Smart Energy &
Power Quality Solutions

EN 50160 / ISO 50001
Made in Germany

UMG 507 – Power analyser

Janitza®

UMG 507 – Power analyser

Power analysers of the UMG 507 product family are suitable for use at all network levels. The continuous measurement enables the collection of various measurement parameters, the identification of short-term interruptions, a fault recorder function and harmonic analysis. Extensive communication options e.g. Ethernet (TCP/IP), Modbus, Profibus, RS232, RS485, HTTP, SMTP, UTP or DNS allow affordable and quick integration in existing communication networks. Worldwide access to the embedded web server can be gained through a web browser. This means that the extensive opportunities offered by the UMG 507 are available without any additional software. The large number of digital and analogue inputs and outputs enable incorporation in monitoring systems, control tasks, information reports, the communication of measurement data (e.g. energy consumption) to a central control point and incorporation in extensive energy management systems. Nummerus logic functions allow the analysis of measurement data and the introduction of concrete measures.

Areas of application

- For measuring, monitoring and control of electrical parameters in energy distribution systems
- For recording load profiles (energy consumption) for energy management systems (cost centre data collection)
- For monitoring power quality (harmonics, short term interruptions, inrush currents...)
- Control tasks e.g. depending upon the achieved measurement values or limit values
- Remote monitoring via onboard homepage

UMG 507

Multi-function power analyser

The use of energy measurement technology in energy distribution has moved dynamically towards digital universal measuring instruments in the past few years. The advantages are obvious: lower equipment costs for more information and functionality. In addition, digital measuring technology is more accurate, even all along the entire lifespan.

Clear cost advantages also result from the construction of the cabinet which results in lower installation costs and less wiring efforts in comparison to analogue measuring technology. Power analysers of the UMG 507 product family are designed for use at all network levels.

Main features

- Continuous measurement
- Data collection of short-term interruptions
- Ethernet and embedded web server
- Harmonics analysis
- 6 digital inputs, 6 digital outputs, 2 analogue outputs, 1 analogue input
- 1 temperature input
- Integrated logic for control tasks and alarm signals
- Modbus master, Ethernet / Modbus gateway

Due to the continuous measurement, short-term interruptions are registered and the fault recorder function provides more information about the event. A rapid, cost-optimised and reliable communication system can be developed through the Ethernet connection. The instrument's own homepage offers you the opportunity to call up the data or configure the instrument directly using the embedded web server. The large number of digital and analogue inputs and outputs offers a variety of communication possibilities and allow connection to PLC controls and independent control tasks. The integrated harmonic analysis becomes more significant with increasing network pollution (increasing THD-U values).

Applications

The three-phase electronic measuring instrument collects and digitalises the effective values of currents and voltages (True RMS) in a 50/60Hz network. The integrated microprocessor calculates the electrical parameters from the sampling values. All measurement values are continuously measured and recorded at intervals of 200ms over 10 periods (50 Hz).

This allows the safe identification of short-term interruptions with the fault recorder function. For short-term events, the effective values are recorded over 128 periods with 64 pre-trigger periods and with the transient memory over 5 periods with 2 pre-trigger periods.

The reaction time of the internal outputs is < 10ms and the external bus outputs < 200ms.

GridVis software
The UMG 507 power analysers already contain the GridVis software upon delivery. On one hand, this software enables simple and complete parameterisation of the respective measurement instruments and on the other hand, can analyse the measurement value memory in the unit. In GridVis, the data are stored in a database and can be processed in MS Excel for example. GridVis also allows online presentation of the measurement values. More information is available in chapter 5 – "Software".

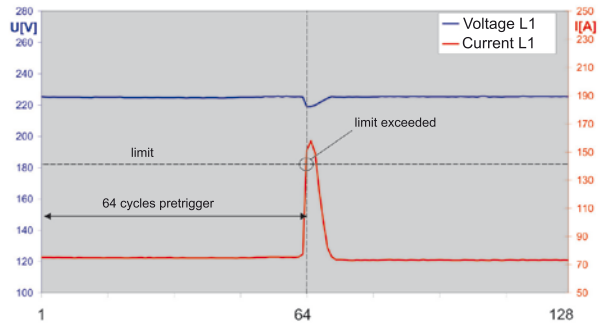
Embedded web server/e-mail
Worldwide access to the UMG 507 can be gained through a web browser. In order to provide access, the web address and access authorisations must be set up. The complete parameterisation software is filed as an HTML page on the flash memory. The open architecture of the UMG 507 allows the user to apply own ideas to design Java-Applets and Active X-components and file them on the UMG 507. If limit value violations or events occur, they can be automatically sent to the set up e-mail address. Data from the memory storage can be sent by e-mail (attachment) at preset times and processed with the GridVis software.
Protocols: HTTP, SMT, UTP, DNS, NTP, MOD TCP, Modbus over TCP, DHCP/BootP.

Connection to an ISDN router / DSL router
The unit can be connected to the internet using an external router (e.g. ISDN router or DSL router).

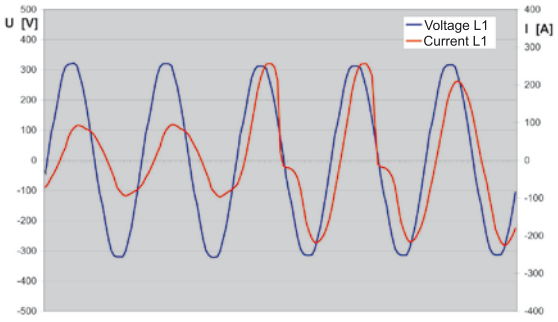
The SMTP authentication enables you to store mails on the internet provider's mailbox using the Plain/Login/Cram-MDS (newest encryption methods).

Data collection and recording
The UMG 507 has an internal memory of 256 KB RAM and, depending on the version, an additional memory of 16 MB flash is available for continuous recording of the measured data. This measurement value memory can be freely configured with reference to the measurement values which are to be saved and the recording intervals. In addition, the highest and lowest actual values (200 ms average time) can also be saved within these intervals. The recording of events is prompted by triggers. Events such as excess currents, under voltage or overvoltage can be safely collected from a half period duration. Events are recorded over 128 periods as effective value recorders.

Effective value recorder (128 periods)



Waveform recorder



Transformer monitoring, k-factor

The maximum permitted current can be monitored in transformers, fuses or motors by entering the k-factor. The data from transformer manufacturers such as the current and k-factor (1= 100%) can be programmed on the digital output using the comparator. In addition, the temperature input can be used for transformer monitoring.

Inputs and outputs

Depending upon the product variant, the UMG 507 has a large number of internal digital and analogue inputs and outputs (refer to design versions). The top versions of the UMG 507 (AD, P, E and EP) have six digital inputs, six digital outputs, two analogue outputs (0/4-20mA), a temperature input and an analogue input (0/4-20mA). The digital inputs can be used as pulse inputs, synchronisation inputs or signal inputs. The digital outputs can be defined as limit value outputs, pulse outputs, time switch outputs or logic outputs. Both analogue outputs can be applied as measurement value transducers or for analogue control of generators (0-20mA). Transformer temperature data can be collected using the temperature input. Any process signals can be allocated to the analogue input.

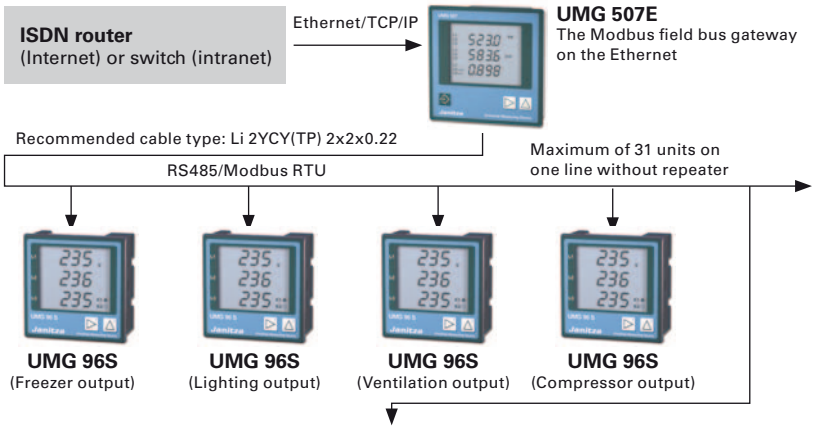
Integrated logic

The 128 programmable logic links provide connections between inputs and outputs, measurement values and internal functions of the UMG 507. The standard operators AND, NAND, OR, XOR, EQU, rising edge and falling edge are available. The events are allocated to free flags which can also be linked with other flags. The incoming information through the Modbus RTU or the Profibus can also be incorporated in the logic links.

Trigger events, the virtual weekly time switch channels and Emax channels, the limit value comparator and signals received through the field bus are available as operands. These flags can then prompt the switchover of digital outputs, tariff changes, measurement value synchronisation, the time setting or the despatch of an e-mail. Measurement values can also be added, subtracted, multiplied or divided.

Modbus RTU master function / Modbus gateway

The RS485 of the UMG 507E/EP can also be used as a Modbus RTU master. This means that the measurement instruments UMG 96, UMG 503, UMG 507L, UMG 505 and Prodata with RS485, protocol Modbus RTU can be connected to the RS485 of the UMG 507E/EP and, in full functionality, can be illustrated on the Ethernet TCP/IP for example. In addition, the instrument inputs and outputs can be decentrally expanded using the WAGO modules. For the Modbus data of other bus users, a minimum of 32 and a maximum of 64 three Modbus data points are available such as in the topology view of the GridVis.




Modem


PLC

Software

Interfaces
- Ethernet
- RS232
- RS485

Highlights
- The despatch of e-mails including ring buffer contents

- **Web server**
  - JAVA Applets
  - Active X components
  - Macromedia FLASH in MX

- Modbus master function
- Supports WAGO I/O using the RS 485 and Modbus TCP/IP*
- Capturing short term interruption >=10ms for U and I
- Measurement value recorder (1 measurement value every 200 ms)
- Connection to DSL/ISDN router

* Special software is necessary on the WAGO coupler - available from us.

Protocols
- Profibus DP V0
- Modbus RTU
- Modbus TCP/IP (Port 502)
- UTP
- Modbus over TCP/IP (Port 8000)
- SMTP
- HTTP
- DNS
- NTP

6 digital inputs
- Pulse input
- HT/LT switchover
- Clock synchronisation
- Signal input logic

6 digital outputs
- Limit value output for I, U, P etc.
- Remote using Modbus / Profibus
- Pulse output effective energy/reactive energy
- Signal output short term interruption reaction time <=10ms
- Logic output

2 analogue outputs
- Settings: 0...20mA or 4...20mA

1 analogue outputs

16Mbyte memory
- For 1000k events and measurement values

256kByte RAM memory
- For 18k events and measurement values

Weekly time switch
- 24 channels
- Digital output
- Nominal value switchover HT/LT
- Send e-mail

Limit value programming with 16 comparators
- Within window
- Within window with hysteresis
- Outside of window
- Outside of window with hysteresis
- Over limit value
- Over limit value with hysteresis
- Under limit value
- Under limit value with hysteresis, setting: lead/follow-up time

Ethernet / Modbus gateway*
- Simple connection of Modbus devices

* Master/Slave operation only possible with UMG 96S, UMG 503, UMG 505, Prophi and ProData

Overview of product variants

Three/four-phase universal measurement instruments 50/60Hz; current transformer...1/5A; including GridVis programming and analysis software																
Auxiliary voltage										Interfaces						
85 .. 265V AC, 120 .. 370V DC	40 .. 115V AC, 55 .. 165V DC	20 .. 45V AC, 20 .. 60V DC	Memory 256k RAM	Additional 16MB flash memory	6 digital inputs	6 digital outputs	1 temperature input	1 analogue input	2 passive analogue outputs	RS 232	RS 485	Ethernet 10baseT	Profibus DP V0	Integrated weekly time switch clock	Type	Item number
•	-	-	•	-	•	•	-	-	-	•	•	-	-	•	**UMG 507 L**	**52.15.004**
•	-	-	•	•	-	-	-	-	-	•	-	•	-	-	**UMG 507 EL**	**52.15.021**
•	-	-	•	-	•	•	•	•	•	•	•	-	-	•	**UMG 507 AD**	**52.15.003**
•	-	-	•	-	•	•	•	•	•	•	•	-	•	•	**UMG 507 P**	**52.15.002**
•	-	-	•	•	•	•	•	•	•	•	•	•	-	•	**UMG 507 E**	**52.15.001**
-	•	-	•	•	•	•	•	•	•	•	•	•	-	•	**UMG 507 E**	**52.15.006**
-	-	•	•	•	•	•	•	•	•	•	•	•	-	•	**UMG 507 E**	**52.15.011**
•	-	-	•	•	•	•	•	•	•	•	•	•	•	•	**UMG 507 EP**	**52.15.005**
-	•	-	•	•	•	•	•	•	•	•	•	•	•	•	**UMG 507 EP**	**52.15.010**
-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	**UMG 507 EP**	**52.15.015**

• = Included - = Not possible

General technical data

Operating voltage L-N, AC		Refer to order details
Overvoltage category		600V CAT III
Quadrants		4
Measurement	Per channel	Continuous
Weight		1kg
Dimensions		W= 144mm x H= 144mm x D=66.5mm
Mounting		Front panel installation
Working temperature range		-10…55 °C
Connectable conductors (U/I)	Single wire, multi-wire, fine-wire, pin cable lugs, ferrule	0.08 - 2.5 mm^2, 1.5 mm^2
Protection class (front/reverse)	According to EN60529	IP 50/20

Measurement range

Voltage L-N, AC (without voltage transformer)		50…500VAC
Voltage L-L, AC (without voltage transformer)		80…870VAC
Current (transformer: x/1 and x/5 A)		0.005...6 A
Frequency of mains		45...65 Hz
Grid types		TN, TT, (IT)
Measurement in single and multi-phase networks		1ph, 2ph, 3 ph and up to 3 x 1ph

Measurement accuracy

Accuracy VA		± 0,2%
Reactive energy kvarh	Class	1 (5A), 2 (1A)
Effective energy kWh	Class	1 (5A), 2 (1A)

Measurement values

Measurement parameter	Display range	Measurement range at scaling factor 1	L1	L2	L3	Sum	Lowest value	Maximum average value	Average value*1	Maximum value	Date/Time	Measurement accuracy
Current .. /(1)5A	0.000 .. 9999 A	0.005 .. /(1)6A	•	•	•			•	•	•	•	+-0.2 %
Current, N	0.000 .. 9999 A	0.060 .. 15 A				•		•		•	•	+-0.6 %
Voltage L-N	0.0 .. 999.9 MV	50 .. 500 V	•	•	•		•	•		•	•	+-0.2 %
Voltage L-L	0.0 .. 999.9 MV	90 .. 870 V	•	•	•		•	•		•	•	+-0.2 %
Pos./neg./ zero sequence	0.0 .. 999.9 MV	50 .. 500 V						•		•	•	+-0.5 %
Frequency (U)	45.00 .. 65.00 Hz	45.00 .. 65.00 Hz	•	•	•		•	•		•	•	+-0.2 %
Effective power +/-	0.00 W .. 9999 MW	0.05 W .. 2.5 kW	•	•	•	•		•	•	•	•	+-0.5 %
Apparent power	0.00 VA .. 9999 MVA	0.05 VA .. 2.5 kVA	•	•	•	•		•		•	•	+-0.5 %
Reactive power	0.00 kvar .. 999 mvar	0.05 var .. 2.5 kvar	•	•	•	•		•		ind.	•	+-0.5 %
Power factor	0.00 kap. .. 1.00 .. 0.00 ind.	0.00 kap. .. 1.00 .. 0.00 ind.	•	•	•	•		•		ind.	•	+-0.5 %
Effective energy + Effective energy -	0.0 Wh .. 9999 GWh -0.0 Wh .. -9999 GWh	0.05 Wh .. 9999 GWh*2 -0.05 Wh .. -9999 GWh*2				•		•			t^1/t^2	Class *3 1 (5A), 2 (1A)
Reactive energy +/-	0.0 .. 9999 Gvarh	0.05vars .. 9999 Mvarh*2				•		•			t^1/t^2	Class *3 1 (5A), 2 (1A)

t^1: start time, t^2: runtime, + purchase, - supply
*1- integration over time: 5, 10, 15, 30 seconds, 1, 5, 10, 15, 30 and 60 minutes
*2 - memory period – 60 minutes
*3 - accuracy class according to DIN EN61036: 2001-01, VDE0418 part 7, IEC1036:1996 + A1: 2000

Power quality

Harmonics, 1st to 20th harmonics, uneven	Current, voltage L1, L2, L3	Accuracy: ± 0.5%
Distortion factor THD- U in %	L1, L2, L3	Accuracy: ± 0.5%
Distortion factor THD- I in %	L1, L2, L3	Accuracy: ± 0.5%
Voltage positive/negative/zero system		Accuracy:: ± 0.5%
Short-term interruptions	10ms	yes
Initial current	10ms	yes
Recorder for limit value events		yes

Features

Memory size		256kB/16MB – refer to order details
Clock		± 2 minutes per month
Integrated logic	128 links, 16 comparators	yes
Weekly time switch	24 channels	yes

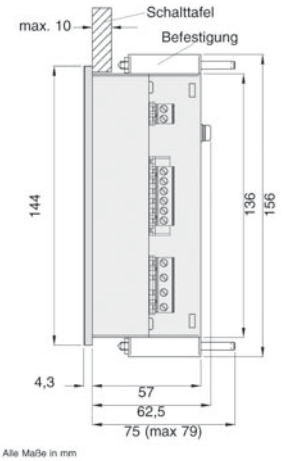
Periphery

Digital inputs	As a status input or pulse input	6, refer to order details
Digital outputs	As a switch output or pulse output	6, refer to order details
Analogue outputs	0(4)...20mA	2, refer to order details
Temperature measurement input	Pt100, Pt1000, KTY83, KTY84	1, refer to order details
Analogue input	0(4)...20mA	1, refer to order details
Password protection		yes
Software GridVis	**Refer to chapter 5**	**yes**

Communication

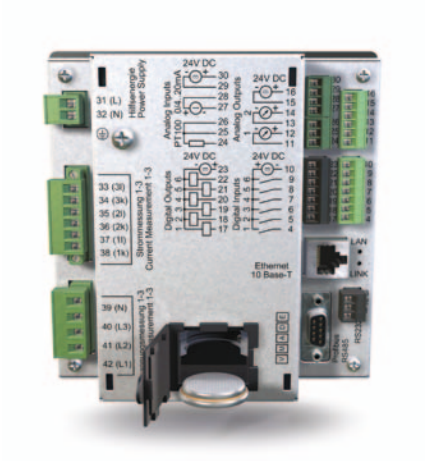
Interfaces		
RS 232	38.4 kbps	yes
RS 485 (Modbus/Profibus)	9.6, 38.4, 115.2 kbps up to 1.5 Mbps (Sub D 9 pole)	Yes, refer to order details
Ethernet 10 Base-T	RJ45	Yes, refer to order details
Protocols		
Modbus RTU		Yes, refer to order details
Profibus DP V0		Yes, refer to order details
Modbus Gateway		Yes, refer to order details
Embedded Webserver	Configurable homepage	Yes, refer to order details
TCP/IP		Yes, refer to order details
SMTP	E-Mail	Yes, refer to order details
DHCP		Yes, refer to order details
Modbus TCP		Yes, refer to order details
Modbus over Ethernet		Yes, refer to order details
BootP		Yes, refer to order details
NTP		Yes, refer to order details

Dimensional drawing



Switchboard cut-out: 139x139 mm

Connection illustration



Typical connection options (e. g. UMG 507EP)