

# UPM309RGW <KIT30, KIT45, KIT70, KIT90>

## DIN 96x96 multifunction three-phase meter with Rogowski coils

- 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
- 4 available KITS: 30, 45, 70, 90 cm coil length
- 3 selectable current scales
- Possibility to connect by PT
- Up to 8 MB for data recording
- Possibility to record all energy counters
- Up to 24 parameters selectable among real time measurements for MIN/AVG/MAX recording
- 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.

The connections are very quick and easy, very useful for retrofitting applications on existing switchboards or for energy audit.

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.
- The use of Rogowski coils for current measurement grants a quick installation, particularly on existing plants. In case of changes on the plant, the instrument can be fit for the current consumption without replacing the transducer.
- 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

- MFC150
- WintoolNET

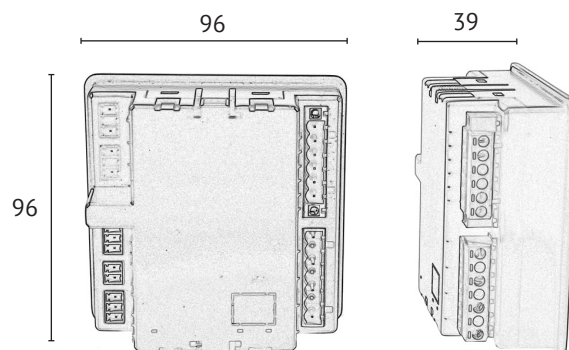
## » Available features

|   |  |   |
|---|--|---|
| <b>CURRENT INPUTS</b>   | Rogowski inputs (3 MFC150 included)                                | ● |
| <b>AUXILIARY POWER SUPPLY</b><br>(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%  | ● |
| <b>COMMUNICATION PORT</b><br>(make one choice only)                     | RS485 for MODBUS RTU/ASCII communication                           | ● |
|   | Ethernet for HTTP, MODBUS TCP communication                        | ● |
| <b>INSTRUMENT REMOTE MANAGEMENT</b>                                     | WintoolNET   | ● |
|   | Web server (only for instrument with Ethernet port)                | ● |
| <b>SIGN REPRESENTATION IN MODBUS PROTOCOL</b><br>(make one choice only) | Sign bit   | ● |
|   | 2's complement   | ● |
| <b>2 DIGITAL OUTPUTS</b>  | For alarm events or pulse emissions                                | ● |
| <b>ANALOG OUTPUT</b><br>(only for instrument with RS485 port)           | 0...20 / 4...20 mADC, programmable                                 | ○ |
| <b>DIGITAL INPUT</b>  | To synchronise the DMD value calculation                           | ● |
| <b>DMD VALUE CALCULATION MODE</b>                                       | Digital input synchronisation, Fixed or Sliding window             | ● |
| <b>MEMORY</b>   | 8 MB   | ● |
| <b>RECORDINGS</b>   | Real time params MIN/AVG/MAX values (up to 24 params programmable) | ● |
|   | Energy counters  | ● |
| <b>WIRING MODES</b>   | Three phase, 4 wires, 3 currents (3.4.3)                           | ● |
|   | Three phase, 3 wires, 2 currents (3.3.2)                           | ● |
|   | Single phase (1ph)   | ● |
| <b>THD &amp; HARMONICS</b>  | Voltage and current THD values                                     | ● |
|   | Voltage and current harmonics up to 15 <sup>th</sup>               | ● |
| <b>APPARENT ENERGY COUNTERS</b><br>(make one choice only)               | Total counters   | ● |
|   | Separated Inductive&Capacitive counters                            | ● |

**LEGEND**

- = Standard
- = Optional

## » Technical drawing



## » Measurements & recordings

| INSTANTANEOUS VALUES                                   |   |       |
|--|---|-------|
| 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]   | ● MAM |
| REACTIVE POWER (+/-)                                   | $Q_{L1} - Q_{L2} - Q_{L3} - Q_{\Sigma}$ [var]   | ● 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
- MAM = Parameters for MIN/AVG/MAX recording (up to 24 params programmable)
- EC = Parameters for Energy counter recording (fixed)
- +/- = Signed value
- imp&exp = Values splitted in imported and exported
- abs = Absolute value
- ind&cap = Values splitted in inductive and capacitive

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%<br>115 VAC ±15% on request<br>85...265 VAC / 110 VDC ±15% on request        |
| Safety:   | Instrument with Ethernet port: 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:  | 3 selectable scales, 500/4000/20000 A  |
| Starting current ( $I_{sc}$ ):                                | 0.3 A for FSA 500 A, 1 A for FSA 4000 A, 10 A for FSA 20000 A  |
| Minimum current for FFT calculation:                          | 70 A for FSA 500 A, 400 A for FSA 4000 A, 1500 A for FSA 20000 A   |
| 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<br>2% harmonic accuracy ±2 digits  |
| 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<br>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<br>HTTP, NTP, DHCP, MODBUS TCP in case of Ethernet port                       |
| Baud rate:  | 300 a 57600 bps in case of RS485 port<br>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   |
| EMC:  | EN 61326-1, EN 55011, EN 61000-4-2, EN61000-4-3, EN61000-4-4,<br>EN61000-4-5, EN61000-4-6, EN61000-4-11, EN61000-6-2 |

| ORDER CODE  | ROGOWSKI KIT DETAIL |        | VER. | POWER SUPPLY            | COMMUNICATION PORT with SIGN BIT in Modbus |          | APPARENT EN. COUNTER (VAh) | I/O |    |    | REMOTE MANAGEMENT |            |
|---|---------------------|--------|------|-------------------------|--|----------|----------------------------|-----|----|----|-------------------|------------|
|   | Length [cm]         | Ø [cm] | ENH  | Auxiliary               | RS485                                      | ETHERNET | SEPARATED Ind&Cap          | DI  | DO | AO | WintoolNET        | Web Server |
| <b>ROGOWSKI COIL KIT: NO. 3 MFC150 INCLUDED, 3m cable</b> |                     |        |      |                         |  |          |                            |     |    |    |                   |            |
| 1212.0001.0001  | 30                  | ~10    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  |    | ●                 |            |
| 1212.0002.0001  | 45                  | ~14    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  |    | ●                 |            |
| 1212.0003.0001  | 70                  | ~22    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  |    | ●                 |            |
| 1212.0004.0001  | 90                  | ~29    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  |    | ●                 |            |
| 1212.0005.0001  | 30                  | ~10    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  | ●  | ●                 |            |
| 1212.0006.0001  | 45                  | ~14    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  | ●  | ●                 |            |
| 1212.0007.0001  | 70                  | ~22    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  | ●  | ●                 |            |
| 1212.0008.0001  | 90                  | ~29    | ●    | 230VAC ±15%             | ●  |          | ●                          | ●   | ●  | ●  | ●                 |            |
| 1212.0009.0001  | 30                  | ~10    | ●    | 85...265VAC/110VDC ±15% |  | ●        | ●                          | ●   | ●  |    | ●                 | ●          |
| 1212.0010.0001  | 45                  | ~14    | ●    | 85...265VAC/110VDC ±15% |  | ●        | ●                          | ●   | ●  |    | ●                 | ●          |
| 1212.0011.0001  | 70                  | ~22    | ●    | 85...265VAC/110VDC ±15% |  | ●        | ●                          | ●   | ●  |    | ●                 | ●          |
| 1212.0012.0001  | 90                  | ~29    | ●    | 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

CABLE LENGTH different from standard (3m): 5, 7, 10 m

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

**LEGEND**

**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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