EN 50160 / ISO 50001
Made in Germany

UMG 505 – Power analysis, LON and I/O-Vielfalt

UMG 505 – Power analysis, LON and I/O-Vielfalt

Power analysers of the UMG505 product family are mainly designed for use in low and medium voltage distribution systems. Due to the additional communication options using LON, this power analyser is often used in building management systems. The large number of digital and analogue inputs and outputs (4 DI, 5DO, 4AO) enables the incorporation in monitoring systems, control tasks, information reports, the communication of measurement data (e.g. energy consumption) at a control point and incorporation in an extensive energy management system. Additional functions such as the measurement of harmonics, the recording of minimum and maximum values, pulse and analogue outputs, the bi-metallic strip function, password protection and many more offers an effective tool for fault analysis and for monitoring power quality.

Areas of application

- Measurement, monitoring and control of electrical parameters in energy distribution systems
- Recording of load profiles for energy management systems (cost centre data collection)
- Measurement value generator for central building control systems or PLC
- Monitoring of harmonics, limit value monitoring
- Control tasks e.g. depending upon achieved measurement values or limit values

UMG 505

LON for building services, analogue I/Os for control tasks

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. Universal measuring instruments of the UMG 505 product family are mainly designed for use in low and medium voltage distribution systems.

Main features

- LON bus
- Harmonics display
- 4 analogue outputs
- 4 digital inputs, 5 digital outputs
- Integrated logic for control tasks and alarm signals
- Weekly time switch with 100 channels

In addition to the large quantity of electrical measurement values, this series also offers a number of additional functions such as the recording of minimum and maximum values, the bi-metallic strip function, password protection and many more. Due to the LON field bus, the UMG 505 is starting to find more applications in building services. 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 harmonics analysis becomes more significant with increasing network pollution (increasing THD-U values).

Applications

The UMG 505 is a digital flush-mounted measurement instrument which is suitable for measuring and recording electrical parameters (True-RMS) in low and medium voltage networks. The measurement device is suitable for 1- and 3-phase systems with and without neutral conductors. At a mains frequency of 50 Hz, the scanning frequency of random measurements, which takes place twice per second, is 6.4 kHz. It is characterised by the high accuracy level, the compact construction and the measurement of harmonics in each phase.

In order to achieve functional variety of the UMG 505, you would need around 13 analogue units such as an ampere meter, volt meter, volt meter switch, power meter (kW, kVA, kvar, cos φ), an effective and reactive energy meter (kWh/kvarh), a clock, a frequency meter and a harmonic analyser. This means that the planning, installation, wiring and storage costs are significantly reduced with the UMG 505 in comparison to analogue measuring instruments. Another advantage is the more accurate and better legibility. Selected measurement values and power failure/power return are recorded in a ring buffer with time stamp.

Measurement value displays and automatic display rotation
The extremely legible LCD display in connection with the function keys informs the user about the selected measurement values (actual, low, high and average values). With the UMG 505, three measurement values can be simultaneously displayed in the LCD data field and up to 140 data fields can be individually designed with the GridVis software. A cycle between 1 and 9999 seconds can be set for measurement value rotation and a selection of measurement values can be made.

Memory
The memory of the UMG 505 is split into three areas: the event memory, the lowest and highest memory and the ring buffer.

Event memory
The following events can be stored in the event memory with time and date:

- Deletion of the event memory
- Changes to the digital input
- Failure and return of the auxiliary voltage
- Failure and return of the measurement voltage

Up to a maximum of 9999 events can be stored. The data can only be read out with the PC and the GridVis software.

Ring buffer
The following can be selected for storage in the ring buffer:

- Average of measurement values
- The fixed energy meters

When storing the average values of U1, U2, U3, I1, I2, I3, P1, P2 and P3 using an average time of 15 minutes, the memory is sufficient for a period of 1 year. A total of six limit value windows for storing measurement values can be programmed. The upper and lower limit values can be freely selected. The recording can take place within or outside of the range.

Summer/winter time switch
The following options can be selected:
- No switchover
- Own switchover point
- EU listed switching

Weekly time switch
The time switch in the UMG 505 has 100 time channels. Each time switch channel specifies a period of time. The period of time is specified by the start-up point and the switch off point. The start and stop points are defined by weekdays, hour and minutes. Each time switch channel can simultaneously control a time switch output and select a consumption meter. A time switch output can be allocated to a “digital output” when programming the digital outputs.

Pulse input
Digital input 4 can also be used as a pulse meter input for the effective energy measurement (max 20Hz).

Digital inputs
The 4 optical coupler inputs are illustrated on the internal inputs 1 to 4. The eight inputs from the LON bus interface (option) are illustrated on the internal inputs 5 to 12. The status of the digital inputs 1-4 can be called up using the serial interface.

Each input channel can simultaneously switch a energy counter and synchronise the internal clock.

Two of each of the digital inputs can be linked with each other using AND. The results can be allocated to an input channel. Each digital input 1 to 4 is allocated to an event counter (1-3 max. 1Hz). If one of the digital inputs (1 to 4) is allocated a function, with the exception of pulse value, all changes are recorded with the date and time stamp in the event memory.

Digital output
The UMG 505 has five digital transistor outputs. These outputs are marked on the display with out1 to out5. Each of these outputs can be allocated to a different data source. There are up to 5 different data sources which can be selected:

- Limit value outputs
- Times switch outputs
- LON bus (option)
- Energy meter

Each data source can only be allocated to one output. If an output is allocated to a consumption meter, the output works as a pulse generator.

The signals from all data sources (except the consumption meter) can also be generated as inverted signals.

Pulse outputs
The five digital outputs in the UMG 505 can be assigned as pulse outputs. The minimum pulse length is 50ms and the maximum frequency is 10Hz.

Analogue outputs
The UMG 505 has 4 analogue outputs. The analogue outputs have common ground and are galvanically isolated from the other inputs and outputs in the UMG 505. An external auxiliary voltage of 20V to 30V DC is required to operate the analogue outputs. The sources for analogue outputs are:

- Measurement values
- Values which are sent to the UMG 505 through Modbus.

Interfaces
Depending upon the product variant, the UMG 505 is equipped with an RS485 LON and/or an RS232 interface. The RS232 interface serves as a peer-to-peer connection e.g. as a connection between the UMG 505 and a laptop. The protocol Modbus RTU is available through the RS485 which is used to network the UMG 505. The LON interface is frequently used in central building control systems in order to incorporate the UMG 505 in building automation.

Limit value monitoring
Five limit value outputs can be programmed to monitor the measurement values. Each limit value output can be allocated to up to 3 comparators (A, B, C). The following can be programmed for each comparator:

- 2 limit values and 2 measurement values or
- 2 limit values and 1 measurement value or
- 1 limit value and the minimum start-up time

Any limit value violations established by a limit value output is registered in the event memory with a record of the time and can also be issued on a "digital output".


Modem


PLC

Software

Interfaces
- LON
- RS232

Protocols
- LONTalk
- Modbus RTU (RS 232)

4 digital inputs
- Pulse input
- HT/LT switchover
- Clock synchronisation

5 digital outputs
- Limit value output for I, U, P etc.
- Remote using
- Pulse output effective/reactive energy
- Time switch output

4 analogue outputs
- 0 .. 20 mA or 4 .. 20 mA can be set
- Almost all measurement values
- Values from the Modbus

Limit value programming with 3 comparators
- Minimum start up time if the value is exceeded
- Minimum start up time if the value is not achieved
- Hysteresis if the value is exceeded
- Hysteresis if the value is not achieved
- Within range
- Outside of range
- Both limit values exceeded
- Both limit values not achieved

512k byte memory
- For 320,000 measurement values
- Event memory
- Lowest and highest values
- Ring buffer

Weekly time switch
- 100 channels
- Digital output
- Nominal value switchover HT / LT
- Energy meter, 4 tariffs

Overview of product variants

Three / four phase universal measurement instrument; 50/ 60Hz; current transformer ../1/5A; including GridVis programming and analysis software												
Auxiliary voltage							Interfaces					
85 .. 265V AC, 80 .. 370V DC	40 .. 115V AC, 55 .. 165V DC	15 .. 55V AC, 20 .. 80V DC	Memory 512k RAM	4 digital inputs	5 digital outputs	4 passive analogue outputs 0(4) – 20mA	LON	RS 232	RS 485	3-phase measurement	Type	Item number
•	-	-	•	•	•	•	•	•	-	•	**UMG 505 LON**	**52.10.001**
-	•	-	•	•	•	•	•	•	-	•	**UMG 505 LON**	**52.10.002**
-	-	•	•	•	•	•	•	•	-	•	**UMG 505 LON**	**52.10.003**

• = Included - = Not possible

General technical data

Operating voltage L-N, AC		Refer to order details
Overvoltage category		600V CAT III
Quadrants		4
Scanning rate 6 channels	Per channel	6.4 kHz / 7.68 kHz
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

Power quality

Harmonics, 1st to 20th harmonics, even/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%
Recorder for limit value events		yes

Measurement values

Measurement parameter	Display range	Measurement range at scaling factor 1	L1	L2	L3	Sum	Lowest value	Average value*1	Maximum value	Date/Time	Measure-ment accuracy
Current .. /5A	0.000 .. 9999 A	0.005 .. 6 A	•	•	•		•	•	•	•	+-0.2 %
Current .. /1A	0.000 .. 9999 A	0.005 .. 1 A	•	•	•		•	•	•	•	+-0.2 %
Current, calculated in neutral	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	80 .. 870 V	•	•	•		•	•	•	•	+-0.2 %
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	•	•	•	•	kap.	•	ind.	•	+-0.5 %
Power factor	0.00 kap. .. 1.00 .. 0.00 ind.	0.00 kap. .. 1.00 .. 0.00 ind.	•	•	•	•	kap.	•	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	*3
Reactive energy +/-	0.0 .. 9999 Gvarh	0.05vars .. 9999 Mvarh*2				•		•		t^1/t^2	*3
Harmonic rateTHD U,I	0.0 .. 100 %	0.0 .. 100 %	•	•	•		•	•	•	•	+-0.5 %
Partial harmonic I, 2.-20.	0.000 A .. 9999 A	0.005 A .. 5A (1 A)	•	•	•		•	•	•	•	+-0.5 %
Partial harmonic U, 2.-20.	0.000 V .. 9999 V	0.000 V .. 9999 V	•	•	•		•	•	•	•	+-0.5 %

t^1: start time, t2: 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 EN61036:1996, VDE0418 part 7: May 1997, IEC1036:1996 with current transformer ../5A: class 1 with current transformer .../1A: class 2

Features

Memory size		512kB
Clock		± 3 minutes per month
Weekly time switch		Yes, 100 channels

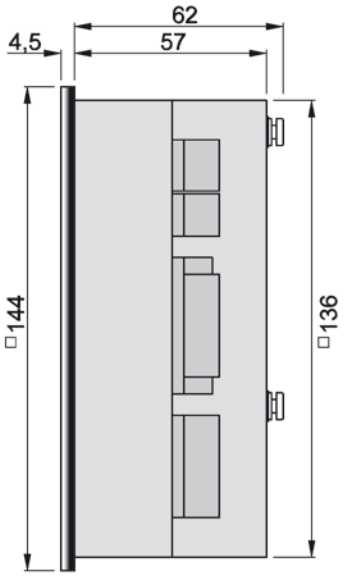
Periphery

Digital inputs	As a status input or pulse input	4
Digital outputs	As a switch output or pulse output	5
Analogue outputs	0(4)...20mA	4
Password protection		yes
Software GridVis	**Refer to chapter 5**	**yes**

Communication

Interfaces		
RS 232	9.6, 19.2, 38.4 kbps	Yes, refer to order details
LON		Yes, refer to order details
Protocols		
Modbus RTU		yes
LonTalk		Yes, refer to order details

Dimensional drawing



Switch board cut-out 139x139 mm

Connection illustration

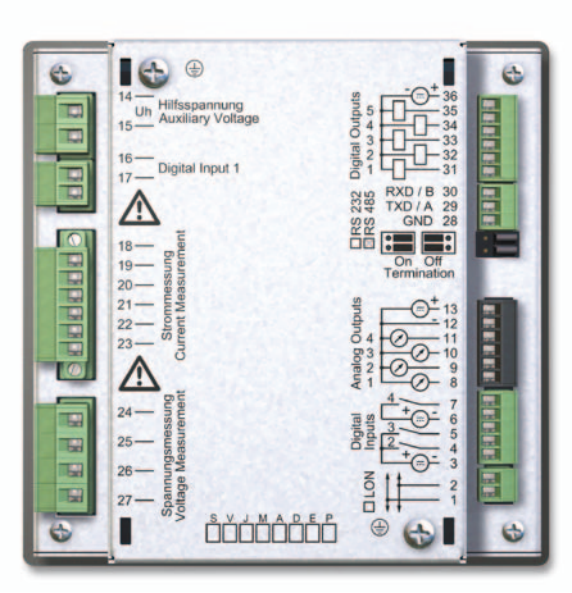


Illustration: option with LON

Typical connection options