functionality features, suitable for electrical parameters measurement and power quality analysis.

It provides accurate True RMS values on graphic LCD display, or via communication port. Six or more parameters displayed simultaneously give the complete situation of the electrical line at first sight.

UPM315 performs clear graphical functions such as: waveforms of voltage and current, harmonic spectrum, phasor diagrams and trends of measured values.

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.

The backlighted LCD display is highly efficient therefore it guarantees perfect visibility in all light conditions.

UPM315 offers small size and is suitable for new installations as well as retrofit applications. The power meter fits in DIN 96 square cutouts.

Benefits

- UPM315 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, UPM315 is suitable for replacing conventional meters. It fits in DIN 96 cutout allowing retrofit to existing equipment.
- UPM315 offers time and cost saving on mounting, compared to many individual single-function instruments.
- Via communication port it is possible to read, set 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

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Main features

Measurements

- Single-phase and three-phase 3-wire or 4-wire unbalanced load operation.

- Direct measurement up to 600 (750) V_{AC}.

- Programmable 1A / 5A current full scale.

- True RMS metering provides accurate measurement even for distorted waveform.

- Fully bi-directional, four-quadrant readings. 10 energy counters are available, the apparent 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 35 graphical pages.

- Individual & total harmonic distortion for voltage and current up to the 50th order. The harmonic content is represented like even, odd and total.

- Advanced waveform capture function. The instrument can store, after a trigger, up to 200 waves with a resolution from 16 to 128 samples (depending on the number of waveforms). The trigger can be programmed on a digital input or output change, on a set point crossing or the capture can be started from the keypad. The stored waweform is downloadable through the communication port.

Modularity

- Two slots for plug-in options boards.

- The compact DIN 96 instrument allows to fit the requirements of new installations as well as retrofit applications.

Graphics

- The excellent graphical display performs clear graphical representations allowing an immediate comprehension of the measured parameters. The voltage and current waveforms, the harmonic spectrum and the phasor diagrams are displayed.

- Moreover 6 measured values can be represented as a graphical trend on the display. The scale of the trend can be selected between 15 min, 1 hour, 1 day and 1 month.

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 8 selectable parameters.

- Total and daily energy consumption recording. The consumption of more than 300 days is recorded.

- 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 200 registers gives 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.

- In case of more than one electricity supplier, if three tariffs are not enough it's possible to start from the recorded demand values instead of the daily ones. Each value is recorded with date and time and can be exported for example, in .xls format. This allows to create a flexible map that considers the different electricity suppliers. The DMD value is the AVG value (see programmable recordings). It can be synchronized by an external pulse applied to one of the inputs (option DI4-TR inputs board). In case, UPM315 can be customized with up to 5 tariffs (only on request).

- 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.

Communication

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

- Selectable 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.

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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 and trigger for wave capture. A multiplier is programmable for each input in order to store the real quantities, as well as different measurement units are selectable (kWh, kVAh, kvarh, m^3, etc.).

- One of the digital inputs can be programmed as demand period syncronization input.

- On request input for Rogowski coils.

Other

- Real time clock with battery backup.

- Calculation of capacitor bank value for PF compensation.

- No.1 programmable user page with 6 parameters selected among measured values.

- Five alpha-numeric characters password to avoid unauthorized setup access.

- Downloadable firmware via serial port.

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)	$I_{L1} - I_{L2} - I_{L3} - I_{Lx}$ Therm- I_N-$P_{AV} - S_{AV} - I_{AV}$	●
THERMAL CURRENT	$I_{L1} - I_{L2} - I_{L3}$ [A^2s]	□
K FACTOR	$K_1 - K_2 - K_3$	□
VOLTAGE & CURRENT THD (Total)	$THDV_{L1, L2, L3} - THDI_{L1, L2, L3}$ [%]	●
VOLTAGE & CURRENT THD (Even, Odd)	$THDV_{L1, L2, L3} - THDI_{L1, L2, L3}$ [%]	□
FFT ANALYSIS 31ST	$V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3}$ [%, V, A]	○
FFT ANALYSIS 50TH	$V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3}$ [%, V, A]	□
UNBALANCE	V,I [%]	□
PHASE REVERSAL	123 / 132	●
REAL TIME CLOCK	Date, Time	●

STORED DATA

SYSTEM ACTIVE ENERGY	[Wh]	■
SYSTEM APPARENT ENERGY (N.4 Counters - □)	[VAh]	■
SYSTEM LAGGING REACTIVE ENERGY	[varh ind]	■
SYSTEM LEADING REACTIVE ENERGY	[varh cap]	■
MIN / MAX VALUES WITH TIME REFERENCE	7xV, 5xI, f, 4xPF, 6xTHD	□
PEAK VALUES	$P_{AV} - S_{AV} - I_{AV} - I_{L1} - I_{L2} - I_{L3} - I_{L1TH} - I_{L2TH} - I_{L3TH} - I_{L4TH} - I_N$	●

PROGRAMMABLE RECORDINGS

DAILY CONSUMPTION (More than 300 days)	[Wh, VAh, varh]	■
ALARM / EVENT LOG8 Set Points, Outputs ON/OFF, Instrument ON/OFF		□
MIN / AVG / MAX VALUES[1]	[1]	●

ADVANCED FEATURES

GRAPHICAL TRENDS	Max 6 parameters [15min/1hrs/1day/1month]	□
TIME OF USE (TARIFF REGISTERS)	[Wh, VAh, varh]	□
WAVEFORM CAPTURE	$V_{L1-N} - V_{L2-N} - V_{L3-N} - I_{L1} - I_{L2} - I_{L3}$ [128 samples max]	□
CALCULATION OF PF COMPENSATION	Capacitor bank [kvar]	●
DIGITAL INPUTS COUNTERS	[Wh, VAh, varh, m^3, litres, etc.]	○

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

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

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DEDALO communication software

- For Microsoft Windows environments
- User-friendly
- Single point and network version
- Real time data viewing and trending
- Quick instruments setup
- Up to 5 data logging files
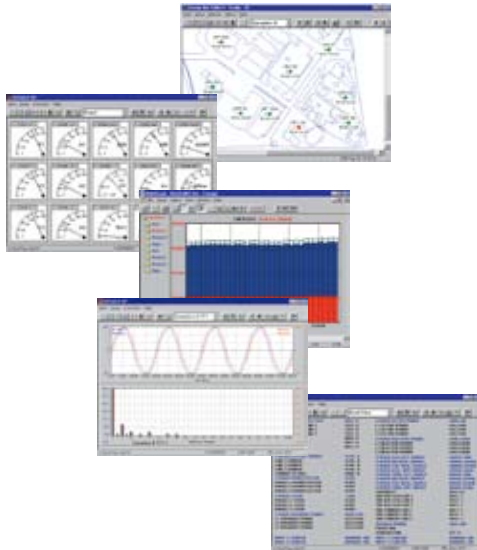
DEDALO software enables power meters to be connected to a PC. It allows to download, to display, to collect and analyse all electrical parameters.

It is also an easy and fast tool for direct or remote connection. It allows to connect to the meters by serial communication port (RS232 or RS485) or by external devices such as telephone line or Ethernet/Internet. This remote monitoring function allows to carry out all the functions from instrument setup to data monitoring or downloading.

The DEDALO software is available in two different versions:
- DEDALO SP: software for single meter connection.
- DEDALO NET: software version for a meter network up to 512 instruments. It is available as workstation package or for multiple user access (LAN version).

Main features

DEDALO software performs the following main functions:
- Real time data viewing and trending
- Instrument recordings download
- Quick instrument setup
- Alarms & limits
- Up to 5 data logging files & printouts
- Export data file

Both the software basic versions can grow by additional functions as the requirements change.

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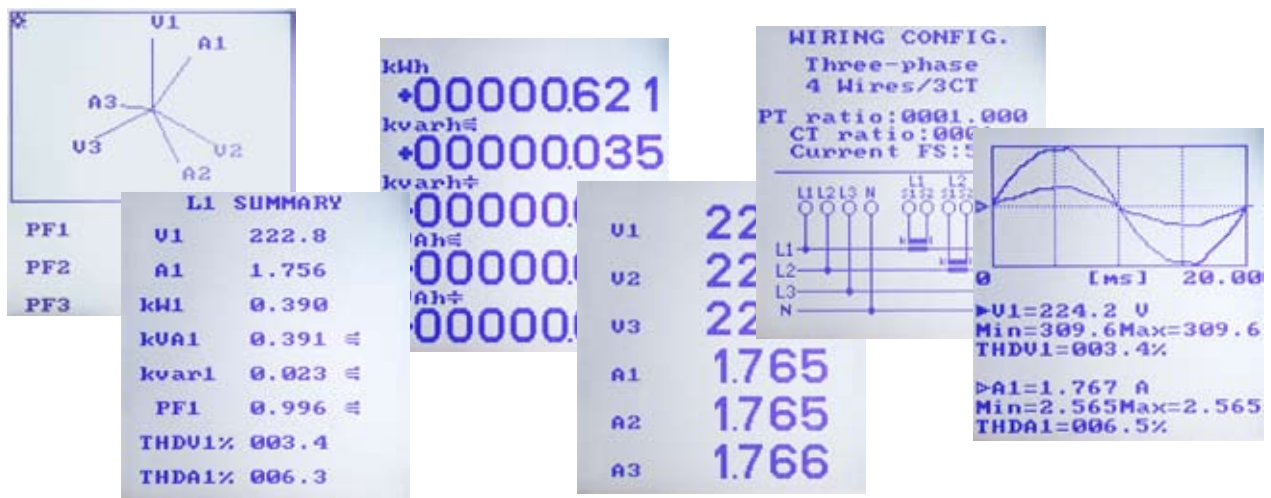
Specifications

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: backlighted graphic LCD display
160 x 144 dots
Keypad: 5 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 - 300mA$_{AC-DC}$)

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: standard pluggable terminals (EU)
on request barrier terminal strips (USA)
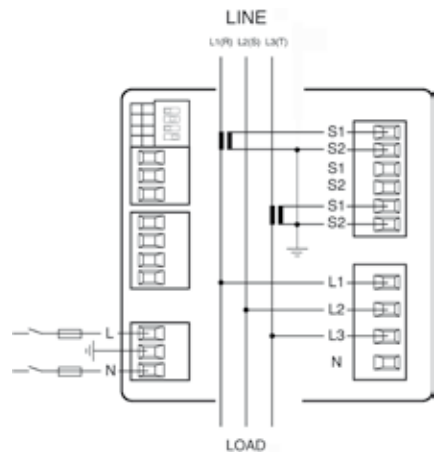Size / weight: 96x96x130 mm / 750 gr

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,
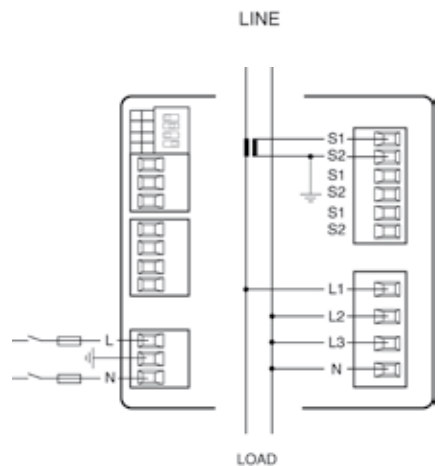EN50081-2, EN50082-2, EN61326/A1

WIRING DIAGRAMS
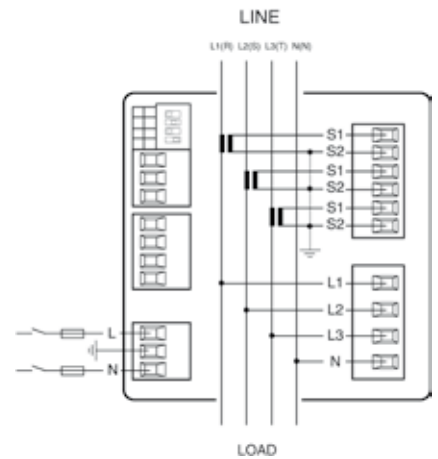
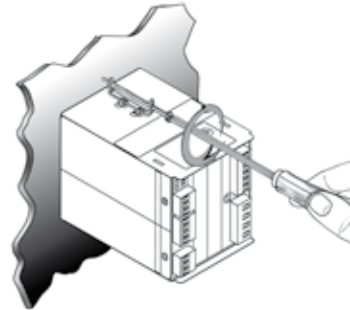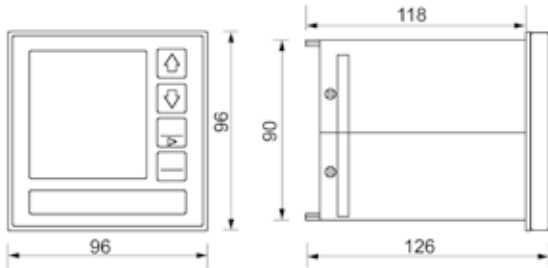3.4.3 - direct connection

3.3.2 - direct connection

1 phase - direct connection

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PHYSICAL CONFIGURATION

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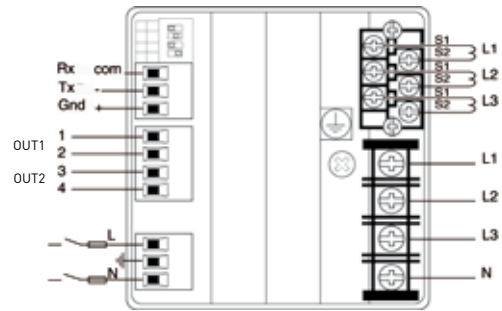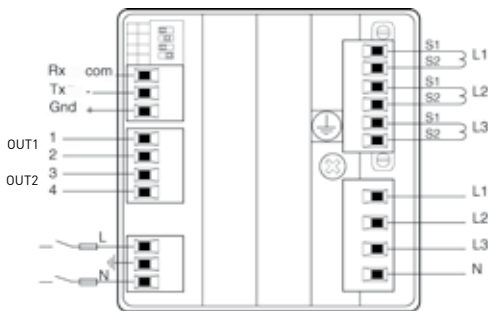

Rear connections - Standard pluggable terminals (EU)
The RS232 / RS485 programmable port and the two digital outputs are included in the basic configuration. Two slots are available for option boards.

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.

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ORDER CODE

| ALR | | | | | 5 | | | | | | | | |

UPM315

Series
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*

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

Serial port
5 = RS232/485 selectable by dip switch

Memory
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)

Time of use (TOU) - only with ENH version
X = None
2 = 5 time of use (120 schedules)
R = 3 time of use (10 schedules)
S = 4 time of use (10 schedules)

Physical configuration
A = Standard Pluggable Terminals (EU)
G = Barrier Terminal Strips (USA)

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 - 300mA$_{AC-DC}$)
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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