

# UPM309 <1/5A CT>

## DIN 96x96 multifunction three-phase meter

- DIN 96x96 ultra compact version, only 39 mm depth
- Fully bi-directional four quadrants measurements for all energies and powers
- Main electrical parameters measured and displayed for a cost-effective consumption analysis
- Version for 1 or 5A CT and for direct connection up to 6A
- Possibility to connect by PT
- Up to 8 MB for data recording (ENH version)
- Possibility to record all energy counters (ENH version)
- Up to 24 parameters selectable among real time measurements for MIN/AVG/MAX recording (ENH version)
- MODBUS RTU/ASCII communication by RS485 port or MODBUS TCP communication by Ethernet port
- Possibility to manage the instrument in remote mode by WintoolNET software or by Web interface
- 2 digital outputs, 1 digital input, 1 analog output (optional)
- Accuracy class 0.5 according to IEC/EN 61557-12 for active power/energy



### » General features

UPM309 is an innovative instrument for measurement and recording of the electrical parameters. It is particularly suitable for consumption analysis and control, with an excellent quality/price ratio.

UPM309 is the ideal instrument to establish the measurement points on the plant.

The instrument can communicate through the RS485 serial port by MODBUS RTU/ASCII protocol or through Ethernet port by MODBUS TCP protocol.

Furthermore, it is available the WintoolNET software for the instrument remote management. Web interface is also available in case of instrument with Ethernet port: a very useful function that gives the possibility to manage the instrument by any PC connected on the network.

### » Benefits

- UPM309 provides fully and accurate information on the load in the measurement point and it allows to calculate the costs of the energy consumption.
- Data read by PC allows to generate consumption profiles, recorded values trend, alarms/events report and costs calculation as well as critical values identification.
- Available the remote firmware upgrade of the instrument.

### » Applications

- Energy audit.
- Monitoring system and energy control.
- Individual machine load monitoring.
- Power peak control.
- Switchboards, gensets, motor control centers, etc.
- Remote metering and cost allocation.

### » Related products

- WintoolNET

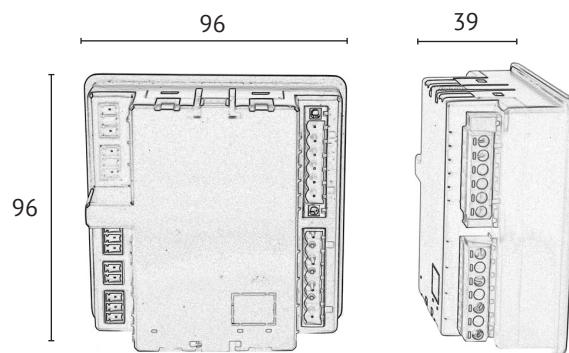
## » Available configurations

		BASIC	ENH
CURRENT INPUTS	For 1/5A CT	●	●
AUXILIARY POWER SUPPLY (make one choice only)	115 VAC ±15% (only for instrument with RS485 port)	●	●
	230 VAC ±15% (only for instrument with RS485 port)	●	●
	85...265 VAC / 110 VDC ±15%		●
COMMUNICATION PORT (make one choice only)	RS485 for MODBUS RTU/ASCII communication	●	●
	Ethernet for HTTP, MODBUS TCP communication		●
INSTRUMENT REMOTE MANAGEMENT	WintoolNET	●	●
	Web server (only for instrument with Ethernet port)		●
SIGN REPRESENTATION IN MODBUS PROTOCOL (make one choice only)	Sign bit	●	●
	2's complement	●	●
2 DIGITAL OUTPUTS	For alarm events or pulse emissions	●	●
ANALOG OUTPUT (only for instrument with RS485 port)	0...20 / 4...20 mADC, programmable		○
DIGITAL INPUT	To synchronise the DMD value calculation	●	●
DMD VALUE CALCULATION MODE	Digital input synchronisation or Fixed window	●	
	Digital input synchronisation, Fixed or Sliding window		●
MEMORY	1 MB	●	
	8 MB		●
RECORDINGS	Active and reactive power AVG values	●	
	Real time params MIN/AVG/MAX values (up to 24 params programmable)		●
	Energy counters		●
WIRING MODES	Three phase, 4 wires, 3 currents (3.4.3)	●	●
	Three phase, 3 wires, 2 currents (3.3.2)	●	●
	Single phase (1ph)	●	●
THD & HARMONICS	Voltage and current THD values	●	●
	Voltage and current harmonics up to 15 <sup>th</sup>		●
APPARENT ENERGY COUNTERS (make one choice only)	Total counters	●	●
	Separated Inductive&Capacitive counters	●	●

### LEGEND

- = Standard
- = Optional

## » Technical drawing



## » Measurements & recordings

INSTANTANEOUS VALUES		BASIC	ENH
VOLTAGE	$V_{L1-N} - V_{L2-N} - V_{L3-N} - V_{L1-L2} - V_{L2-L3} - V_{L3-L1} - V_{\Sigma}$ [V]	●	● MAM
CURRENT (+/-)	$I_{L1} - I_{L2} - I_{L3} - I_N - I_{\Sigma}$ [A]	●	● MAM
ACTIVE POWER (+/-)	$P_{L1} - P_{L2} - P_{L3} - P_{\Sigma}$ [W]	● AVG	● MAM
REACTIVE POWER (+/-)	$Q_{L1} - Q_{L2} - Q_{L3} - Q_{\Sigma}$ [var]	● AVG	● MAM
APPARENT POWER (+/-)	$S_{L1} - S_{L2} - S_{L3} - S_{\Sigma}$ [VA]	●	● MAM
POWER FACTOR (ind&cap)	$PF_{L1} - PF_{L2} - PF_{L3} - PF_{\Sigma}$	●	● MAM
DPF (+/-)	$DPF_{L1} - DPF_{L2} - DPF_{L3}$		● MAM
TANGENT Ø (+/-)	$TAN\theta_{L1} - TAN\theta_{L2} - TAN\theta_{L3} - TAN\theta_{\Sigma}$	●	● MAM
VOLTAGE THD	$THDV_{L1} - THDV_{L2} - THDV_{L3} - THDV_{L1-L2} - THDV_{L2-L3} - THDV_{L3-L1}$ [V]	●	● MAM
CURRENT THD	$THDA_{L1} - THDA_{L2} - THDA_{L3} - THDA_N$ [A]	●	● MAM
FREQUENCY	f [Hz]	●	● MAM
PHASE ORDER	Ph	●	●
DEMAND VALUES (DMD)			
DMD CURRENT (abs)	$I_{L1DMD} - I_{L2DMD} - I_{L3DMD} - I_{NDMD} - I_{\Sigma DMD}$ [A]		●
DMD ACTIVE POWER (imp&exp)	$P_{L1DMD} - P_{L2DMD} - P_{L3DMD} - P_{\Sigma DMD}$ [W]	●	●
BALANCE OF DMD SYSTEM ACTIVE POWER (+/-)	$P_{\Sigma DMBAL}$ [W]		●
DMD REACTIVE POWER (imp&exp)	$Q_{L1DMD} - Q_{L2DMD} - Q_{L3DMD} - Q_{\Sigma DMD}$ [var]	●	●
BALANCE OF DMD SYSTEM REACTIVE POWER (+/-)	$Q_{\Sigma DMBAL}$ [var]		●
DMD APPARENT POWER (imp&exp)	$S_{L1DMD} - S_{L2DMD} - S_{L3DMD} - S_{\Sigma DMD}$ [VA]		●
BALANCE OF DMD SYSTEM APPARENT POWER (+/-)	$S_{\Sigma DMBAL}$ [VA]		●
DMD POWER FACTOR (imp&exp)	$PF_{L1DMD} - PF_{L2DMD} - PF_{L3DMD} - PF_{\Sigma DMD}$		●
MAX VALUES			
MAX VOLTAGE	$V_{L1-NMAX} - V_{L2-NMAX} - V_{L3-NMAX} - V_{L1-L2MAX} - V_{L2-L3MAX} - V_{L3-L1MAX} - V_{\Sigma MAX}$ [V]	●	●
MAX CURRENT (abs)	$I_{L1MAX} - I_{L2MAX} - I_{L3MAX} - I_{NMAX} - I_{\Sigma MAX}$ [A]	●	●
MAX ACTIVE POWER (imp&exp)	$P_{L1MAX} - P_{L2MAX} - P_{L3MAX} - P_{\Sigma MAX}$ [W]		●
MAX REACTIVE POWER (imp&exp)	$Q_{L1MAX} - Q_{L2MAX} - Q_{L3MAX} - Q_{\Sigma MAX}$ [var]		●
MAX APPARENT POWER (imp&exp)	$S_{L1MAX} - S_{L2MAX} - S_{L3MAX} - S_{\Sigma MAX}$ [VA]		●
MAX POWER FACTOR (imp&exp)	$PF_{L1MAX} - PF_{L2MAX} - PF_{L3MAX} - PF_{\Sigma MAX}$		●
MAX TANGENT Ø (imp&exp)	$TAN\theta_{L1MAX} - TAN\theta_{L2MAX} - TAN\theta_{L3MAX} - TAN\theta_{\Sigma MAX}$		●
MAX VOLTAGE THD	$THDV_{L1MAX} - THDV_{L2MAX} - THDV_{L3MAX} - THDV_{L1-L2MAX} - THDV_{L2-L3MAX} - THDV_{L3-L1MAX}$ [V]		●
MAX CURRENT THD	$THDA_{L1MAX} - THDA_{L2MAX} - THDA_{L3MAX} - THDA_{NMAX}$ [A]		●
MAX DMD CURRENT	$I_{L1MAXDMD} - I_{L2MAXDMD} - I_{L3MAXDMD} - I_{\Sigma MAXDMD}$ [A]		●
MAX DMD ACTIVE POWER (imp&exp)	$P_{L1MAXDMD} - P_{L2MAXDMD} - P_{L3MAXDMD} - P_{\Sigma MAXDMD}$ [W]	●	●
MAX DMD REACTIVE POWER (imp&exp)	$Q_{L1MAXDMD} - Q_{L2MAXDMD} - Q_{L3MAXDMD} - Q_{\Sigma MAXDMD}$ [var]	●	●
MAX DMD APPARENT POWER (imp&exp)	$S_{L1MAXDMD} - S_{L2MAXDMD} - S_{L3MAXDMD} - S_{\Sigma MAXDMD}$ [VA]		●
MIN VALUES			
MIN SYSTEM ACTIVE POWER	$P_{\Sigma MIN}$ [W]	●	●
MIN SYSTEM REACTIVE POWER	$Q_{\Sigma MIN}$ [var]	●	●
MIN SYSTEM APPARENT POWER	$S_{\Sigma MIN}$ [VA]	●	●
COUNTERS			
ACTIVE ENERGY (imp&exp)	$kWh_{L1} - kWh_{L2} - kWh_{L3} - kWh_{\Sigma}$ [Wh]	●	● EC
BALANCE OF SYSTEM ACTIVE ENERGY	$kWh_{\Sigma BAL}$ [Wh]	●	● EC
REACTIVE ENERGY (imp&exp) (ind&cap)	$kvarh_{L1} - kvarh_{L2} - kvarh_{L3} - kvarh_{\Sigma}$ [varh]	●	● EC
BALANCE OF SYSTEM REACTIVE ENERGY (ind&cap)	$kvarh_{\Sigma BAL}$ [varh]	●	● EC
APPARENT ENERGY (imp&exp) (ind&cap on request)	$kVAh_{L1} - kVAh_{L2} - kVAh_{L3} - kVAh_{\Sigma}$ [VAh]	●	● EC
BALANCE OF SYSTEM APPARENT ENERGY (ind&cap on request)	$kVAh_{\Sigma BAL}$ [VAh]	●	● EC
INSTALLATION HOUR COUNTER	HRCNTi [h]		●
MEASUREMENT HOUR COUNTER	HRCNTm [h]		●
HARMONIC ANALYSIS UP TO 15 <sup>th</sup>			
VOLTAGE HARMONICS	$V_{L1-N} - V_{L2-N} - V_{L3-N} - V_{L1-L2} - V_{L2-L3} - V_{L3-L1}$ [V]		● MAM
CURRENT HARMONICS	$I_{L1} - I_{L2} - I_{L3} - I_N$ [A]		● MAM

**LEGEND**

● = Standard

+/- = Signed value  
 imp&exp = Values splitted in imported and exported  
 abs = Absolute value  
 ind&cap = Values splitted in inductive and capacitive

AVG = Parameters for AVG recording (fixed)  
 MAM = Parameters for MIN/AVG/MAX recording (up to 24 params programmable)  
 EC = Parameters for Energy counter recording (fixed)

DMDBAL = Difference between the positive and negative demand value: [DMD+] - [DMD-]  
 BAL = Difference between the imported and exported value: [imp] - [exp]

## » Specifications

POWER SUPPLY	
Voltage range (according to the model):	Instrument with RS485 port: 230 VAC ±15% 115 VAC ±15% <b>on request</b> 85...265 VAC / 110 VDC ±15% <b>on request</b>
Safety:	300 V CAT III
Frequency:	50/60 Hz
VOLTAGE INPUTS	
Maximum measurable voltage:	600 VAC L-L
Safety:	300 V CAT III
Minimum voltage for FFT calculation:	20/35 VAC (multiplied by PT ratio in case of PT use) with direct connection
Input impedance:	>1.3 MOhm
Frequency:	45 - 65 Hz
CURRENT INPUTS	
Maximum value:	7 A
Starting current (I <sub>s</sub> ):	2 mA
CT burden:	max 0.15 VA per phase
Minimum current for FFT calculation:	100 mA * CT ratio
TYPICAL ACCURACY / PERFORMANCE CLASS (device only)	
Voltage:	±0.2% reading in 10% FS...FS range (FS=Full Scale value)
Current:	±0.4% reading in 5% FS...FS range
Frequency:	±0.1% reading ±1 digit in 45...65 Hz range
Active power/energy:	Class 0.5 according to IEC/EN 61557-12
Reactive power/energy:	Class 2 according to IEC/EN 61557-12
DISPLAY & KEYBOARD	
Display:	Backlighted LCD, 78x61 mm 3 rows, 4 digits + symbols
Keyboard:	4 front buttons
COMMUNICATION PORT	
Type:	RS485 optoisolated or Ethernet (RJ45)
Protocols:	MODBUS RTU/ASCII in case of RS485 port HTTP, NTP, DHCP, MODBUS TCP in case of Ethernet port
Baud rate:	300 a 57600 bps in case of RS485 port 10/100 Mbps in case of Ethernet port
2 DIGITAL OUTPUTS (DO)	
Type:	NPN or PNP, passive optoisolated
Maximum values (according to IEC/EN 62053-31):	27 VDC - 27 mA
Energy pulse length (only for DO in pulse mode):	50 ±2ms ON time
Max output reaction time (only for DO in alarm mode):	1 s
ANALOG OUTPUT (AO)	
Type:	Active optoisolated
Selectable ranges:	0...20 / 4...20 mADC
Maximum load:	500 Ω
DIGITAL INPUT (DI)	
Type:	Optoisolated
Voltage range:	80 ... 265 VAC-DC
WIRE DIAMETER FOR TERMINALS	
Measuring terminals (A&V):	2.5 mm <sup>2</sup> / 14 AWG
Terminals for I/O, AUX, RS485 port:	1.5 mm <sup>2</sup> / 16 AWG
SIZE & WEIGHT	
LxHxP, W:	96x96x39 mm, max 310 g
ENVIRONMENTAL CONDITIONS	
Operating temperature:	-25°C ... +55°C (3K6)
Storage temperature:	-25°C ... +75°C (2K3)
Max humidity (without condensation):	80%
Sinusoidal vibration amplitude:	50 Hz ±0.075 mm
Protection degree - frontal part:	IP54 (granted only in case of installation in a cabinet with at least IP54 protection degree)
Protection degree - terminals:	IP20
Pollution degree:	2
Installation and use:	Internal
STANDARD COMPLIANCE (for the parts applicable for instrument)	
Directives:	2006/95/EC, 2004/108/EC
Safety:	EN 61010-1, EN 61010-2-030, EN 61010-2-032
EMC:	EN 61326-1, EN 55011, EN 61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11, EN61000-6-2

ORDER CODE	VERSION		POWER SUPPLY	COMMUNICATION PORT with SIGN BIT in Modbus		APPARENT EN. COUNTER (VAh)	I/O			REMOTE MANAGEMENT	
	BASIC	ENH	Auxiliary	RS485	ETHERNET	SEPARATED Ind&Cap	DI	DO	AO	WintoolNET	Web Server
<b>FOR 1/5A CTs (not included)</b>											
1211.0001.0001	●		230VAC ±15%	●		●	●	●		●	
1211.0002.0001		●	230VAC ±15%	●		●	●	●		●	
1211.0003.0001		●	230VAC ±15%	●		●	●	●	●	●	
1211.0004.0001		●	85...265VAC/110VDC ±15%		●	●	●	●		●	●

**OPTIONS AVAILABLE ONLY ON REQUEST (MOQ 30 PCS)**

2'S COMPLEMENT for sign representation in Modbus protocol

TOTAL apparent energy counters (Ind+Cap)

PNP type digital outputs

115VAC ±15% or 85...265VAC/110VDC ±15% power supply

To be indicated together with the selected order code from the list above.

**LEGEND**

- BASIC:** Reduced parameter set and functions - 1MB memory, active&reactive power AVG recording.
- ENH:** Extended parameter set and functions - 8MB memory, real time parameters MIN/AVG/MAX recording (up to 24 parameters programmable), energy counter recording.
- DI:** 1 digital input to synchronise demand value calculation.
- DO:** 2 NPN type digital outputs for alarm or pulse emission.
- AO:** 1 analog output for real time parameter variation transmission.
- WintoolNET:** Software for instrument remote management, downloadable for free at [www.algodue.it](http://www.algodue.it), in the Client protected area.

NOTE: Subject to change without notice



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