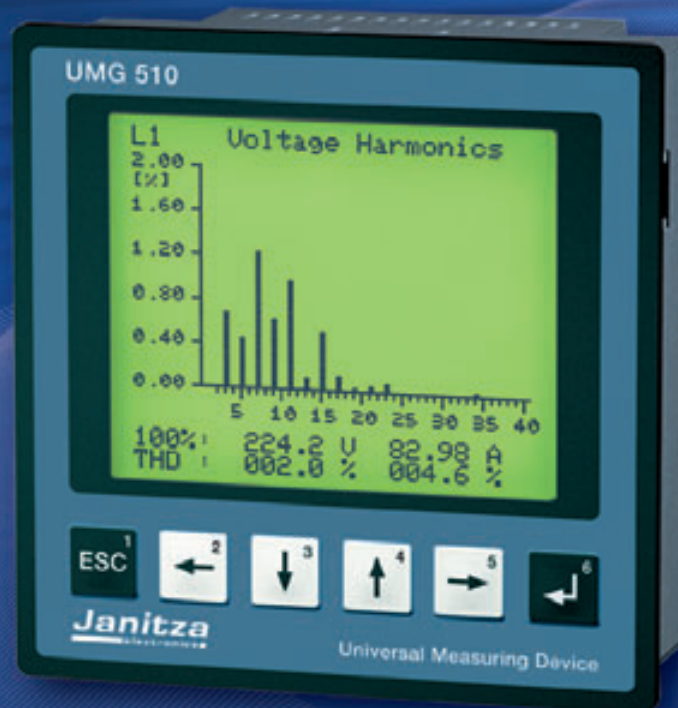


Power Quality Monitoring
Power Management
Cost Centre Management
Power Quality Solutions
Systemsoftware
Applications

Main catalogue 2007



Janitza
electronics



We are inspired by nature

"Owl [lat. Strigiformes], extremely sharp-sighted, nocturnal genera of birds. Able to pre-estimate and classify speed and distance exactly. Reacts phenomenally fast and with highest precision."

Just as sharp-sighted is the UMG 604, but diurnal and nocturnal.

Power analyzer UMG 604

- 500MHz CPU with DSP
- 8 measuring channels (4xV and 4xA)
- Continuous sampling frequency 20kHz/channel
- Periodic true RMS storage with up to 12.000 values per channel
- Short term interruptions (1 period)
- Transient recorder (50_s)
- 1st - 40th harmonic (V, A, P and Q, consumption and delivery)
- Free memory configuration
- 128 MB Flash memory
- Customised user programs (graphically programmable)
- Maximum demand controller (optionally)
- 2 digital inputs and outputs
- 1 temperature input KTY83/84 or PT 100/1000
- Ethernet 10/100 Base TX
- Modbus Gateway, Modbus TCP/IP
- Profibus DP V0, Modbus RTU, BACnet
- Web Interface, Email
- Analysis software **GridVis**



For further information: www.janitza.de

Janitza
electronics

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Janitza: Made in Germany.



Our Story

Janitza electronics GmbH was founded by Mr. Eugen Janitza and Mr. Markus Janitza in Lahnau/Germany in the year of 1986. After the retirement of the founder Eugen Janitza, his son Markus Janitza became managing director.

As a family driven medium sized company, Janitza electronics GmbH is a significant employer within the region with a fast growing tendency. The management clearly focuses on the German location by permanently training young people in the different business areas. With development, production and sales, the full value-added chain is based in the headquarter in Lahnau. The new, strongly extended production, which was finished in the early year 2007 confirms, that this will remain unchanged in the future. Besides innovative technologies, products and fast, professional support, traditional values such as consistency and reliability are of large interest for customers.



Quality management certificate

Our Customers

Basically products of Janitza electronics GmbH are interesting for all users of electrical energy besides private households. Hence, Janitza products are already used by 17 companies listed in the main German stockmarket DAX. The most important clients are from the automobile industry, banking, insurance and municipal sector.

The products are used in industrial applications, commercial buildings, power authorities, airports, supermarkets, universities and hospitals. But also for smaller companies the use of Janitza products is profitable.

Janitza electronics GmbH has an export quota of about 50% and sells its products to more than 40 countries worldwide.

Our Focus

Janitza electronics GmbH is one of the leading manufacturers in the field of digital panel meters, energy control systems as well as power factor correction worldwide. Generally, the products of Janitza serve to reduce energy consumption, maintenance and production costs of the clients.

For several years, the awareness of power quality became more and more important in all businesses. Increased system distortion leads to quick abrasion of all electrical distribution equipment and connected electrical and electronic consumers and in worst cases to loss of production.

Janitza power meters, therefore, give essential information about insufficient power quality and allow measures to avoid net problems. This leads to significantly longer life expectancy of the equipment, prevention of production loss and, therefore, to an improved sustained yield regarding capital investments.

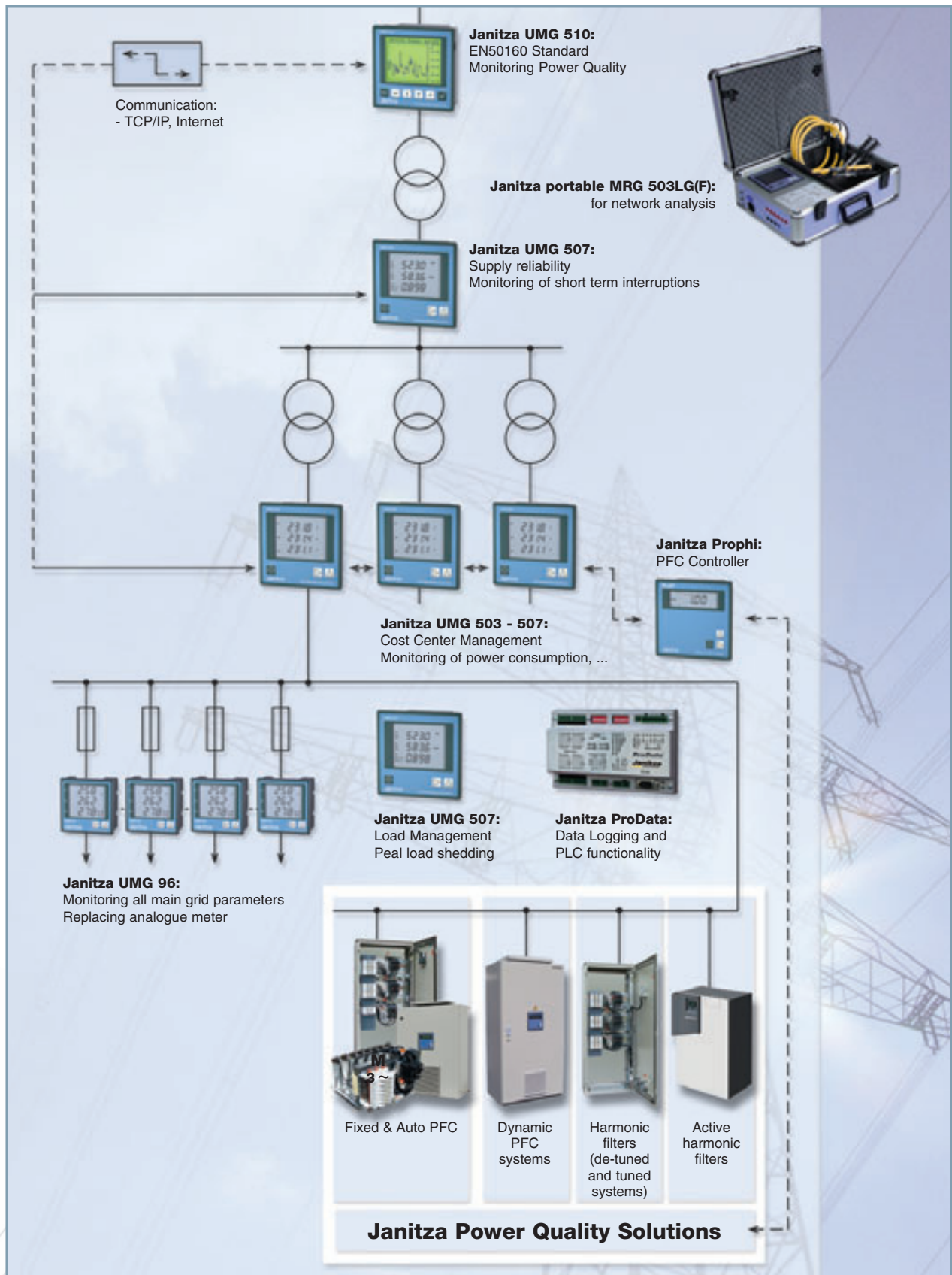
In industrial enterprises it is required to assign energy costs to certain products or processes. For cost center management, Janitza electronics GmbH provides optimized solutions.

The reduction of costly power peaks and the compensation of reactive power directly reduce the electricity bill.



Soldering Line

Various products of Janitza in the application in various grid levels and connection points.



Product overview

Digital panel meters with energy counter
Power quality supervision EN50160/EN61000-2-4

02



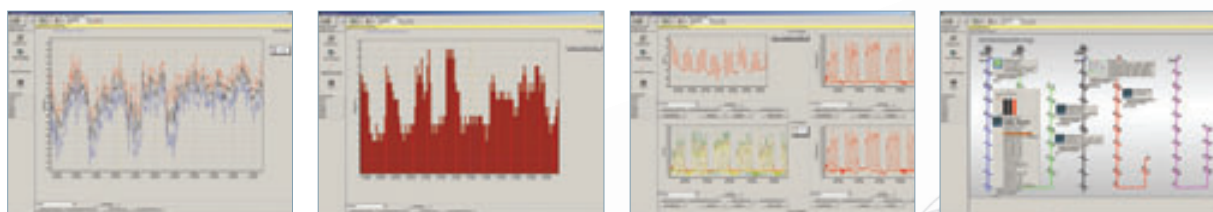
Portable Power Quality Analyzer



Energy management
Maximum demand control, cost center management
kWh-meters



Software for: Programming, reading out, measured data collection,
evaluation with DDE-Server support



Overview Power Quality Monitoring



Type	UMG 96L	UMG 96	UMG 96S									UMG 503						
												L	LG	LS	S	OV	V	
Item no.	52.14.001 (52.14.005)	52.09.001 (52.09.002)	52.13.001	52.13.005	52.13.009	52.13.017	52.13.013	52.13.021	52.13.025	52.13.035	52.13.029	52.07.017	52.07.027	52.07.028	52.07.008	52.07.006	52.07.001	
Measuring range L-N, AC	50 - 255V, (16 - 80V)*1	50 - 275V, (60 - 276V)*1	50 - 300V (25 - 150V)*1									50 - 500V						
Measuring range L-L, AC	86 - 442V, (28 - 139V)*1	86 - 476V, (85 - 135V)*1	87 - 520V									80 - 870V						
Supply voltage L-N, AC	196 - 255V, (45 - 80V)*1	196 - 275V, (49 - 76V)*1	85-300V(5213025/35; 140 -300V) -									-						
Auxilliary voltage	-	-	only 52.13.029; 18 - 70V DC, 18 - 33V AC									85 - 265V AC; 80 - 370V DC*1						
Three / Four Wire	-/●	-/●	-/●									●/●						
Quadrants	4 *4	4 *4	4									4						
Random measurement	●	●	●									●						
Number of samplings / second	1	1	1									2						
Averaging time / ms	20	20	120									20						
Permanent measurement	-	-	-									-						
Harmonics order V/A	-	-	1,3 ... 15									1 - 20						
THD V in %	-	-	●									●						
THD I in %	-	-	●									●						
Unbalance	-	-	-									-						
Positive/Negative/Zero sequence	-	-	-									-						
Actual flicker intensity	-	-	-									-						
Short/long term flicker	-	-	-									-						
Transients	-	-	-									-						
Trigger events	-	-	-									-						
Accuracy V, A	+/-1% vMb	+/-1% vMb	+/-0,5% vMb									+/-0,2% vMb						
Real energy class	2	2	1									1						
Operating hours counter	●	●	●									-						
Weekly switch clock	-	-	-									-						
Auxilliary input	-	-	-									-	-	-	-	1*3	1	
Digital inputs	-	-	-	-	-	-	-	(2)	(2)	(2)	(2)	-	-	-	-	-	-	
Digital outputs	-	●	2	2	2	2	2	(2)	(2)	(2)	(2)	-	-	-	-	1*3	●	
Relay outputs	-	-	-									-	-	-	-	1*3	●	
Analogue inputs	-	-	-									-	-	-	-	-	-	-
Analogue outputs	-	-	-	-	-	(2)	(2)	-	-	-	-	-	-	-	-	1*3	1	
Thermistor input	-	-	-									-						
Intergrated logic	-	Comparator	Comparator									Comparator						
Min/max value storage	●	●	●									●						
Memory capacity	-	-	-	-	512k	512k	-	-	-	-	-	128k	512k	128k	128k	512k	512k	
Number of stored values	-	-	-	-	160k	160k	-	-	-	-	-	80k	320k	80k	80k	320k	320k	
Timer	-	-	-	-	●	●	-	-	-	-	-	●						
Bimetal function A / kW	●	●	●									●						
Malfunction recorder	-	-	-									-						
Power Management	-	-	-									-						
Software	-	-	PSWbasic/ Option: Professional									PSWbasic / Option: Professional						
Interfaces																		
RS 232 (Modbus RTU)	-	-	-	●								●	●	-	-	●	●	
ISDN-Router	-	-	-									-	-	-	-	-	-	
RS 485 (Modbus RTU)	-	-	●									-	-	●	●	●	●	
Modbus-Gateway	-	-	-									-						
Profibus DP	-	-	-									●	-	●	-	●*3	●*3	●*3
M-Bus	-	-	-									-	●	-	-			
LON	-	-	-									-						
Ethernet	-	-	-									-						
Webserver / Email	-	-	-									-						
Protocols																		
Modbus RTU	-	-	●									●						
Profibus DP V0	-	-	-	-	-	-	-	-	●	-	●	-	-	-	●*3	●*3	●*3	
LonTalk	-	-	-									-						
Modbus TCP/IP	-	-	-									-						



Type	UMG 505				UMG 507						UMG 510	UMG 604			
	MOD	MOD	LON	LON	L	EL	AD	P	E	EP		L	E	P	EP
Item no.	52.10.004	52.10.007	52.10.001	52.10.013	52.15.004	52.15.021	52.15.003	52.15.002	52.15.001	52.15.005	52.12.001	52.16.003	52.16.002	52.16.004	52.16.001
Measuring range L-N, AC	50 - 500V				50 - 500V						5 - 500V	50 - 300V			
Measuring range L-L, AC	80 - 870V				80 - 870V						8 - 870V	87 - 520V			
Supply voltage L-N, AC	-				-						-	-			
Auxilliary voltage	85 - 265V AC; 80 - 370V DC*1				85 - 265V AC; 80 - 370V DC*1						95 - 265V AC; 100 - 370V DC	110 - 265V AC; 150 - 370V DC			
Three / Four Wire	●/●				●/●						●/●	●/●			
Quadrants	4				4						4	4			
Random measurement	●				-						-	-			
Number of samplings / second	2				-						-	-			
Averaging time / ms	20				200						200	200			
Permanent measurement	-				●						●	●			
Harmonics order V/A	1 - 20				1,3 - 15						1 - 50	1 - 40			
THD V in %	●				●						●	●			
THD I in %	●				●						●	●			
Unbalance	-				●						●	●			
Positive/Negative/Zero sequence	-				●						●	●			
Actual flicker intensity	-				-						●	-			
Short/long term flicker	-				-						●	-			
Transients	-				-						70µs	50µs			
Trigger events	-				●						●	●			
Accuracy V, A	-0,2% vMb				0,2% rng						+(0,2% rdg+0,02% rng)	*5			
Real energy class	1				1						1	0,5S (.../5A); 1 (.../1A)			
Operating hours counter	-				●						-	●			
Weekly switch clock	●				●						-	● Jasic			
Auxilliary input	-				-						-	-			
Digital inputs	4				6	-	6	6	6	6	8	2			
Digital outputs	5				6	-	6	6	6	6	5	2			
Relay outputs	-				-	-	-	-	-	-	-	-			
Analogue inputs	-				-	-	1	1	1	1	-	-			
Analogue outputs	4				-	-	2	2	2	2	-	-			
Thermistor input	-				-	-	1	1	1	1	-	1			
Intergrated logic	Comparator				●						Comparator	● Jasic			
Min/max value storage	●				●						●	●			
Memory capacity	512k				256k	16MB	256k	256k	16MB	16MB	128MB	16MB RAM / 128 MB Flash			
Number of stored values	320.000				18k	1.000k	18k	18k	1.000k	1.000k	5.000k	5.000k			
Timer	●				●						●	●			
Bimetal function A / kW	●				●						-	●			
Malfunction recorder	-				●						●	●			
Power Management	-				●						-	●			
Software	PSWbasic/Option:Professional				PSWbasic/ Option: Professional						PAS510	GridVis			
Interfaces															
RS 232 (Modbus RTU)	●	-	●	-	●	●	●	●	●	●	-	●	●	●	●
ISDN-Router	●	-	●	-	●	-	●	●	●	●	-	-	●	-	●
RS 485 (Modbus RTU)	-	●	-	●	●	-	●	●	●	●	●	●	●	●	●
Modbus-Gateway	-	-	-	-	-	-	-	-	●	●	●	-	●	-	●
Profibus DP	-	-	-	-	-	-	-	●	-	●	●	-	-	●	●
M-Bus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LON	-	-	●	●	-	-	-	-	-	-	-	-	-	-	-
Ethernet	-	-	-	-	-	●	-	-	●	●	●	-	●	-	●
Webserver / Email	-/-	-/-	-/-	-/-	-/-	●/●	-/-	-/-	●/●	●/●	●/-	-	●	-	●
Protocols															
Modbus RTU	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Profibus DP V0	-	-	-	-	-	-	-	●	-	●	●	-	-	●	●
LonTalk	-	-	●	●	-	-	-	-	-	-	-	-	-	-	-
Modbus TCP/IP	-	-	-	-	-	●	-	●	●	●	●	-	●	-	●

*1 Other voltage optionally

(2) Combinations of inputs & outputs: a) 2 digital outputs, b) 2 digital inputs, c) 2 analogue outputs, d) 1 digital & analogue output, e) 1 digital output & one digital input.

*3 Option *4 not for energy

*5 V ±0,2% rdg + 0,02% rng / A ±0,2% rdg + 0,05% rng / N ±0,6% rdg + 0,05% rng

● : included - : not included



Digital panel meter

Application

The UMG 96L is a digital power meter suitable for measurement and storage of electrical parameters in 50/60Hz mains. The measurement circuit is designed for three phase systems with neutral conductor (TN and TT mains). For a net frequency of 50 or 60Hz, the scanning frequency of the random test measurement, which takes place twice a second, is 2,5kHz respectively 3,0kHz. The power supply and scanning frequency for the operation of the UMG 96L is taken from the measuring voltage of phase 1 against neutral. Energy as well as minimum and maximum values are stored every 15 minutes and the programmed data at once in a non volatile memory (EEPROM).



Main features are the compact design (96x96mm) and the high resistance against interference. In order to achieve equal functionality of the UMG 96L, about 11 other analogue devices such as amperemeter, voltmeter, voltmeter switch, power meter (kW, kVA, kvar, cos-phi), kWh-meters and frequency meter are required. Significant cost reduction for project planning, mounting, wiring and storage can be achieved compared to the use of analogue meters. Better and more accurate reading precision as well as storing of maximum and minimum values are further benefits of the UMG 96 L.

Possible applications are:

- Replacement of analogue panel meters
- Monitoring and control of electrical parameters in energy distribution systems

Display

The well legible LCD display in connection with the function keys inform about the selected values (actual, lowest, peak and mean values). The LCD display of UMG 96 L is designed to indicate 3 measured values at once. The contrast of the LCD display can be adjusted by the user.

Selection of measured values and rotation

With the factory pre-setting all measured values are initially available. Measured values, which are not necessary can be suppressed and reactivated again. An interval of 1 to 250 seconds can be set for display rotation. The display rotation can also be deactivated.

Operating hours counter

The operating hours counter is activated immediately after connecting the device and cannot be reset. The time is measured with a resolution of 15 minutes and indicated in hours.

Bimetallic function

A common averaging time for the current measurement values L1, L2, L3 and N is programmable. Another common averaging time for the power measurement values real power, apparent power and reactive power can be programmed. These values can be integrated for a selectable time of 5, 10, 30, 60, 300, 480 and 900 seconds and can be stored as highest mean value.

Password

It is possible to protect the programming and configuration from unintentional change by entering a three digit user password.

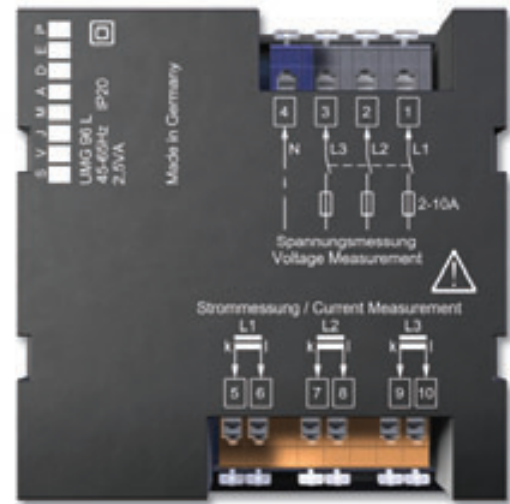
UMG 96L Product Range

Description	Type	Voltage	Item no.
Four wire, 50/60Hz; current transformer: ..1/5A			
Measuring range: L - N: 50 ... 255V, AC; L - L: 86 ... 442V, AC	UMG 96L	L-N: 196 .. 255V, AC	52.14.001
as before, but measuring range: L - N: 16 ... 80V, AC; L - L: 28 ... 139V; AC	UMG 96L	L-N: 45 .. 80V, AC	52.14.005
as before, but measuring range: L - N: 25 ... 160V, AC; L - L: 45 ... 277V; AC	UMG 96L	L-N: 90 .. 160V, AC	52.14.007

Technical data

Overvoltage class	CAT III
Pollution degree	2
Operating ambient temperature	-10°C .. +55°C
Storage temperature	-20°C .. +70°C
Humidity	15% to 95% without dew
Mounting position	optional
Dimensions	w96 x h96 x d42mm
Measuring range	L-N 50 .. 255V, L-L 86 .. 442V, AC ^{*2}
Operation voltage	L-N 196 .. 255V, AC ^{*2}
Frequency	45 .. 65 Hz
Current measurement	.. /5A (/1A)
Power consumption	approx. 0,2 VA
Minimum operating current	20 mA
Protection class front	IP 50 acc. to IEC 60529
Protection class front incl. seal (option)	IP 65 acc. to IEC 60529
Protection class back side	IP 20 acc. to IEC 60529

^{*2} also available for measuring voltage ranges : L-N 45...80 V / L-L 78...139 V and L-N 90...160V / L-L 156...277 V



02

Display examples



Voltage phase to phase



cos (phi)



real power



real energy consumption

Measured values

Parameter	Indication range	Measuring range at scale factor 1	L1	L2	L3	Sum	Lowest value	Mean value*1	Maximum value	Mean value	Measured value	Accuracy
Current 1/5A L1-L3	0,00 .. 9,99 kA	0,02 .. 6 A	●	●	●			●	●	●		+1 % rng
Current , N	0,00 .. 9,99 kA	0,06 .. 18 A				●		●	●	●		+3 % rng
Voltage L-N	0,0 .. 34 kV	50 .. 255 V AC*2	●	●	●		●					+1 % rng
Voltage L-L	0,0 .. 60 kV	86 .. 442 V AC*2	●	●	●		●					+2% rng
Frequency (U)	45,0 .. 65,0 Hz		●									+1,5 % rng
Real power, sum,+/-	0,00 W .. 150 MW	1,8 W .. 2,4 kW	●	●	●	●		●	●	●		+1,5 % rng
Apparent power, sum	0,00 VA .. 150 MVA	1,8 VA .. 2,4 kVA	●	●	●	●		●		●		+1,5 % rng
Reactive power, sum	0,00 var .. 150 MVar	1,8 var .. 2,4 kvar	●	●	●	●		●				ind.+1,5 % rng
cos(phi)	0,00 ind. .. 1,00 .. 0,00 kap.	0,00 kap. .. 1,00 .. 0,00 ind.	●	●	●	●						+3 % rng*4
Real energy, consumption	0 .. 999.999.999 kWh					●						class 2 ^{*3}
Reactive energy, inductive	0 .. 999.999.999 kvarh					●						class 2 ^{*3}
Operating hours counter	0 .. 999.999.999 h											+2 min. per day

rng: of measured range, rdg: of measured value

^{*1} Integration possible for a selectable time of 5, 10, 30, 60, 300, 480 and 900 seconds,

^{*2} also available for measuring voltage ranges: L-N 16 .. 80 V, AC, L-L 28 .. 139 V, AC, operating voltage: L-N 45 .. 80 V, AC and measuring voltage ranges: L-N 25 .. 160 V, AC, L-L 45 .. 277 V, AC, operating voltage: L-N 90 .. 160 V, AC

^{*3} Accuracy class acc. to, DIN EN61036:2001-01, VDE0418Teil 7, IEC61036:1996 + A1:2000

^{*4} The measured apparent power has to be in the range of 1 .. 100 %.



Digital panel meter

Application

The UMG 96 is a digital power meter suitable for measurement and storage of electrical parameters in 50/60Hz mains. The measurement is designed for three phase systems with neutral conductor (TN and TT mains). For a net frequency of 50 or 60Hz, the scanning frequency of the random test measurement, which takes place once a second, is 2,5kHz respectively 3,0kHz. The power supply and scanning frequency for the operation of the UMG 96 is taken from the measuring voltage of phase 1 against neutral.

Energy as well as minimum and maximum values are stored every 15 minutes and the programmed data at once in a non-volatile memory (EEPROM). Main features are the compact design (96x96mm) and the high resistance against interference. In order to achieve equal functionality of this panel meter, about 11 analogue devices such as amperemeter, voltmeter, voltmeter switch, power meter (kW, kVA, kvar, cos-phi), kWh-meters and frequency meter are required. Significant cost reduction for project planning, mounting, wiring and storage can be achieved compared to the use of analogue meters. Better and more accurate reading precision, storing of maximum and minimum values as well as pulse outputs are further benefits of the UMG 96.



Possible applications are:

- Monitoring and control of electrical parameters in energy distribution systems
- Pulse outputs for real and reactive energy or transducer for PLC
- Power Management and Cost Centre Management

Display

The well legible LCD display in connection with the function keys inform about the selected values (actual, lowest, peak and mean values). The LCD display of UMG 96 is designed to indicate 3 measured values at once. The measured values are calculated once per second and shown in the display. To retrieve the measured values, two methods are available: 1. The automatically rotating display of selected measured values. 2. The selection of a measured value via the function keys from a selected display profile. Four pre-set display profiles are available, and a client-specific display profile can be configured by PC and transmitted to the device.

Selection of measured values and rotation

With the factory pre-setting all measured values are initially available. Measured values, which are not necessary can be suppressed and reactivated again. An interval of 1 to 250 seconds can be set for display rotation. The display rotation can also be deactivated.

Bimetallic function

A common averaging time for the current measurement values L1, L2, L3 and N is programmable. Another common averaging time for the power measurement values real power, apparent power and reactive power can be programmed. These values can be integrated for a selectable time of 5, 10, 30, 60, 300, 480 and 900 seconds and can be stored as highest mean value.

Operating hours counter

The operating hours counter is activated immediately after connecting the device and cannot be reset. The time is measured with a resolution of 15 minutes and indicated in hours.

Transistor outputs for real and reactive energy or limits (Min./Max.)

The transistor outputs P1 and P2 can be used for real and reactive energy or for supervision of limits. At programming of limits the electronic outputs can be combined with a measured value and activated while exceeding or underscoring.

In order to avoid a too frequent switching, a minimum connection time can be programmed for each transistor output. The transistor outputs are suitable for the control of electrical switchgear with DC-voltage or devices with NPN-inputs, for example a PLC.

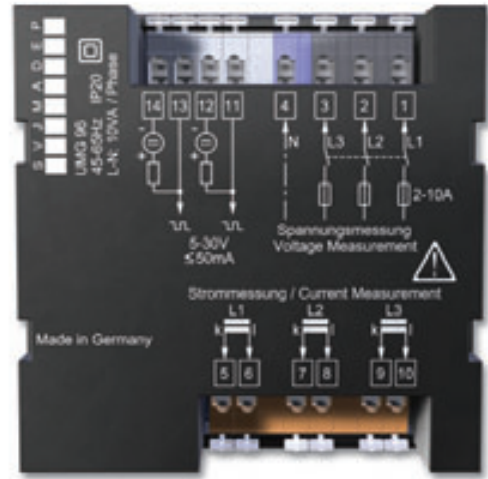
UMG 96 Product Range

Description	Type	Operating voltage	Item no.
Four wire, 50/60Hz			
Measuring voltage range: L - N: 50 ... 275V, AC; L - L: 87 ... 476V; AC			
Current transformer: ..1/5A, 2 digital-/pulse outputs	UMG 96	L-N: 196 .. 275V, AC	52.09.001
as before, but measuring range: L - N: 20 .. 76V, AC; L - L: 35 .. 132V; AC	UMG 96	L-N: 49 .. 76V, AC	52.09.002
as before, but measuring range: L - N: 30 .. 140V, AC; L - L: 52 .. 242V; AC	UMG 96	L-N: 98 .. 140V, AC	52.09.005

Technical Data

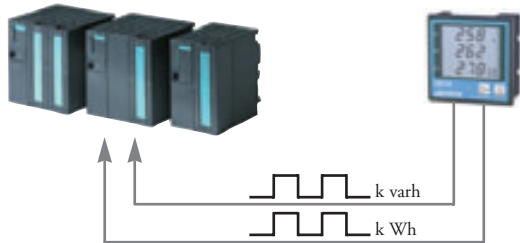
Overvoltage class:	CAT III
Pollution degree:	2
Operating ambient temperature:	-10 °C .. +55°C
Storage temperature:	-20°C .. +70°C
Humidity:	15% bis 95% without dew
Mounting position:	optional
Dimensions:	B96 x H96 x T42mm
Measuring voltage:	196 - 275 L/N ² 340 - 476 L/L ²
Frequency:	45Hz .. 65 Hz
Current measurement:	.. /5A (/1A)
Power consumption:	ca. 0,2 VA
Minimum operating current	10 mA
Protection class	front IP 50 according to IEC 60529 front with seal (option) IP 65 acc. to IEC 60529 Back IP 20 to IEC 60529
Outputs	NPN Transistor, 30V DC, 50 mA

*2 Optional: L-N 49 .. 76V / L-L 85 .. 132V and L-N 98 .. 140V / L-L 170 .. 242V

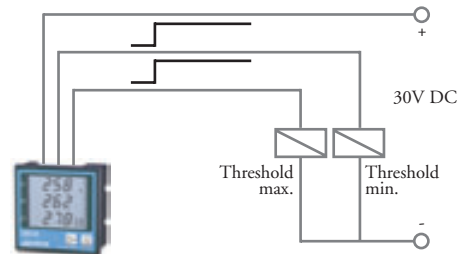


02

Cost centre management and supervising limits



Digital outputs for cost centre management



Digital outputs for supervision of thresholds

Measured values

Parameter	Indication	Measuring range at scale factor 1	L1	L2	L3	Sum	Lowest value	Mean value ¹	Peak value Mean value Measured value	Measuring accuracy
Current .. 1/5A L1-L3	0,00 .. 9,99 kA	0,02 .. 5 A	●	●	●			●	●	+1 % rng
Current .. 1/5A N	0,00 .. 9,99 kA	0,03 .. 15 A				●		●	●	+3 % rng
Voltage L-N	0 .. 34 kV	196 .. 275 V AC ²	●	●	●		●		●	+1 % rng
Voltage L-L	0 .. 60 kV	340 .. 476 V AC ²	●	●	●		●		●	+2 % rng
Frequency	45 .. 65 Hz	45 .. 65 Hz	●							+1,5 % rng
Real power +/-	0,00 W .. 99,9 MW	3,2 W .. 1,375 kW	●	●	●	●		●	● ⁴	+1,5 % rng
Apparent power	0,00 VA .. 99,9 MVA	3,2 VA .. 1,375 kVA	●	●	●	●		●	●	+1,5 % rng
Reactive power	0,00 var .. 99,9 MVar	3,2 var .. 1,375 kvar	●	●	●	●		●		ind. +1,5 % rng
cos (phi)	0,00 ind. ..1,00 .. 0,00 kap.	3,2 kap. .. 1,00 .. 0,00 ind.	●	●	●	●				+3 % rng ⁵
Real Energy	0 .. 999 999 9,99 kWh					●				*3
Reactive Energy	0 .. 999 999 9,99 kvarh					●				
Operating hours counter	0 .. 999.999.999 h									+2 min. per day

rng: of measuring range, rdg: of measured value

¹ Integration possible for a selectable time of: 5, 15, 30, 60, 300, 480, 600 and 900 seconds, ² Optional: L-N 49 .. 76V / L-L 85 .. 132V and L-N 98 .. 140V / L-L 170 .. 242V

³ The measuring accuracy of energy is related to the accuracy of power, ⁴ Only for sum values, ⁵ The measured apparent power must be in the range of 1 .. 100%.



Digital panel meter

Application

The UMG 96 S is an universal measuring device, which is suitable for measuring, saving and supervision of electrical parameters in low and medium voltage mains. The measurement circuit is designed for one and three phase systems with neutral conductor, in low voltage mains for the range L-N = 85...300V; L-L=148...520V and in medium voltage for the range L-N=49...140V; L-L=85...242V (via voltage transformer).

Main features are the compact design (96x96mm) and the measurement of harmonic currents and voltages in each outer conductor. For equal functionality about 15 analogue devices such as amperemeter, voltmeter, voltmeter switch, power meter (kW, kVA, kvar and cos phi), pulse senders (real/reactive), transducers etc. would be necessary. Therefore the costs for the project, installation, wiring and storage are much lower compared to analogue instruments.



Possible applications are:

- Monitoring and control of electrical parameters in energy distribution systems
- Pulse outputs for real and reactive energy or transducer for PLC
- Power Management and Cost Centre Management

Data memory

It is possible to save up to 160.000 measured values or events in the data memory (option). For saving the measured values and events, 4 pre-defined profiles are at your disposal. Each profile can be programmed separately or together with other profiles.

Memory

All models UMG 96S store energy (total) and minimum and maximum values (without date and time).

UMG 96 S Product Range

50/60Hz; current transformer...1/5A; including programming and evaluation software PSWbasic

can be activated optionally*1		can be activated optionally*2		clock / memory	Interface Profibus (DP V0)	M-Bus	supply voltage: 24V DC	Standard version 300V Measuring range: L-N50 - 300V; AC*3 Measuring range: L-L87 .. 520V; AC	Special version 150V Measuring range: L-N25 - 150V; AC Measuring range: L-L40 .. 250V; AC	<div> ● = included ○ = not included </div> <div> Transmission rates: Modbus 9.6, 19.2, 38.4 kBit/s; Profibus 9.6, 19.2, 93.75, 187.5, 500 kBit/s and 1.5 Mbit/s. M-Bus 300, 2400, 9600 Bit/s </div>		
2 digital outputs	2 digital inputs	2 analogue outputs 4-20mA	RS485 (Modbus RTU)							UMG 96 S	Operating voltage	Item no.
●	○	○	○	○	○	○	○	●	○	Supply voltage	L-N: 85 .. 300V, AC	52.13.001
●	○	○	○	○	○	○	○	●	○		L-N: 85 .. 300V, AC	52.13.005
●	○	○	○	○	○	○	○	●	○		L-N: 85 .. 300V, AC	52.13.009
●	○	○	○	○	○	○	○	●	○		L-N: 85 .. 300V, AC	52.13.013
●	○	○	○	○	○	○	○	●	○		L-N: 85 .. 300V, AC	52.13.017
●	○	○	○	○	○	○	○	●	○		L-N: 85 .. 300V, AC	52.13.021
●	○	○	○	○	○	○	○	●	○		L-N: 140 .. 300V, AC	52.13.025
●	○	○	○	○	○	○	○	●	○		L-N: 140 .. 300V, AC	52.13.035
●	○	○	○	○	○	○	○	●	○		18 .. 70V DC, 18 .. 33V, AC	52.13.029
●	○	○	○	○	○	○	○	○	●	Supply voltage	L-L: 85 .. 260V, AC	52.13.002
●	○	○	○	○	○	○	○	○	●		L-L: 85 .. 260V, AC	52.13.006
●	○	○	○	○	○	○	○	○	●		L-L: 85 .. 260V, AC	52.13.010
●	○	○	○	○	○	○	○	○	●		L-L: 85 .. 260V, AC	52.13.014
●	○	○	○	○	○	○	○	○	●		L-L: 85 .. 260V, AC	52.13.018
●	○	○	○	○	○	○	○	○	●		L-L: 85 .. 260V, AC	52.13.022
●	○	○	○	○	○	○	○	○	●		L-L: 85 .. 260V, AC	52.13.026
●	○	○	○	○	○	○	○	○	●		18 .. 70V DC, 18 .. 33V, AC	52.13.031

*1 Possible combinations of inputs and outputs: a) 2 digital outputs, b) 2 digital inputs, c) 2 analogue outputs, d) 1 digital output and 1 analogue output, e) 1 digital output and 1 digital input.

*2 The interface RS232 cannot be driven with interface RS485 simultaneously.

*3 Range for supply voltage for devices with Profibus: 140V .. 300V AC. Additionally available: Special version operating voltage: L-N: 25 .. 140V, L-L: 85 .. 260VAC

Measured values

Parameter	Indication range	Measuring range at scale factor 1	L1	L2	L3	Sum	Lowest value	Mean value*2	Peak value	Accuracy
Current	0,01 .. 60,0 kA	0,01 .. 6 A	●	●	●		●	●	●	+0,5 % rng
Current, N	0,01 .. 180,0 kA	0,01 .. 18 A				●	●	●	●	+1,5 % rng
Voltage L-N	0,0 .. 34 kV	50 .. 300 V	●	●	●		●		●	+0,5 % rng
Voltage L-L	0,0 .. 60 kV	87 .. 520 V	●	●	●		●		●	+1,0 % rng
Frequency (U)	45,00 .. 65,00 Hz	45,00 .. 65,00 Hz	●							+0,1 % rng
Real power per phase	0,1 W .. 99,9 MW	0,1 W .. 1,8 kW	●	●	●			●	●	+1,0 % rng
Apparent power per phase	0,1 VA .. 99,9 MVA	0,1 VA .. 1,8 kVA	●	●	●			●	●	+1,0 % rng
Reactive power per phase	0,1 var .. 99,9 Mvar	0,1 var .. 1,8 kvar	●	●	●			●	ind.	+1,0 % rng
Real power sum	1,0 W .. 99,9 MW	1,0 W .. 5,4 kW				●		●	●	+1,0 % rng
Apparent power sum	1,0 VA .. 99,9 MVA	1,0 VA .. 5,4 kVA				●		●	●	+1,0 % rng
Reactive power sum	1,0 var .. 99,9 Mvar	1,0 var .. 5,4 kvar				●		●	ind.	+1,0 % rng
cos(phi)	0,00 kap. .. 1,00 .. 0,00 ind.	0,00 kap. .. 1,00 .. 0,00 ind.				●		●		+1,0 degree
Real energy, consumption	0 .. 999.999.999 kWh					●				Class 1(5A) 2 (1A)
Reactive energy, inductive	0 .. 999.999.999 kvarh					●				Class 1(5A) 2 (1A)
Operating hours counter	0 .. 999.999.999 h					●				+2 min. per day
Total harmonic content THD V, I	0,1 .. 100 %		●	●	●				●	+2 % rng
Partial harmonic content I, 1-15*3	0,01 .. 60 kA	1,0 mA .. 6000 mA	●	●	●				●	+2 % rng
Partial harmonic content V, 1-15*3	0,0 .. 34 kV	0,1 V .. 300,0 V	●	●	●				●	+2 % rng

rng: of measuring range, rdg: of measured value

*2 Integration possible for a selectable time of: 5, 10, 30, 60, 300, 480 and 900 seconds

*3 Only odd partial harmonics

Display examples



Rotating field indicator



Peak value THD L3



Programming of current transformer



Real energy consumption

LCD contrast

The LCD contrast of the LCD display can be adapted by the user. In order to achieve the optimum contrast over the full temperature range, an automatic contrast setting is carried out via the measured inner temperature.

Operating hours counter

Operating hours counter measures the time (solution 0.1 hour), after the device is put into service and cannot be reset. Furthermore, up to 6 total running times can be programmed via the six comparators, and detected as total running time for the comparator. Measured values, limits and operands ($>=<$) serve as parameters. The total running times can be reset separately.

Measured value display and display rotation

The measured values are calculated once per second and shown in the display. To retrieve the measured values, two methods are available:

- The automatically rotating display of selected measured values with a selectable changing time of 0 .. 60 seconds.
- The selection of a measured value indication via the function keys from a selected display profile.

Four pre-set display profiles are available, and a client-specific display profile can be configured by PC and transmitted to the device.



Modbus /
Profibus /
M-Bus



Harmonics



Memory



Analogue outputs



Digital I/O

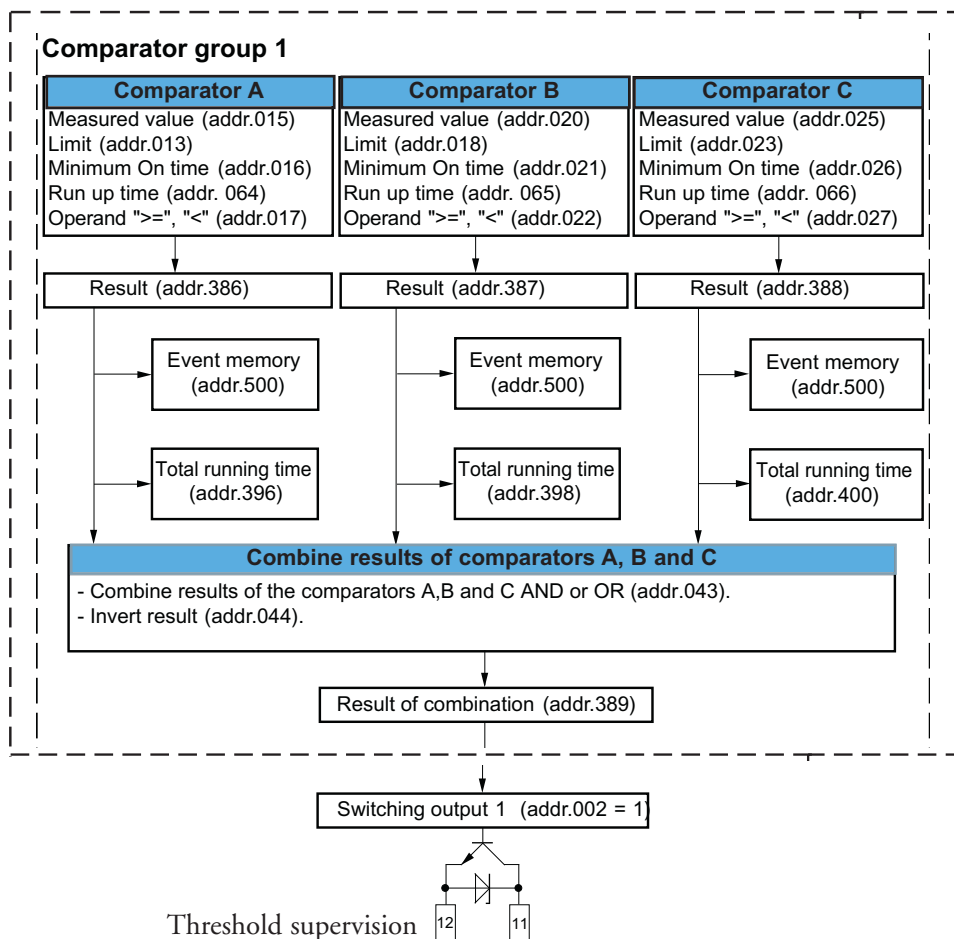


Digital inputs / Digital outputs

The digital outputs can be used as pulse outputs (max. 10Hz) for real and reactive energy or as switching outputs. The digital outputs can be programmed for supervision of measured data.

Up to three comparators can be assigned to each digital output. The result of the comparators can be overwritten externally via Modbus RTU. The switching outputs can be set via Profibus-Remote as well.

Comparators



Analogue outputs

For the version with analogue outputs, the digital outputs can be configured either as analogue outputs, pulse outputs or switching outputs. For each analogue output, the following parameters are available: Measured values, scale starting value (4mA) and scale end value (20mA).

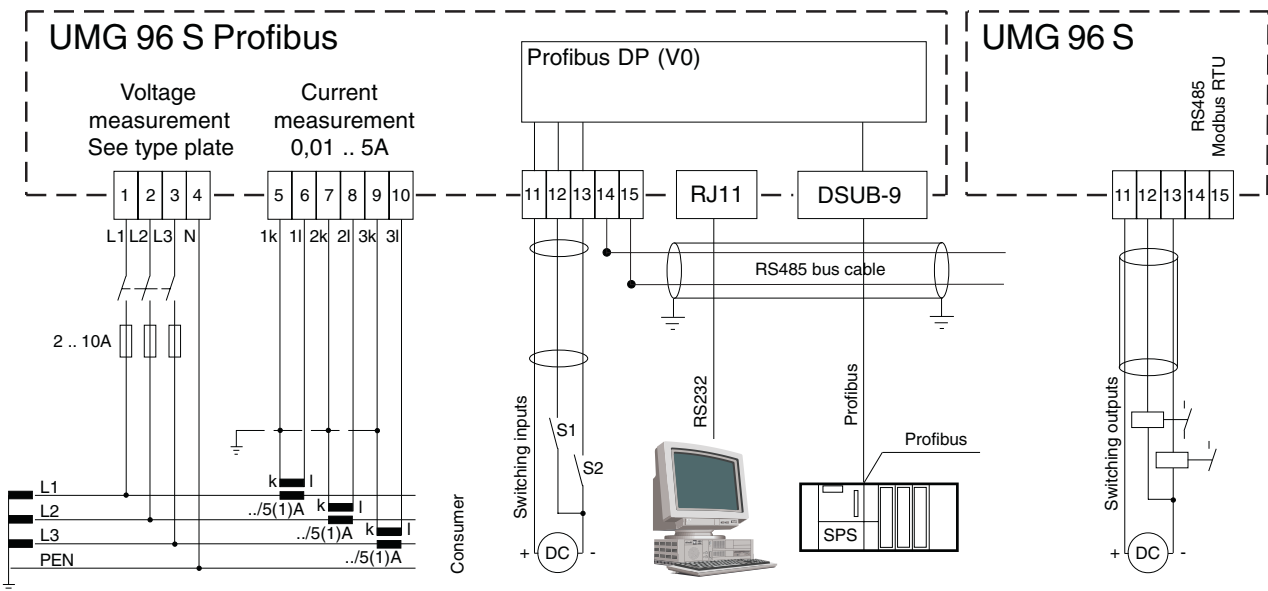
Technical data

Overvoltage class:	CAT III
Pollution degree:	2
Operating temperature:	-10°C .. +55°C
Storage temperature:	-20°C .. +70°C
Humidity:	15% to 95% without dew
Mounting position:	optional
Measuring and auxiliary voltage: ^{*4}	L-N: 85 .. 300V AC, L-L: 148 .. 520V AC
Frequency:	45 - 65Hz
Current measurement:	.. /5A (../1A)
Minimum working current:	5mA
Switching outputs:	NPN-Transistor, Frequency: max. 10Hz, max. 50mA, 5 .. 24V DC (max. 27V DC)
Switching inputs:	20 .. 27V DC, max. 5mA
Analogue outputs:	8Bit, Load: max. 300 Ohm, 20 .. 27V DC
Protection front:	IP 50 according to IEC 60529
Protection front with seal:	IP 65 according to IEC 60529
Protection back side:	IP 20 according to IEC 60529

^{*4} Special voltage version: Profibus with supply voltage: 18 .. 70V DC; 18 .. 33V AC 50/60Hz

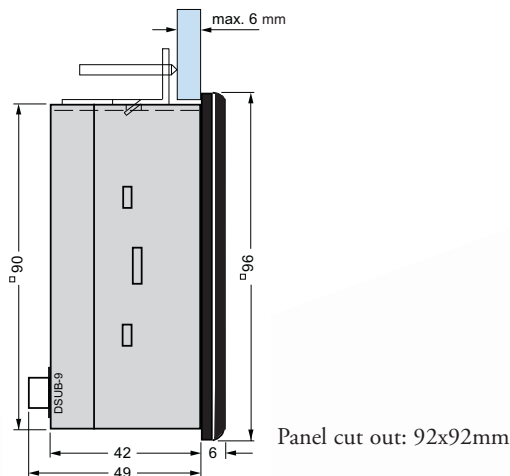


02



UMG 96 S Profibus with switching inputs, RS 232 and Profibus

UMG 96 S without options



Panel cut out: 92x92mm



Power Analyzer

The UMG 503 is an universal measuring device, which is suitable for measurement, storage and supervision of electrical parameters in low and medium voltage mains. The measurement circuit is designed for 1 and 3 phase systems with or without neutral conductor. For a net frequency of 50Hz, the scanning frequency of the random test, which is carried out twice a second, is 6.4kHz. Main features are the high accuracy class, compact design and measurement of harmonic voltages and currents in each phase. For similar functionality minimum 13 other devices such as amperemeter, voltmeter, voltmeter switch, power meter (kW, kVA, kvar and cos-phi), real and reactive energy for four tariffs (consumption/ supply), harmonic analyzer and measurement transformer, clock etc. are necessary. Therefore, the costs for the project, installation, wiring and storage are much lower compared to analogue instruments.

A further advantage is a better and more accurate reading precision. Selected measured values as well as power drop and net return are saved with date and time in a ring buffer.



Possible applications:

- Monitoring and control of electrical parameters in energy distribution systems
- Recording of (different) load profiles for Power Management
- Acquisition of energy demand for Cost Center Management
- Measured value transducer for PLC, Protocols Modbus RTU or Profibus DP V0/V1

UMG 503 Product Range

Three and four wire, 50/60Hz; current transformer ..1/5A; including programming and evaluation software PSWbasic

Auxiliary voltage				Interfaces										Type	Item no.
85 .. 250V AC, 80 .. 370V DC	40 .. 115V AC, 55 .. 165V DC	15 .. 55V AC, 20 .. 80V DC	memory 128k RAM	memory 512k RAM	relay outputs	pulse outputs	analogue output 0(4) -20mA	RS 232	RS 485	auxiliary input	three wire measurement	Profibus DP V0/V1	software PSW professional		
●	-	-	●	-	-	-	-	●	-	-	○	-	○	UMG 503 L	52.07.017
-	●	-	●	-	-	-	-	●	-	-	○	-	○	UMG 503 L	52.07.019
-	-	●	-	●	-	-	-	●	-	-	○	-	○	UMG 503 L	52.07.022
●	-	-	-	●	-	-	-	●	-	-	○	-	○	UMG 503 LG	52.07.027
-	●	-	-	●	-	-	-	●	-	-	○	-	○	UMG 503 LG	52.07.033
-	-	●	-	●	-	-	-	●	-	-	○	-	○	UMG 503 LG	52.07.068
●	-	-	●	-	-	-	-	-	●	-	○	-	○	UMG 503 LS	52.07.028
-	●	-	●	-	-	-	-	-	●	-	○	-	○	UMG 503 LS	52.07.074
-	-	●	●	-	-	-	-	-	●	-	○	-	○	UMG 503 LS	52.07.037
●	-	-	●	-	-	-	-	-	●	-	○	-	○	UMG 503 S	52.07.008
-	●	-	-	-	-	-	-	-	●	-	○	-	○	UMG 503 S	52.07.015
-	-	●	●	-	-	-	-	-	●	-	○	-	○	UMG 503 S	52.07.009
●	-	-	-	●	●	●	●	●	●	●	○	○	○	UMG 503 V	52.07.001
-	●	-	-	●	●	●	●	●	●	●	○	○	○	UMG 503 V	52.07.014
-	-	●	-	●	●	●	●	●	●	●	○	○	○	UMG 503 V	52.07.005
●	-	-	-	●	○	○	○	●	○	○	○	○	○	UMG 503 OV	52.07.006
-	●	-	-	●	○	○	○	●	○	○	○	○	○	UMG 503 OV	52.07.016
-	-	●	-	●	○	○	○	●	○	○	○	○	○	UMG 503 OV	52.07.007

The options marked ○ are available for the respective devices. Every option is only one time possible.

Options for the devices (release code).

	UMG 503..	
Profibus DP V0/V1	S, OV,V	52.07.050
Relay outputs (Min/Max)	OV	52.07.051
Pulse output for real or reactive energy	OV	52.07.052
Analogue output 0 (4) – 20mA	OV	52.07.053
Auxiliary input	OV	52.07.056
Three wire measurement	L/LG/LS/S/OV	52.07.058

○ = Option – = not possible ● = included

Measured values

Parameter	Indication	Measuring range at scale factor 1+	L1	L2	L3	Sum	Lowest value	Mean value ^{*1}	Peak value	Date / Time	Measuring accuracy
Current .. /5A	0,000 .. 9999 A	0,005 .. 5 A	●	●	●		●	●	●	●	+0,2 % rng
Current .. /1A	0,000 .. 9999 A	0,005 .. 1 A	●	●	●		●	●	●	●	+0,2 % rng
Current, N	0,000 .. 9999 A	0,060 .. 15 A				●	●	●		●	+0,6 % rng
Voltage L-N	0,0 .. 999,9 MV	50 .. 500 V	●	●	●		●	●	●	●	+0,2 % rng
Voltage L-L	0,0 .. 999,9 MV	80 .. 870 V	●	●	●		●	●	●	●	+0,2 % rng
Frequency (U)	45,00 .. 65,00 Hz	45,00 .. 65,00 Hz						●		●	+0,2 % rng
Real power +/-	0,00 W .. 9999 MW	0,05 W .. 2,5 kW	●	●	●	●	●	●	●	●	+0,5 % rng
Apparent power	0,00 VA .. 9999 MVA	0,05 VA .. 2,5 kVA	●	●	●	●	●	●	●	●	+0,5 % rng
Reactive power	0,00 kvar .. 999 MVar	0,05 var .. 2,5 kvar	●	●	●	●	cap.	●	ind.	●	+0,5 % rng
Power factor	0,00 kap. .. 1,00 .. 0,00 ind.	0,00 kap. .. 1,00 .. 0,00 ind.	●	●	●	●	cap.	●	ind.	●	+0,5 % rng
Real energy +	0,0 Wh .. 9999 GWh	0,05 Wh .. 9999 GWh ^{*2}				●		●		t ₁ /t ₂	*3
Real energy -	-0,0 Wh .. -9999 GWh	-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 content THD V, A	0,0 .. 100 %	0,0 .. 100 %	●	●	●		●	●	●	●	+0,5 % rng
Harmonic content	0,000 A .. 9999 A	0,005 A .. 5A (1 A)	●	●	●		●	●	●	●	+0,5 % rng
HDF V, A 2-20	0,0 V .. 99,99 kV	0,000 V .. 9999 V	●	●	●		●	●	●	●	+0,5 % rng

rng: of measuring range, rdg: of measured value, t₁: Starting time, t₂: record time, + consumption, - supply

*1 Integration possible for a selectable time of: 5, 10, 15, 30 seconds, 1, 5, 10, 15, 30, 60 minutes *2 Saving period 60 minutes.

*3 Accuracy class acc. EN61036:1996, VDE418part 7:May 1997, IEC1036:1996 with cts. ./5A : class 1, with cts. ./1A: class 2

Memory

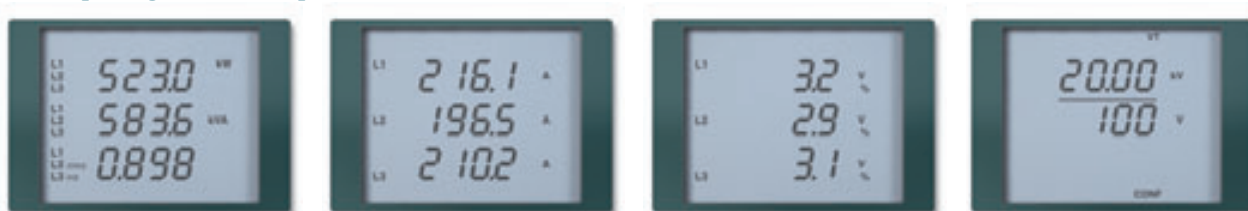
For the saving of the selected mean values, a ring buffer for 80.000 or 320.000 measured values is at your disposal. In the factory's pre-settings, the mean values of U1, U2, U3, I1, I2, I3, P1, P2, and P3 are saved with an averaging time of 15 minutes for about 1 year in the devices with 512 k RAM and about 3 months in devices with 128 k RAM.

Six windows can be programmed for saving measured values. An upper and lower threshold can be selected, and data are saved within or out of these thresholds.

Measured value indication/rotation

The well legible LCD display in combination with the function keys inform about the selected measured values (actual- / lowest- / highest- / mean values). With the UMG 503 you can indicate 3 measured values in the display and create 140 displays individually via the software PSWbasic. For the measured value rotation a cycle of 1-9999 seconds can be set and measured values can be selected.

Display examples



Bimetallic function

The bimetallic function is built for the three currents in the phases L1, L2 and L3. These values can be integrated over the time periods of 5, 10, 15, 30 seconds, 1, 5, 10, 15, 30, 60 minutes and saved as highest mean values.

Summer- / Wintertime changeover

The following possibilities are at your disposal:

- Off
- Select changeover time of summer- / wintertime
- Automatic changeover according to the middle European conventions.

Event memory

The following events can be saved within the event buffer:

- Deletion of event buffer
- Relay outputs on/off
- Breakdown and return of operation voltage
- Breakdown and return of measuring voltage

Auxiliary input*⁴

The auxiliary input can be programmed for one of the following functions

- OFF = Auxiliary input not used
- 1 = Reset of the 15 minutes power mean value
- 2 = Tariff changeover
- 3 = Synchronization of the internal clock

Pulse output*⁴

The pulse output delivers current pulses of the assigned real or reactive energy.
The minimum pulse duration is 50 ms.

Relay outputs*⁴

The relay outputs K1 and K2 can be used for supervision of certain thresholds. Each relay output can be linked with a measured value and be saved with date and time and activated in case of exceedings. In order to avoid too frequent switchings, a minimum time can be programmed for each relay output.

Interfaces

The communication interface of the UMG 503 according to EIA RS485 Standard (semi duplex) supports the Profibus DP V0/V1 or Modbus RTU protocol depending on the version of UMG 503. The communication protocol can be selected via a selection menu. Used as Profibus SLAVE the UMG503 is bound to the master station aided by a GSD file. Depending on the format between 7 and 21 measured values can be transmitted cyclically.

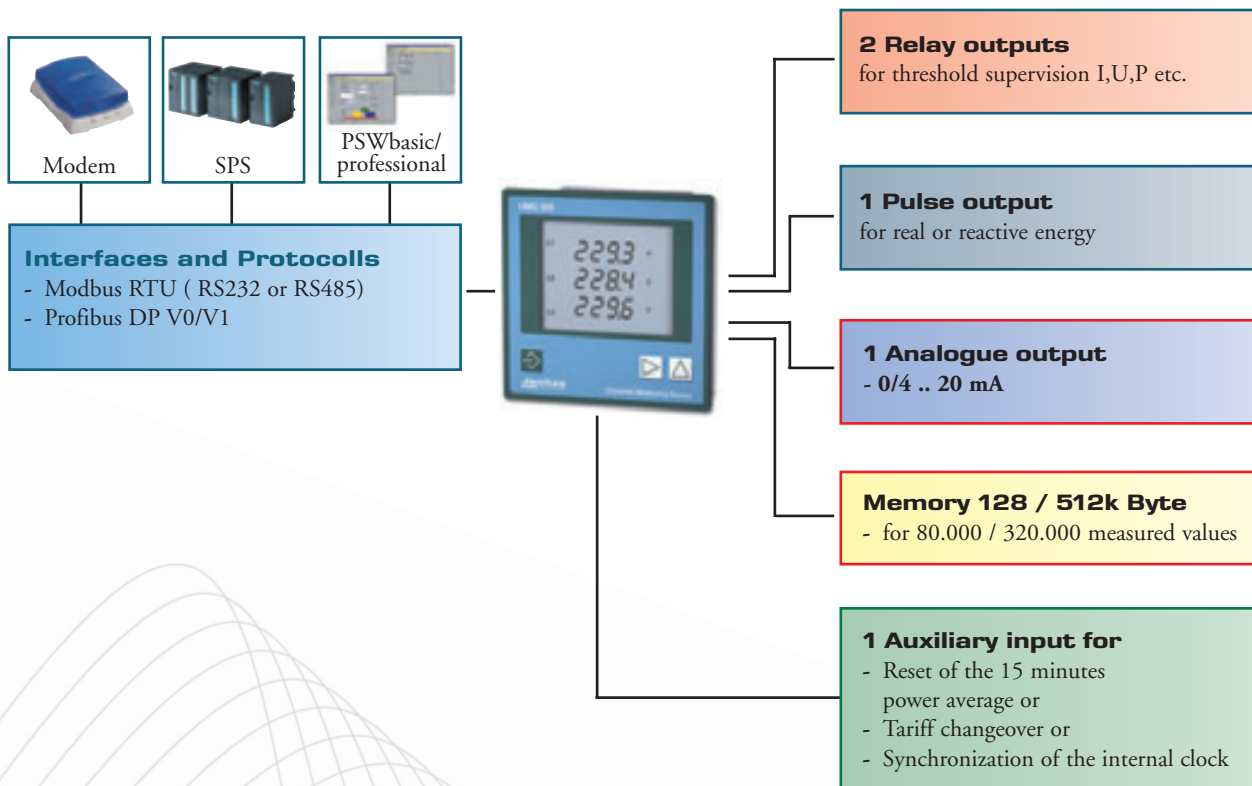
The measured values can be freely selected. If even more measured values are required, register address areas can be polled by the so called "higher protocol". This method allows greatest flexibility for changes.

The RS485 supports Baud rates from 9.6 kBit/s up to 1.5 MBit/s. According to the technical guideline 2.082 the UMG 503 supports Profibus DP V1.

Besides the cyclic data transmission, data of UMG 503 can also be retrieved anti-cyclic. In Modbus RTU mode Baud rates between 9.6 kBit/s up to 115 kBit/s are supported depending on the version of UMG 503.

The register addresses are available in integers for PLC users or as floating point format for software developers.

*⁴: Depending on the variant ordered

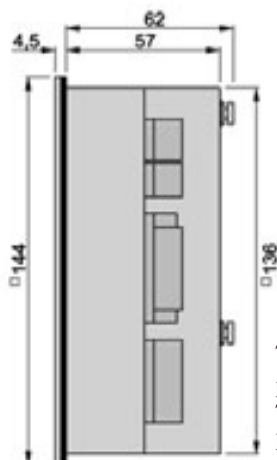
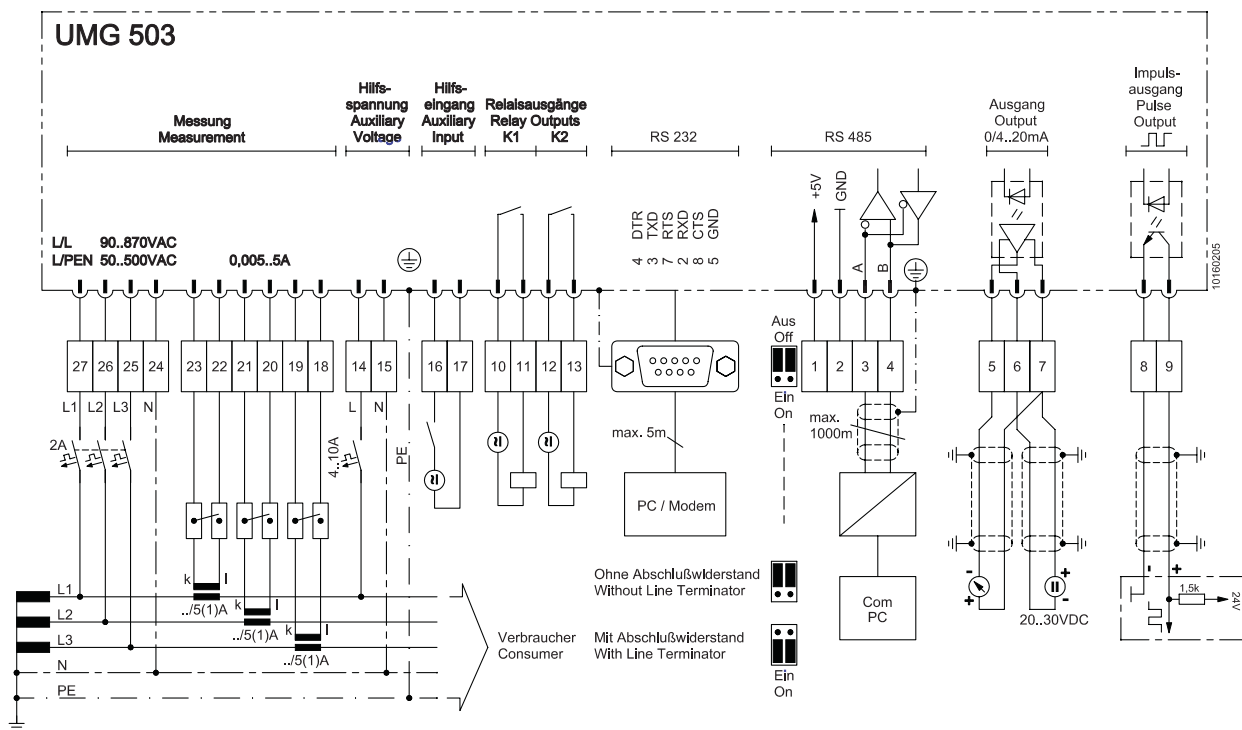


Technical data

Protection class:	III
Pollution degree:	2
Ambient temperature:	-10 °C .. +55°C
Storage temperature:	-20°C .. +60°C
Mounting position:	optional
Protection class:	1=Device with protective wire
Auxiliary voltage:	(see versions)
Voltage measurement:	L-N 50.. 500V 50/60 Hz L-L 80.. 870V 50/60 Hz
Current measurement:	.. /5A (1A)
Power consumption:	ca. 0,2 VA
Minimum working current:	5mA
Protection class:	Front IP 50 according to IEC 60529 Front incl. seal (option) IP 65 acc to IEC 60529 Back IP 20 according to IEC 60529



02



The UMG 503 can be used in IT-networks with phase to phase voltage up to 500V AC. The impedance is 2MΩ in each phase against housing (PE).



LON



Power Analyzer with LON

The UMG 505 is a network analyzer, which is suitable for measurement, storage and supervision of a very wide range of electrical parameters in low and medium voltage switchgear. The measurement circuit is designed for one and three phase systems with or without neutral conductor. For net frequency of 50Hz, the scanning frequency of the random test, which is carried out twice a second, is 6.4kHz. Main features are the high accuracy class, compact design and the measurement of the harmonic voltages and currents in each phase. For similar functionality at least 13 other devices such as amperemeter, voltmeter, voltmeter switch, power meter (kW, kVA, kvar and cos-phi), real and reactive energy for four tariffs (consumption/ supply), harmonic analyzer and measurement transformer, clock etc. are necessary.

Therefore, the costs for the project, installation, wiring and storage are much lower compared to analogue instruments.

A further advantage is a better and more accurate reading precision. Selected measured values as well as power drop and grid return are saved with date and time in a ring buffer.



Possible applications:

- Monitoring and control of electrical parameters in energy distribution systems
- Recording of (different) load profiles for Power Management
- Acquisition of the energy demand for Cost Center Management
- Measured value transducer for PLC
- Protocols Modbus RTU or LONtalk

Principle

The three phase electronic measurement system measures and digitizes the effective values of voltage and currents in a 50 / 60Hz mains. Two random samples per second are taken. Peak values, lowest values and programmed data are saved in a battery buffered memory. Selected values as well as grid breakdown (black outs) and return are saved with date and time stamp within the ring buffer.

Memory

The memory of the UMG505 is divided into three areas. The event memory, the maximum and minimum storage and the ring buffer. All EMax monthly peak values are saved for each months for all tariffs.

UMG 505 Product range

Operation voltage					Interfaces						Type	Item no.
85 .. 265V AC, 80 .. 370V DC	40 .. 115V AC, 55 .. 165V DC	15 .. 55V AC, 20 .. 80V DC	memory 512k RAM		LON	RS 232	RS 485					
●	—	—	●	4 digital inputs	—	●	—	●	●	○	UMG 505 MOD	52.10.004
—	●	—	●	5 digital outputs	—	●	—	●	●	○	UMG 505 MOD	52.10.005
●	—	●	●	4 passive analogue outputs 0(4) -20mA	—	—	●	●	●	○	UMG 505 MOD	52.10.006
—	●	—	●		—	—	●	●	●	○	UMG 505 MOD	52.10.007
—	—	●	●		—	—	●	●	●	○	UMG 505 MOD	52.10.008
●	—	—	●		—	—	●	●	●	○	UMG 505 MOD	52.10.009
—	●	—	●		—	—	—	●	●	○	UMG 505 LON	52.10.001
—	—	●	●		—	—	—	●	●	○	UMG 505 LON	52.10.002
—	—	—	●		—	—	—	●	●	○	UMG 505 LON	52.10.003
—	●	—	●		—	—	●	●	●	○	UMG 505 LON	52.10.013
—	—	●	●		—	—	●	●	●	○	UMG 505 LON	52.10.015
—	—	—	●		—	—	●	●	●	○	UMG 505 LON	52.10.016

○ = Option

— = not possible

● = included

Measured values

Parameter	Indication range	Measuring range at scale factor 1	L1	L2	L3	Sum	Lowest value	Mean value ¹	Peak value	Date / Time	Accuracy
Current .. /5A	0,000 .. 9999 A	0,005 .. 5 A	●	●	●		●	●	●	●	+0,2 % rng
Current .. /1A	0,000 .. 9999 A	0,005 .. 1 A	●	●	●		●	●	●	●	+0,2 % rng
Current, N	0,000 .. 9999 A	0,060 .. 1 5 A				●	●	●	●	●	+0,6 % rng
Voltage L-N	0,0 .. 999,9 MV	50 .. 500 V	●	●	●		●	●	●	●	+0,2 % rng
Voltage L-L	0,0 .. 999,9 MV	80 .. 870 V	●	●	●		●	●	●	●	+0,2 % rng
Frequency (U)	45,00 .. 65,00 Hz	45,00 .. 65,00 Hz	●	●	●		●	●	●	●	+0,2 % rng
Real power +/-	0,00 W .. 9999 MW	0,05 W .. 2,5 kW	●	●	●	●	●	●	●	●	+0,5 % rng
Apparent power	0,00 VA .. 9999 MVA	0,05 VA .. 2,5 kVA	●	●	●	●	●	●	●	●	+0,5 % rng
Reactive power	0,00 kvar .. 999 MVar	0,05 var .. 2,5 kvar	●	●	●	●	cap	●	ind.	●	+0,5 % rng
Power factor	0,00 kap. .. 1,00 .. 0,00 ind.	0,00 kap. .. 1,00 .. 0,00 ind.	●	●	●	●	cap.	●	ind.	●	+0,5 % rng
Real energy +	0,0 Wh .. 9999 GWh	0,05 Wh .. 9999 GWh ²				●		●		t ₁ /t ₂	*3
Real energy -	-0,0 Wh .. -9999 GWh	-0,05 Wh .. -9999 GWh ²									
React. energy +/-	0,0 .. 9999 Gvarh	0,05vars .. 9999 Mvarh ²				●		●		t ₁ /t ₂	*3
Total harmonic content THD V, A	0,0 .. 100 %	0,0 .. 100 %	●	●	●		●	●	●	●	+0,5 % rng
Part. harmonic cont	0,000 A .. 9999 A	0,005 A .. 5A (1 A)	●	●	●		●	●	●	●	+0,5 % rng
HDF V, A 2-20	0,0 V .. 99,99 kV	0,000 V .. 9999 V	●	●	●		●	●	●	●	+0,5 % rng

rng: of measuring range, rdg: of measured value, t1: Starting time, t2: Running time, + Consumption, - Supply

*1 Integration possible for a selectable time of: 1, 5, 10, 15, 30 seconds, 1, 5, 10, 15, 30, 60 minutes

*2 Storage time 60 minutes.

*3 Accuracy class acc. EN61036:1996, VDE418part 7:May 1997, IEC1036:1996 with cts .. /5A : class 1, with cts .. /1A: class 2

Summer-/Winter-time change over

The following possibilities are at your disposal:

- off - No change over
- on- Own change over times
- EU-listed change over, based on the procedure of the European community

Digital input

The digital input #4 can be used as pulse input for real energy (kWh) measurement (max. 10 Hz).

Event memory

In the event memory the following events can be saved with date and time:

- Deletion of the event - threshold violations
- Changing of the digital inputs
- Breakdown and return of the operating voltage (black out)
- Changing of the digital EMax outputs
- Breakdown and return of the measuring voltage

Up to 9999 events can be saved. The reading out is easily possible with the programming and reading out software PSWbasic and a PC.

Measured value indication /rotation

The well legible LCD display in combination with the function keys inform about the selected measured values (actual-, lowest-, peak-, and mean values). With the UMG 505 up to three measured values can be indicated simultaneously, and up to 140 data fields can be created individually by the software PSWbasic. For the measured value rotation, a changing time of 1 .. 9999 seconds can be set along with a selection of the measured values.

Ring buffer

The following values can be stored in the ring buffer

- Mean values of the measured values
- The fixed energy meters
- Reset of Emax measuring period

The possible storage period for saving the mean values of U1, U2, U3, I1, I2, I3, P1, P2, P3 over an averaging time of 15 minutes is about 1 year. Six windows can be programmed for saving measured values. An upper and lower threshold can be selected, and data are saved within or out of these thresholds.

Digital inputs

The 4 optical inputs are assigned to the internal inputs 1 .. 4. In total the UMG505 has 20 internal inputs. For the internal inputs 5 .. 12, the 8 inputs of the LONbus interface (option) are assigned, and for the internal inputs 13 .. 20, the 8 inputs of the Modbus interface (option) are assigned.

The condition of the digital inputs 1 .. 4 can be read out via the serial interface. Each of the 20 internal inputs can be assigned to one of the 5 input channels. Each input channel can change over an energy meter, reset the EMax time and synchronize the internal clock.

Two of the digital inputs can be combined by AND, and the result can be assigned to an input channel. For each of the digital inputs 1 .. 4, an event counter is assigned. If a function, except pulse valency, is assigned to digital input 1 .. 4, all changes at the input are saved with date and time.

Digital outputs

The UMG505 has 5 digital transistor outputs. These outputs are indicated on the display with "out1" up to "out5". Each of the outputs can be assigned to a data source. 6 different data sources are at disposal:

- Limit - outputs
- Time controlled outputs,
- LON-Bus (Option)
- MODBUS (Option)
- Energy meter

Each data source can be assigned to one output only. If an output is assigned to an energy meter, the output works as a pulse sender. The signals of all data sources, except energy meters, can also be inverted.



Interfaces and protocols

- LON with 55 SNVTs
- Modbus RTU (RS232 oder RS485)

Programming of limits with 3 comparators

- Minimum ON time at threshold violation
- Hysteresis at threshold violation
- Within range
- Out of range
- Both thresholds exceeded
- Both thresholds too low

Supervision of limits

For the supervision of limits, 5 threshold outputs can be programmed. For each threshold output up to three comparators (A, B, C) can be assigned. For each comparator

- 2 limits and 2 measured values or
- 2 limits and 1 measured value or
- 1 limit and minimum disconnection time

can be programmed.

Threshold violations are saved in the event memory with date and time and can be given out at a digital output by choice.

Weekly time controller

The time controller of the UMG505 has 100 time channels. Each time channel indicates a period of time. The time channel is indicated by a connection and a disconnection time. The connection and disconnection time is described by day, hour and minute. Each time control channel can control a time control output, an Emax target and an energy meter simultaneously. In the programming of the digital outputs, a time control output can be assigned to a digital output.

Interfaces

The UMG 505 is equipped with a RS485, LON and/or a RS232-interface depending on the version. The RS232 interface serves as a peer to peer connection, for example between UMG 505 and a notebook. At RS485, the protocol Modbus RTU is available to build a network of UMG 505 or other instruments. In building management a LON interface is used frequently to provide the data of UMG 505 for the building automation.



4 Digital inputs

- Pulse input
- Tariff changeover
- Synchronizing clock

5 Digital outputs

- Limit output for I,U,P etc.
- Remote via Modbus / Lon
- Pulse output for real and reactive energy

4 Analogue outputs

- 0 .. 20 mA or 4 .. 20 mA by choice

Memory 512k Byte

- for 320.000 measured values

Weekly switching clock

- 99 channels
- Digital output
- Tariff changeover

Pulse outputs

The five digital outputs in the UMG505 can be used as pulse outputs. The minimum pulse width is 50ms and maximum frequency is 10Hz.

Analogue outputs

The UMG505 has 4 analogue outputs. The analogue outputs have a common ground and are separated galvanically against the other in- and outputs of the UMG505. For the operation of the analogue outputs an external auxiliary voltage of 20V up to 30V DC is needed. As sources for the analogue outputs, the following values can serve:

- Measured values
- Values, which are given over Modbus interface to the UMG 505.

LONtalk-Protocol:

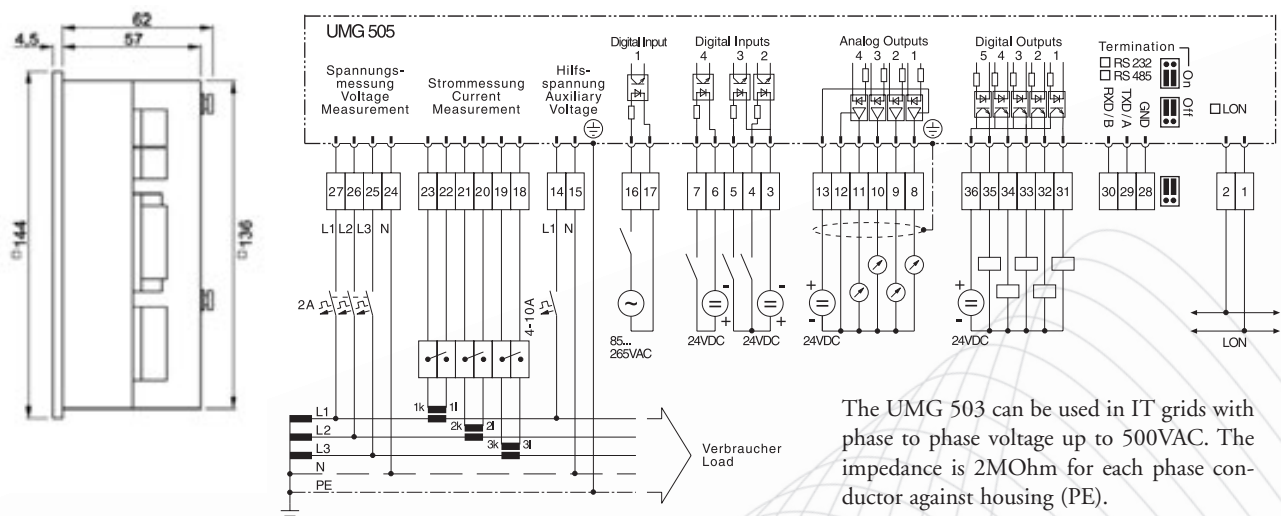
As LON variables the following SNVTs are available, which can be provided to the building manager via the building automation. Upon request, we can also provide client-specific measured value lists of LON variables.

Extract from the protocol:						
Description	SNVT-Type	Index	Direction	Unit	Type	Remark
nvi00Request	SNVT_obj_request	0	Output			nvi00Request
nvo00Status	SNVT_obj_status	1	Output			nvo00Status
volt_NL1	SNVT_volt_f	2	Output	V	float	Voltage L1/N
volt_NL2	SNVT_volt_f	3	Output	V	float	Voltage L2/N
volt_NL3	SNVT_volt_f	4	Output	V	float	Voltage L3/N
...						
power_L1	SNVT_power_f	11	Output	W	float	Real power L1
...						
energie	SNVT_elec_whr_f	32	Output	Wh	float	real energy consumption,sum
...						
input_state	SNVT_state	45	Input			Status of inputs and outputs
Configuration properties						
amp_deltaI	SNVT_amp_f	46	Input	A	float	DELTA I ¹⁾
amp_deltaU	SNVT_amp_f	47	Input	V	float	DELTA U ¹⁾
...						
maxsendtime	NONE 52 Input sec	0	unsig. long			MaxSendTime
outputState	SNVT_state	53	Input			setting of the inputs and outputs
rset_energie	SNVT_lev_disc	54	Input			delete energy counter

1) sent by deviation

Technical data

Overvoltage class:	III
Pollution degree:	2
Ambient temperature:	-10 °C .. +55°C
Storage temperature:	-20°C .. +60°C
Mounting position:	optional
Protection class:	1=Device with protective wire
Auxiliary voltage:	(see versions)
Voltage measurement:	L-N 50 .. 500V 50/60 Hz L-L 80 .. 870V 50/60 Hz
Current measurement:	.. /5A (1A)
Power consumption:	ca. 0,2 VA
Minimum working current:	5mA
Protection:	Front IP 50 according to IEC 60529 Front incl. seal (option) IP 65 acc to IEC 60529 Back side IP 20 according to IEC 60529



The UMG 503 can be used in IT grids with phase to phase voltage up to 500VAC. The impedance is 2MΩ for each phase conductor against housing (PE).



Power analyzer with event recording

Application

The three phase network analyzer acquires the rms values of current and voltage in 50 Hz and 60 Hz power grids by sampling the input signals. Further calculation is done by the built-in microprocessor. All measured values are calculated and aggregated in intervals of 200 ms, containing 10 power line cycles at 50 Hz respectively. Safe detection of short-term interruptions including fault recording. Recording of 128 cycles (one rms value each cycle), including 64 cycles pretrigger and transient recorder storing the waveform of 5 power line cycles, 2 cycles pretrigger. The delay time of the internal outputs is < 10 ms and field-bus connected outputs is < 200ms.



Field of application:

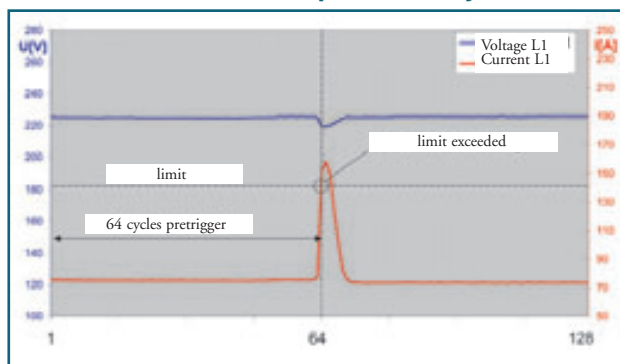
- Detection of electrical disturbances and power quality problems
- Consistently monitoring of the power quality
- Gateway and Comserver function between main (TCP/IP) and submeter (Modbus RTU)
- Smart Demand Management (SDM) / Clock timer
- Multitasking Management of Loads (MML)
- Power Management (PM) and Energy
- Cost Center Management (CCM) / "Energy Billing Systems" (EBS)

Measured values

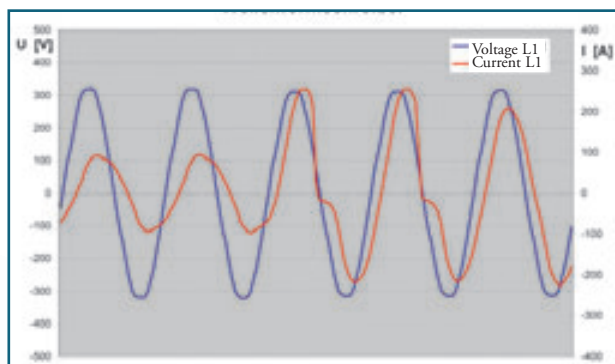
Parameter	Indication range	Measuring range at scale factor 1	L1	L2	L3	Sum	Lowest value	Mean value ^{*1}	highest mean value	Peak value	Date / Time	Accuracy
Current .. /(1)5A	0,000 .. 9999 A	0,005 .. /(1)5A	●	●	●			●	●	●	●	+0,2 % rng
Current, N	0,000 .. 9999 A	0,060 .. 15 A				●		●		●	●	+0,6 % rng
Voltage L-N	0,0 .. 999,9 MV	50 .. 500 V	●	●	●		●	●		●	●	+0,2 % rng
Voltage L-L	0,0 .. 999,9 MV	90 .. 870 V	●	●	●		●	●		●	●	+0,2 % rng
Positive/negative/zero sequence	0,0 .. 999,9 MV	50 .. 500 V						●		●	●	+0,5 % rng
Frequency (U)	45,00 .. 65,00 Hz	45,00 .. 65,00 Hz	●	●	●		●	●		●	●	+0,2 % rng
Real power +/-	0,00 W .. 9999 MW	0,05 W .. 2,5 kW	●	●	●	●		●	●	●	●	+0,5 % rng
Apparent power	0,00 VA .. 9999 MVA	0,05 VA .. 2,5 kVA	●	●	●	●		●		●	●	+0,5 % rng
Reactive power	0,00 kvar .. 999 mvar	0,05 var .. 2,5 kvar	●	●	●	●		●		ind.	●	+0,5 % rng
Power factor	0,00 kap. .. 1,00 .. 0,00 ind.	0,00 kap. .. 1,00 .. 0,00 ind.	●	●	●	●		●		ind.	●	+0,5 % rng
Real energy +	0,0 Wh .. 9999 GWh	0,05 Wh .. 9999 GWh ²				●		●			t _i /t _r	Class 1 ^{*3}
Real energy -	-0,0 Wh .. -9999 GWh	-0,05 Wh .. -9999 GWh ²				●		●			t _i /t _r	Class 1 ^{*3}
React. energy +/-	0,0 .. 9999 Gvarh	0,05vars .. 9999 Mvarh ²				●		●			t _i /t _r	Class 1 ^{*3}
Total harmonic content THD V, I	0,0 .. 100 %	0,0 .. 100 %	●	●	●			●		●	●	+0,5 % rng
Harmonic content	0,000 A .. 9999 A	0,005 A .. 5A (1 A)	●	●	●			●		●	●	+0,5 % rng
V 1-15 (odd-harmonics)	0,0 V .. 99,99 kV	0,000 V .. 9999 V	●	●	●			●		●	●	+0,5 % rng

rng: of measured range, rdg: of measured value, t_i: Starting time, t_r: Running time, + Consumption, - Supply. *1 Integration possible for a selectable time of 5, 10, 15, 30 seconds, 1, 5, 10, 15, 30, 60 minutes, *2 Storage time 60 minutes. *3 Accuracy according to DIN EN 61036: 2001-01, VDE 0418 part 7, EC 61036: 1994 + A1:2000

rms value recorder (128 power line cycles)



Transient recorder



Transformer supervision, k-factor

The maximum permissible current for transformers, fuses and motors can be supervised by setting the k-factor. The manufacturers ratings of the transformer, e.g. current and k-factor (1=100 %) can be monitored by properly setting one or more of the comparators and routing its output to one of the digital outputs. Furthermore the reading of the external temperature sensor can be used for the supervision and protection of transformer/s.

Software

The software PSWbasic is included in the contents of delivery of UMG 507 and allows for a simple programming and configuration of the instrument. The memory can be read out, while the data will be available in ASCII-Format for further handling in MS Excel. Have a look to page 41-44. Optionally the powerful and comprehensive Power Management Software PSW Professional is also available.

Embedded Webserver / Email

The UMG 507 is worldwide accessible via an internet browser. In order to allow access it is only necessary to set up the IP-address and access privileges. The entire configuration menus are available as HTML pages from the internal web server. User contributed Java applets and ActiveX components can be stored in the flash memory. In case of exceeding thresholds or other events a message will be sent to user-defined email addresses. Stored data can be sent by email at set times and can be processed with PSW software.

Supported protocols: HTTP, SMTP, DNS, NTP, Mod/TCP, Modbus over TCP, DHCP, BootP

Internet connection via ISDN or DSL router

The device can be connected to the internet by an external router (e.g. ISDN or DSL) . SMTP provides Plain/Login/Cram-MD5 (latest encryption standards) authentication to send email messages to your mailbox.

UMG 507 Product Range

Three and four wire universal measurement device 50/60Hz; current transformer ..1/5A; including programming and reading out software PSWbasic

Auxiliary voltage				Interfaces				Type	Item no.
85 .. 250V AC, 80 .. 370V DC	40 .. 115V AC, 55 .. 165V DC	15 .. 50V AC, 20 .. 70V DC	memory 256k RAM additional memory 16MB Flash	6 digital inputs	6 digital outputs	1 temperature input	1 analogue input		
●	—	—	●	●	●	—	—	UMG 507 L	52.15.004
—	●	—	●	—	—	—	—	UMG 507 L	52.15.009
●	—	—	●	—	—	—	—	UMG 507 EL	52.15.021
—	●	—	●	—	—	—	—	UMG 507 EL	52.15.022
●	—	—	●	—	—	—	—	UMG 507 AD	52.15.003
—	●	—	●	—	—	—	—	UMG 507 AD	52.15.008
●	—	—	●	—	—	—	—	UMG 507 P	52.15.002
—	●	—	●	—	—	—	—	UMG 507 P	52.15.007
●	—	—	●	—	—	—	—	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
Options for the devices									
EMax-Function								EMax	52.15.080

— = not possible

● = included

Technical data

Overvoltage class:	III
Pollution degree:	2
Operating ambient temperature:	-10 °C .. +55°C
Storage temperature:	-20°C .. +70°C
Mounting position:	optional
Protection class:	1=Device with protective wire
Auxiliary voltage:	(see versions)
Impedance per phase conductor against ground (PE)	4MΩ
Voltage measurement:	L-N 50.. 500V 50/60 Hz
	L-L 90.. 870V 50/60 Hz
Crest factor	V=1,1; I=1,4
Current measurement:	.. /5A (1A)
Power consumption:	approx.. 0,2 VA
Minimum operating current:	5mA
Protection class:	front IP 65 acc. to IEC 60529
	back side IP 20 acc. to IEC 60529



Interfaces & Protocols

- RS 232 Modbus RTU, data rate: 38,4 kBit/s
- RS 485 Modbus RTU slave, Modbus RTU master/gateway, data rates: 9,6, 19,2, 38,4, 57,6 and 115,2 kBit/s
- Profibus DP V0, transmission rates: 9,6, 19,2, 93,75, 187,5, 500 k and 1,5 Mbit/s
- Ethernet 10baseT

The RS485 of UMG 507 can also be used as Modbus RTU master. This means, that any Janitza instrument with RS485 and protocol Modbus RTU can be connected to a UMG 507 and the data can be transmitted on Ethernet TCP/IP with the full functionality. Furthermore, the inputs and outputs of the UMG 507 can be expanded via decentral WAGO modules. For Modbus data of other bus participants up to 64 free Modbus data points are available and can be supervised in topology view of PSWprofessional, for example.

Detection and storage

The UMG 507 has an internal memory of 256kByte RAM, and, depending on the version, an additional memory of 16MByte Flash is available for continuous data collection of all measured data. This measured value memory is freely configurable regarding the values to be saved and the interval of storage. The interval of storage is also the averaging time of the respective measured value. Additionally, the maximum and minimum instantaneous values (200ms averaging time) can be saved.

The storage of transients and events is released by trigger. Transients are safely recognised if they last longer than 10ms. Events like overcurrent as well as over and under voltage are detected from a half period duration. Events are recorded as rms values over 128 periods.

Display - Examples



The display of UMG 507 allows an indication of all measured values in numerical format. Selected displays can be indicated automatically exchanging in automatic display rotation. The programming of the device is carried out via software PSWbasic/professional. Simple programmings like current transformer ration etc. can be carried out via the function keys as well.

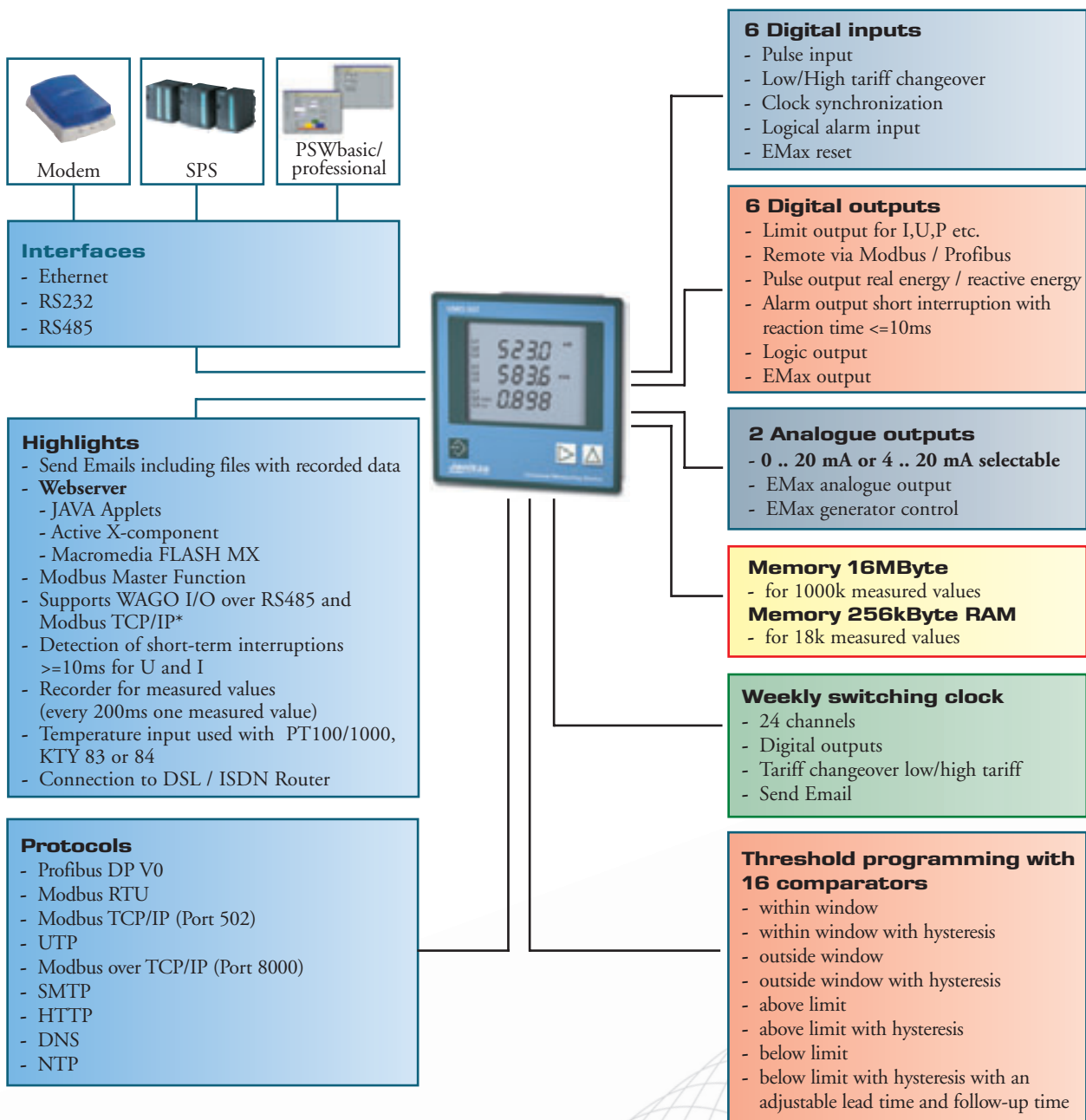
Digital inputs and outputs

Depending on the version, the UMG 507 has a wide variety of internal digital and analogue inputs and outputs. In maximum layout, the UMG 507 (AD, P, E and EP) has 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, synchronization input or alarm input. The digital outputs can be defined as alarm output, pulse output, Emax outputs (option), switching clock outputs or logical output. The two analogue outputs can be used as transducers or for analogue control of generators in Emax operation (option). Transformer temperatures can be detected via the temperature input. The analogue input can be feeded with any kind of analogue process signals (0/4-20mA).

Integrated logic

The 128 programmable logic elements provide connections from the inputs and internal functions of the UMG507 (e.g. comparators) to the digital outputs. Available operators: AND, NAND, OR, NOR, XOR, EQU, edge detection (rising and falling). The results are assigned to free flags, which can be combined with other flags. Also information arriving via Modbus RTU or Profibus DP can be combined this way.

As operands, trigger events, virtual switching clock and Emax channels, limit comparators and signals from field bus are available. These flags can release switchings of digital outputs, tariff changes, synchronization, setting of clock or Email dispatch. Measured values can also be added, subtracted, multiplied or divided.



Power Quality Analyzer

Application

With each 4 voltage and current measurement inputs, the UMG510 acquires the rms voltages and currents in power grids from 40 to 70 Hz. By sampling and analogue to digital conversion the internal DSP (digital signal processor) determines the electrical quantities. For three phase measurements the load relevant voltage can be defined as line-to-neutral or line-to-line voltage. The load relevant voltages are further processed for harmonic analysis, flickermeter and transient and event recording. For the measurement of current events, a nominal current can be set additionally. The fourth current and voltage input represents a separate measurement system. Usually it is used for the measurement of the current in neutral or PE and for the detection of a possible voltage potential between N and PE.



Field of Application:

- Power quality measurement according to EN 50160
- Supervision of main internal grid parameters according to EN 61000-2-4
- Root cause analysis in case of problems
- Continuous supervision of electrical power quality

Measured values

Measured value	Main measurement	Auxiliary measurement	Measuring range at scale factor 1	Condition	Accuracy
Frequency	x	x	15 - 440 Hz	40 .. 70Hz 15 .. 440Hz	± 0,01% rdg ± 0,02% rdg
Voltage					
UL1-N, UL2-N, UL3-N, UL4	x	x	5 ... 500 Vrms	40 .. 70Hz 15 .. 440Hz	± (0,2% rdg + 0,05% rng) ± (0,6% rdg + 0,05% rng)
UL1-L2, UL2-L3, UL3-L1	x	-	8 - 870V		
Star point voltage	x	-	5 ... 500 Vrms		
Unbalance	x	-	0 ... 500 Vrms		
Positive / negative / zero sequence					
Further values: Crest factor, negative peak, positive peak, peak to peak					
Current					
Single currents I1, I2, I3, I4	x	x	0,005 ... 6 Arms	40 .. 70Hz 15 .. 440Hz	± (0,6% rdg + 0,15% rng) ± (1,8% rdg + 0,15% rng)
Sum currents					
I1 + I2 + I3	x	-	0,005 ... 18 Arms		
I1 + I2 + I3 + I4	x	x	0,005 ... 24 Arms		
Unbalance I1, I2, I3	x	-	0,005 ... 6 Arms		
Further values: Crest factor, negative peak, positive peak, peak to peak					
Power					
Rms values				40 .. 70Hz, cos = 1 40 .. 70Hz, cos > 0,8 40 .. 70Hz, cos > 0,5	± (0,4% rdg + 0,0075% rng) ± (0,75% rdg + 0,0075% rng) ± (1,0% rdg + 0,0075% rng)
Real power (PL1-N, PL2-N, PL3-N, Psum, PL4)	x	x	0.025 ... 3000 W	15 .. 440Hz, cos > 0,5	± (3,0% rdg + 0,0075% rng)
Apparent power (SL1-N, SL2-N, SL3-N, Ssum, SL4)	x	x	0.025 ... 3000 VA		
Distortion power					
(DL1-N, DL2-N, DL3-N, Dsum, DL4)	x	x	0.025 ... 3000 VA		
Power factor (L1, L2, L3, sum, L4)	x	x	0 ... 1		
Fundamental				40 .. 70Hz, cos = 1 40 .. 70Hz, cos > 0,8 40 .. 70Hz, cos > 0,5	± (0,4% rdg + 0,0075% rng) ± (0,75% rdg + 0,0075% rng) ± (1,0% rdg + 0,0075% rng)
Real power (PL1-N, PL2-N, PL3-N, Psum, PL4)	x	x	0.025 ... 3000 W	15 .. 440Hz, cos > 0,5	± (3,0% rdg + 0,0075% rng)
Apparent power (SL1-N, SL2-N, SL3-N, Ssum, SL4)	x	x	0.025 ... 3000 VA		
Reactive power (QL1-N, QL2-N, QL3-N, Qsum, QL4)	x	x	0.025 ... 3000 VA		
cos (L1, L2, L3, Lsum, L1-L3, L4)	x	x	0 ... 1		
Phase shift (L1, L2, L3, L4)	x	x	0° - 360°	15 .. 440Hz 40Hz .. 70Hz	± 0,3° ± 0,8°
Energy					
Real energy supply/consumption	x	x	0.05 Wh ... 9999 GWh		Class 1
Reactive energy inductive/capacitive	x	x	0.05 vars ... 9999 Mvarh		Class 1
Apparent energy	x	x	0.05 VA ... 9999 MVA		Class 1
Harmonics^h (HDF)					
Current (I1, I2, I3, I4), value	x	x	%, 0 - 6 Arms	Measured value ≥ 1% of measuring range	± 0,05% rng
Voltage (L1, L2, L3, L4), value	x	x	%, 0 - 500Vrms	Measured value < 1% of measuring range	± 5% rdg
Interharmonics					
Current (I1, I2, I3, I4), value	x	x	%, 0 - 6 Arms		
Voltage (L1, L2, L3, L4), value	x	x	%, 0 - 500Vrms		
Harmonic distortion factor (THD)					
Current (I1, I2, I3, I4)	x	x			
Voltage (L1, L2, L3, L4)	x	x			
Actual flicker value P _{F5}	x	x	0 - ...		
Short term flicker value P _{st} (10 minutes)	x	x	0 - ...		

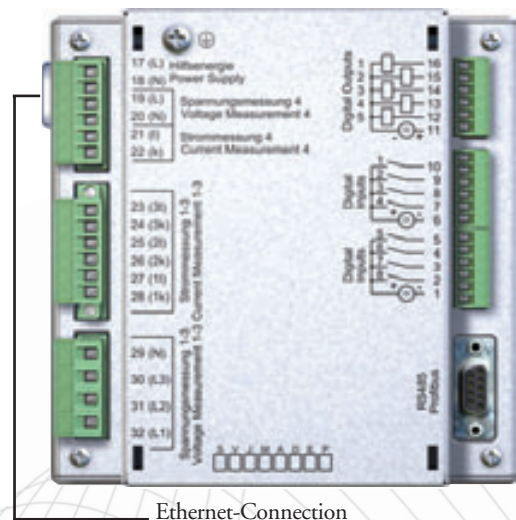
Software

The software PAS510 is within the contents of delivery of the UMG 510. In this software the measured values are either online as actual values, or the data read from memory offline displayed graphically as line diagrams, bar graphs or histogram. The analysis tools EN50160 and EN61000-2-4 allow a fast evaluation according to those two standards. In one view it becomes transparent, whether the standards are fulfilled or violated. A printout can be effected on a printer or as .pdf file. A comprehensive power quality report, easily available from this software, is an excellent tool with real facts for demonstrating to management or clients e.g. the power quality at a certain period of time.



Technical data

Installation Category:	CATIII
Degree of Pollution:	2
Operating Temperature:	-10°C .. +50°C
Storage Temperature:	-20°C .. +60°C
Dimensions:	W 144 x H 144 x D 90 mm
Protection Category:	1=unit has safety ground
Power supply:	95 .. 265V AC; 100 .. 370 V DC; 15VA
Current range:	5A (1A); 0,2 VA
Minimum working current:	5mA
Voltage range:	L-N 5 .. 500V AC; 0,2VA; 15-440Hz L-L 8 .. 870V AC; 0,2VA; 15-440Hz
Protection class front :	IP 50 according to IEC60529
With optional gasket:	IP 54 according to IEC60529
Rear:	IP 20 according to IEC60529
Sampling rate:	28,8 kHz



Ethernet-Connection

Interfaces

- Profibus DP V0, RS485 (Modbus/RTU, Gateway Ethernet to Modbus), Fast Ethernet 10/100Base-TX
- Protocols: HTTP, NTP, Modbus TCP, Modbus over TCP, DHCP

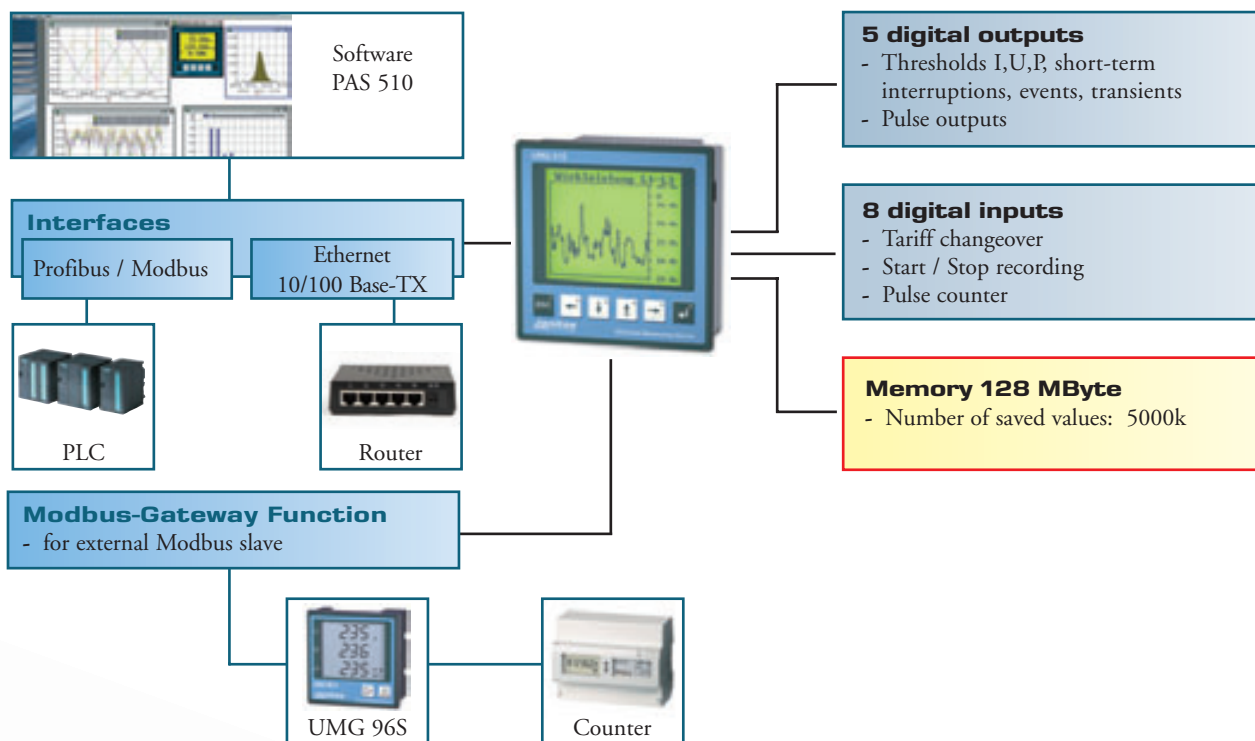
Measured values and recorded data can be read out via TCP/IP (Ethernet). The PAS510 software is provided for configuration and analysis of the recorded data. The fieldbus protocols (Modbus/RTU, Modbus/TCP, Profibus) can be used to control the digital inputs and outputs and to read out measurement values.

Detection and recording

The UMG 510 has got an internal 128MByte Flash memory for the continuous recording of all measured data. This measured value memory can be freely configured regarding the values to be saved and the saving interval, which represents also the averaging time of the respective value. Additionally the highest and lowest instantaneous values (averaging time 200ms) can be recorded within this interval, if the data shall be saved in a line graph $y(t)$.

Of course it is also possible to save the data in histograms. The storage of transients and events is released by trigger. Transients are detected if they last more than 70 μ s.

Events like overcurrents or over and under voltage can safely be detected from the duration of half a period (> 10 milliseconds). Events are recorded over a period of 512 half periods as rms writer.

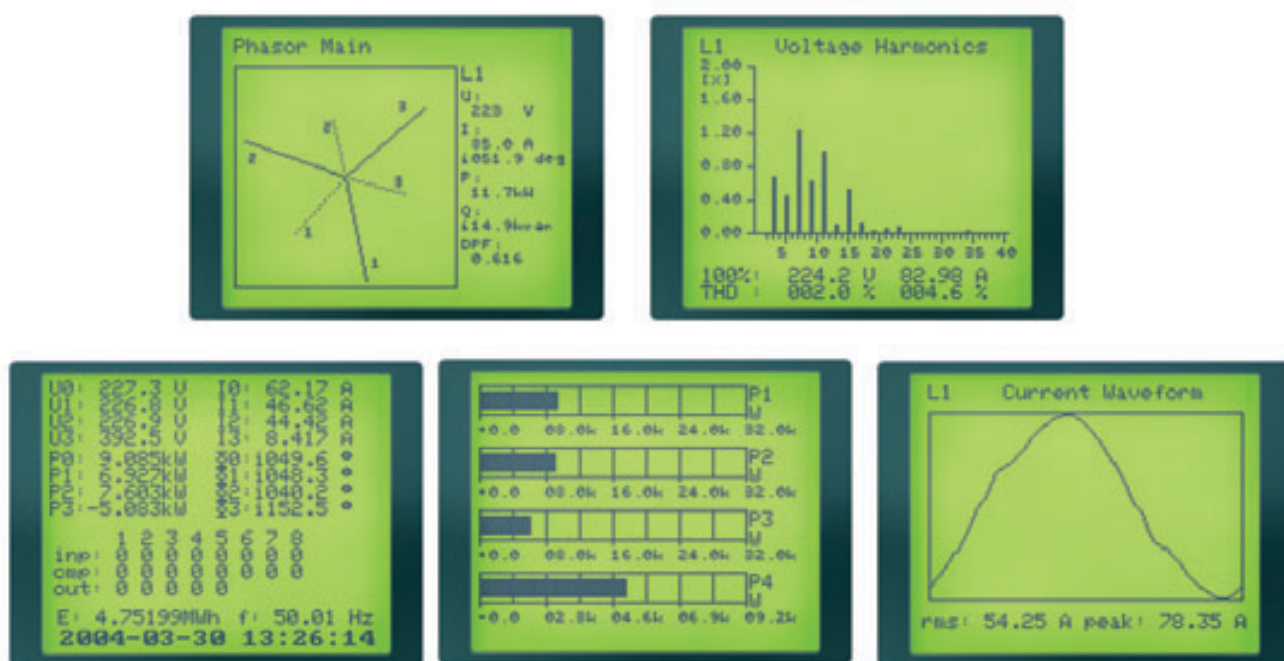


Digital inputs and outputs

The 8 digital inputs of the UMG 510 can be used either for a tariff changeover, synchronization, release of recording or pulse input. Eight programmable comparators are available, which can be assigned up to 4 measured values as threshold comparator. After that, the single comparators can be assigned to the 5 digital outputs. The digital outputs can be used as alarm outputs for transients or events or as pulse output.

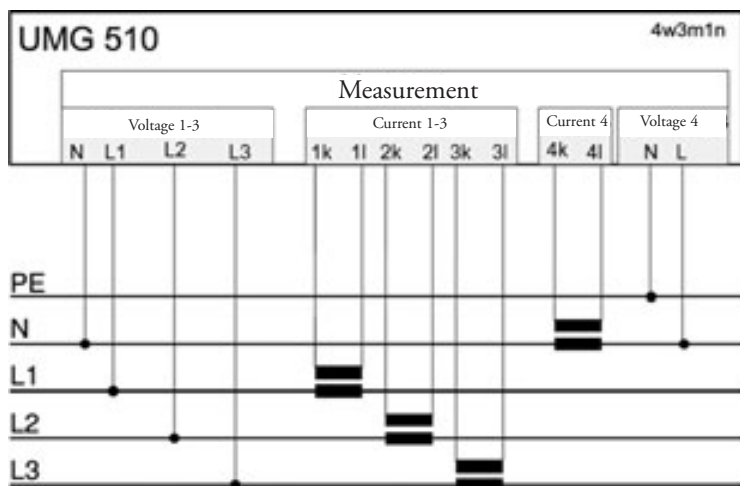
Examples

The graphical display with background illumination of the UMG 510 displays measured values in numerical format, bar graph or line graph. Selected displays can be shown automatically changing (automatic display rotation). The programming of the instrument is carried out via plaintext menus or software PAS 510.



Connection example UMG 510

Three phase measurement with auxiliary input (conductor)



Main measurement

The UMG 510 has 4 measuring channels for current and voltage. The first three channels are designed for a three phase system.

Auxiliary measurement

The auxiliary measurement can be used for a single phase or symmetric three phase system. Alternatively, the current input can be used for measuring the neutral conductor of the three phase system of the main measurement. The voltage input might measure the voltage between neutral and PE. The auxiliary measurement inputs offers all measured values of the main measurement (current, voltage, power, harmonics, transients, events and flicker).

Order data

Description	Type	Item no.
Power quality analyzer	UMG 510	52.12.001

Portable Power Quality Analyzer System analyzer OMNI-QUANT® mobil

The OMNI-QUANT® mobil is preferably used as portable device in changing locations. Four voltage and current measuring inputs, each one allows power measurements, fault analysis and recording functions along with the evaluation of the voltage quality.

Standard accessories provided in the transport case:

- 4 ROGOWSKI current probes (450 mm long) for up to 200 or 2000 A rms
- 6 voltage measuring cables with safety connectors
- Ethernet / USB data cable
- Operator manual
- DAMON® software for data analysis
- Power cable
- **Optional: Current clamps 5/5A**

Complete scanning and calculation of the following values:

- Phase voltage (L-N) and phase-to-phase voltage (L-L)
- Star point voltage and unbalance L1...L3
- Frequency (identical for all channels)
- Current, total current L1...L3, total current L1...L3 + N
- Power (P, Q, S, power factor, distorted reactive power)
- Power of the fundamental (active power, reactive power, apparent power, cos)
- L1...L3 total of the above power variables
- Harmonics 1...50th order
- Intern harmonic of U and I up to 2,5 kHz
- Ripple control level
- Distortion factor (THD) of V and A
- Short-term and long-term flicker



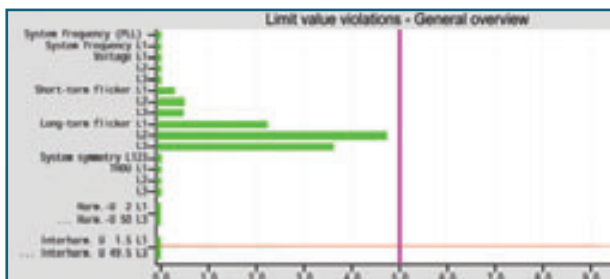
Automatic acquisition and recording to min, max and mean values within adjustable sequencing intervals

- Acquisition of under- and overvoltages from > 10 ms
- Acquisition of voltage failures from > 10 ms
- Acquisition of starting or overcurrents from > 10 ms
- Acquisition of transient events from > 140 µs

DAMON: Powerful and practical configuration and evaluation software

Overview of continuous recordings, example displays:

In this project threshold violations of more than 5 % were found. Evaluation according to standards considers the number of limit violations as a percentage of the total number of all values for a measured variable.



Retrieved measured data:

Evaluation group	Number values	Max. Out [%]	Comment	Measuring channels
System frequency (PLL)	258968	0.0	OK	[Gib]
System frequency	258968	0.0	OK	L1(K1)
Voltage	129483	0.0	OK	L1(K1), L2(K2), L3(K3)
Short-term Flicker	12948	0.5	OK	L1(K1), L2(K2), L3(K3)
Long-term Flicker	1080	4.7	OK	L1(K1), L2(K2), L3(K3)
System symmetry	43161	0.0	OK	L12(K12)
THD	12945	0.0	OK	L1(K1), L2(K2), L3(K3)
Harmonics	634305	0.0	OK	L1(K1), L2(K2), L3(K3)
Interharmonic	634305	33.0	VIOLATED	L1(K1), L2(K2), L3(K3)



Technical data

Ambient conditions	Overvoltage category Voltage measurement	600 V CAT III, 300 V CAT IV
	Ambient temperature range	-10°C ... +40°C
	Storage temperature range	-20°C ... +60°C
	Relative humidity	15 ... 95% (not condensing)
	Elevation	0 ... 2000 m above sea level
Supply voltage	Standard	180 ... 250 V~ (45 ... 65 Hz)
	maximum power consumption	13 W / 20 VA
Uninterruptible power supply	Battery (internal)	Li-Ion, 7,2 V
	Operating time	20 min (up to 6 times)
Current measurement, Rogowski sensors	Measuring ranges	200 Arms, 2000 Arms
	Cable length	2 m
	Length of measuring loop	45 cm
	Measuring error	Typ. 1,5%
Voltage measurement	Input impedance	5 MΩ
	Measuring range L-N	0 ... 500 V~
	Fundamental frequency	15 Hz ... 800 Hz
	Measuring error	0,20%
Scanning frequency	automatic adaptation with digital PLL, based on 57.6 kHz basic scanning frequency (all channels, voltage and current)	
A/D converter resolution	Voltage and current	16 Bit
Memory	internal (non-volatile)	128 MB Flash
Interfaces	Serial	USB 1.1
	Network	Fast Ethernet 19/100 Base-TX

Order data

Description	Type	Item no.
Portable power quality analyzers	Omniquant mobil	52.12.015
Precision current transformer set for Omni-Quant mobil	CT 5	15.05.220
Portable four wire network analyzer	MRG 503 LGF	52.07.404
Flexible current transformer	HT 3003 FLEX	52.05.215

Portable network analyzer MRG 503 LGF

The portable network analyzer MRG 503 LGF is suitable for measurement and storage of electrical parameters in low voltage mains. Up to 320.000 measured values can be saved and read out via the interface RS232. The measurement circuit has been laid out for one and three phase systems and a voltage of L-N 50-500 V AC, L-L 80-870V with an auxiliary voltage of 85-265V AC.

The instrument is used along with flexible current transformers with a voltage output of 3,0V AC. The dimensions of the aluminium case are W480xH395xD195mm. The measuring cables, voltage clips and configuration and reading out software PSWbasic belong to the contents of delivery. The flexible transformers do not belong to the contents of delivery.



Technical data

Flexible transformers	HT 3003 Flex
Measuring range	300A / 3000A
Output sensitivity	AC current, changed by choice
Line voltage max.	10mV / 1mV pro A
Frequency range	600V
Accuracy (25°C)	10Hz bis 20kHz (-1dB)
Measuring loop:	+-1% des Messbereiches (45-65HZ)
Lenght (open)	
Diameter	610mm, double insulated
Inner diameter	14,3mm
Voltage supply	178mm
Battery life expectancy	incl. two AA MN 1500 LR6
	Alkali Batteries
	> 1000 hours



Electronic kWh-meters with pulse output to measure real energy for DIN rail mounting

Application:

kWh-meters are measuring devices for electrical real energy. The counters are either designed for direct measurement of the currents or connection to current transformers. The measurement is laid out for single phase or three phase mains.

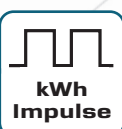
Field of application:

- Energy management and cost center management
- Transducer for PLC or building automation



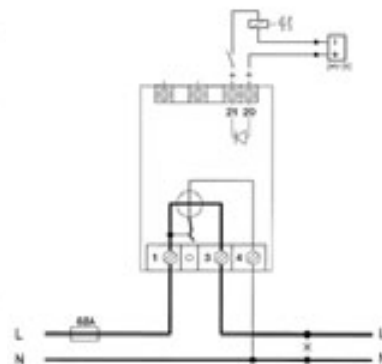
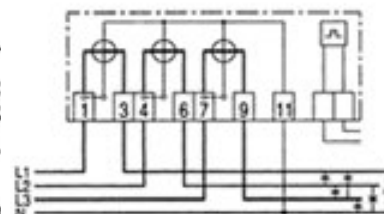
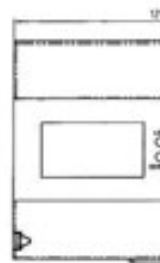
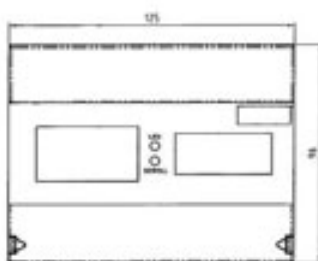
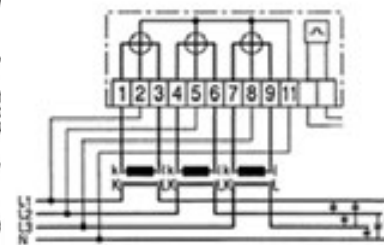
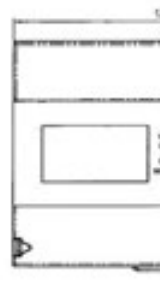
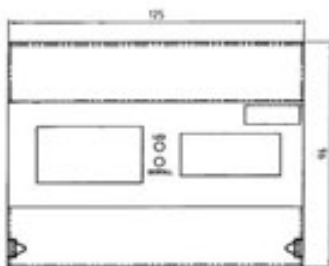
Technical data:

Type	WH6165	DVH3113	MDVH3106
Item no.	14.01.020	14.01.021	14.01.022
Number of phases	1	3	3
Accuracy class	1	2 (1 optional)	1
Protection class	2	2	2
Direct measurement Basis / Limit	10 / 65A	5 / 65A	-
Current transformer	-	-	../5A*1
Power consumption in current path	-	-	<1,0VA
Current inputs sep. galvanically	-	-	yes
Minimum working current	40mA	25mA	25mA
Measuring voltage	230V +/-10%	3x230/400V +/-10%	3x230/400V +/-10%
Self consumption	<1,5VA	<1,5VA	<1,5VA
Frequency	50/60Hz	50/60Hz	50/60Hz
Pulse output SO valence	1000 Impulse/kWh	500 Impulse/kWh	5000 Impulse/kWh
Pulse width	min. 30ms	min. 30ms	min. 30ms
Load		max. 230V AC /100mA	
Number of digits	6,1	6,1	5,2
PTB accreditation	yes	yes	yes
Calibratable	optional	optional	optional
Protection housing/terminals		IP51/IP20	
Connection diameter	up to 16mm ²	up to 25mm ²	Current up to :10mm ² Voltage: 2,5qmm
Width	36mm 2TE	125mm 7TE	125mm 7TE
Dimensions	W36xH96xD66mm	W125xH96xD66mm	W125xH96xD66mm
Weight	140g	500g	500g
Operating temperature	-20 .. +55°C	-20 .. +55°C	-20 .. +55°C
Storage temperature	-25 .. +70°C	-25 .. +70°C	-25 .. +70°C



65
A

../5
A

WH6165**Dimensional Drawing****Connection****DVH3113****Dimensional Drawing****Connection****MDVH3106****Dimensional Drawing****Connection**



LON



Data collection device

Application

The data collecting device ProData is suitable for collection and storage of counters, operating conditions and process data. These data can be used for evaluation of the consumption of electrical energy, water, steam, gas etc., operating hours or the supervision of switching conditions and disturbances in buildings, factories or other facilities. In case of disturbances or threshold violations, the alarm call is carried out via relay outputs, analogue modem or SMS with GSM-modem.

Analogue inputs

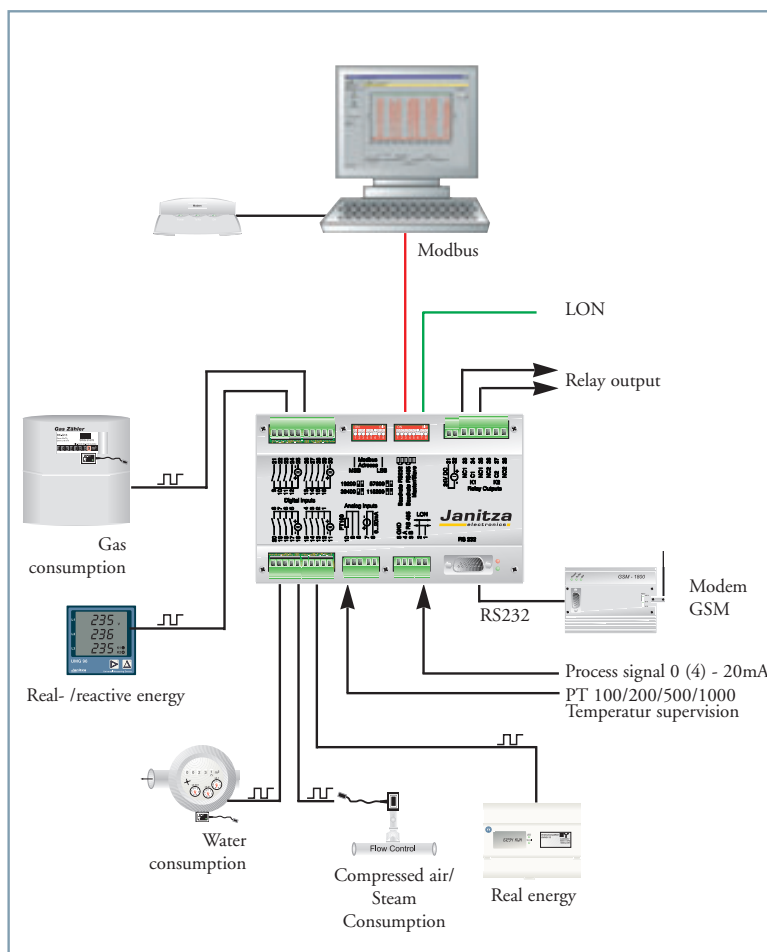
- 1 analogue input is programmable in the range of 0(4)-20 mA or -20/20mA
- 1 input for the temperature sensor PT100, PT200, PT500 or PT1000

These measured values can be read out via Modbus. The temperature value and the scaled 20mA value is available via LON.

Relay outputs

- 2 internal relay outputs (changer)
- 31 decentral relay outputs (optional)

The relay outputs can be used as: Threshold or alarm contact and yearly switching clock. The device can manage up to 31 decentral outputs in Modbus master mode.



Digital inputs

16 digital inputs, which can be used as:

- Total pulse counter at each input, maximum frequency 50Hz, 64-Bit-counter
- Pulse counter with automatic reset in a programmable time range of 1sec. up to 12h or external synchronization with automatically saved meter indication at last reset
- Recognition of the total operation and disconnection time of each input, for example working hours counter, service intervals etc. Resolution 1 second, maximum time > 100 years
- Supervision of operation and disconnection times
- Frequency measurement at each input for supervision of flow meters, power etc.

The above mentioned values can be read out via Modbus. Via LON, the total pulse counters are available as 32-Bit values. The digital inputs (4x4) can be set by plug bridges as pulse (S0 interface) or message inputs.

Data storage

The analogue measured values can be saved in programmable time intervals (1s...12h) as mean, minimal and maximum value. The difference between the total counter and the last saved counter indication is created in programmable time intervals (1s...12h) and stored. Changes of condition of the inputs can be saved with date and time in the memory with 1 second resolution. Various internal events (for example voltage breakdown and return) are stored. Alarm messages or exceeding of programmed thresholds can be saved with date and time. All stored values and events are saved in a ring buffer, which includes 430kB and is sufficient to save all digital counters for three months in a 15 minutes interval.

Comparators

ProData has got 128 programmable comparators, which compare an input value to an upper and lower threshold (with hysteresis), if its value is within or out of the defined window. The result can be combined with the result of another comparator by a logical combination (AND, OR, NOT). Depending on the result, several actions can be carried out. Delays for switching ON or OFF can be programmed separately. Each internal measured value or content of a register can be used as input value for a comparator. In Modbus master mode, also the measured values or registers of a slave device can be retrieved and used as input value.

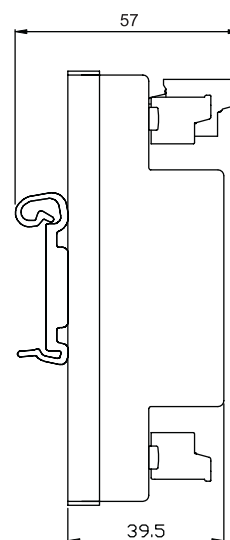
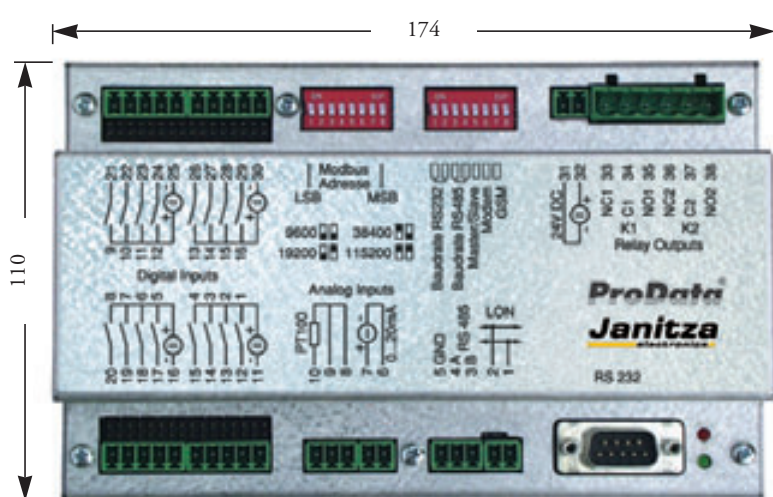
The following actions are possible:

- Switch ON or OFF relay outputs or LEDs
- Set internal condition flag
- Save event in the ring buffer
- Switch relay output or LED for a programmable time
- Write the result of the comparator into a register of a Modbus slave
- Alarm via analogue modem, sending SMS via GSM modem

The internal condition flags (4 units) can be read out via LON, the relays and LEDs can be switched via LON.

Modbus master

The RS485 interface can be switched in the master mode. In this mode, ProData can read registers of other Modbus devices (for example other ProData or UMG 503). Furthermore, ProData can write the results of the programmable comparators into the registers of other devices. Hence, the number of relay outputs can be increased by connecting a respective module to Modbus as a slave. In Modbus master mode the Modbus telegrams, that reach the RS232 interface, but should not be used by ProData, are transmitted to the connected slaves at RS485 bus.



Technical data

Ambient temperature:	-10°C .. +55°C
Mounting position:	optional
Voltage supply:	24V; DC
Digital inputs:	4x4 Optokoppler / S0
Counter frequency:	max. 50 Hz
Relay outputs:	2 changers (2A, 250V; AC)
Protection class:	IP20 according to IEC 60529
Type:	ProData
Item no.:	52.11.001
Type:	Power supply primary
Item no.:	16.05.002
Power supply primary	230 V 50/60 Hz, Secondary 24DC;1A

UMG 507EMax

Intelligent reduction of the peak demand

Application

The UMG 507EMax is a multifunctional instrument, which should not be missed in any low voltage distribution. Using the maximum demand controller UMG 507EMax the maximum real power can be reduced by short term disconnection of consumers. Furthermore, the unit allows a time or event depending switching of consumers with the integrated weekly switching clock.

As basic instrument, an UMG 507L with certain additional components is built in a steel sheet housing, or available as single device.

The UMG 507EMax as a power meter detects the complete load of the electrical supply to avoid a peak demand. Furthermore, the device is also designed to measure and store almost all electrical quantities including current and power mean values (see page 25-28).



Principle

Based on the incoming real power pulse at a digital input or the internal measurement, the total real power is calculated, the UMG 507EMax detects the necessary parameters to keep up to 5 different target values in kW. The device continuously calculates the mean value, instantaneous value, trend value and correction power.

If the device recognizes a possible exceeding of the allowed target value, it checks the necessity to switch OFF the consumers with respect to the programmed consumer data. The purpose of this method is to affect the process or operation of an application as less as possible by switching as rarely as possible, but nevertheless keep the programmed target.

Depending on the ordered type, up to 32 disconnection stages (two-way contact, potential free) are available, and as an option two analogue EMax outputs for the control of generators.

Peak demand control up to 32 disconnection stages / 5 target values

Measuring period duration:

To keep the measurement synchronized with the energy supplier, the reset of the measurement period is carried out via a digital input of the UMG 507EMax or via interface. If no reset is provided within the programmed measuring period, the reset is effected automatically by the internal clock. The reset deletes the EMax real power and starts a new measuring period. The last measured real power maximum is used for the minimum and maximum value storage and saved in UMG 507EMax, if programmed.

Blocking time:

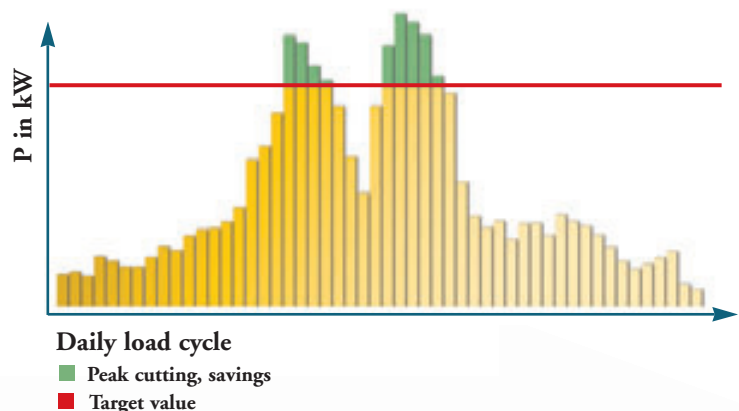
The blocking time runs at the beginning of the measuring period and avoids disconnections during the beginning of the measuring period caused by short power peaks.

Off period:

Time between two switching procedures. As disconnections do not have direct results in the net, the delayed reaction can be respected by programming the Off period.

Involved consumers:

Involved consumers are preferably used for disconnection. Only involved consumers are respected in the trend calculation. This means, the EMax program tries to keep the maximum with respect to the switching times of the consumers and the consumer's power only with the involved consumers. If this is not possible, the other connected consumers are also used for disconnection.



Priority:

Each disconnection stage can be assigned to a priority from 0 to 32. EMax outputs with priority 0 are not used for the trend calculation of the EMax program. EMax outputs with low priority (e.g. 1) are switched OFF at first, and switched ON as last one.

Connection load:

To detect the switching time most exactly the connected consumer power must be programmed for each EMax output. The switching times, which are assigned to each EMax output are kept in any case.

Minimum connection time:

Depicts, how long a consumer must be connected until it is disconnected again.

Minimum disconnection time:

Depicts, how long a consumer must stay disconnected.

Maximum disconnection time:

Depicts the longest time of disconnection for the respective consumer.

Availability:

The availability of a consumer can be programmed in percentage



Maximum demand controller UMG 507EMax in a steel sheet housing for wall mounting, readily wired on terminals, including PSWbasic and standard programming.

Operating voltage: 230V; 50/60Hz;
Dimensions: W600xH380xD210mm,
Colour: RAL 7035,

UMG 507EMax Product Range

memory 256k RAM	additional memory 16MB Flash	6 digital inputs	disconnection stages	two-way contact 1A	1 temperature input	1 analogue input	2 passive analogue inputs	Interfaces				integrated weekly clock	Type	Item no.
								RS 232	RS 485	Ethernet 10baseT	Profibus DP V0			
●	○	●	6	●	○	○	○	●	●	○	○	●	UMG 507EMAX6	52.15.217
●	○	●	16	●	○	○	○	●	●	○	○	●	UMG 507EMAX16	52.15.222
●	○	●	32	●	○	○	○	●	●	○	○	●	UMG 507EMAX32	52.15.232

● = included ○ = optional (by assembling another type of UMG 507)

For further functions and technical data please have a look on page 25 – 28.

In the above mentioned versions, the UMG 507L is included.

The functions of the analogue consumer and generator control are optional.

Software PSWbasic/professional

Functions in brief overview

The system software PSWbasic/professional allows programming and parameter setting, data read out and visualisation of power monitoring devices, data collection units and power factor controller of Janitza electronics GmbH.

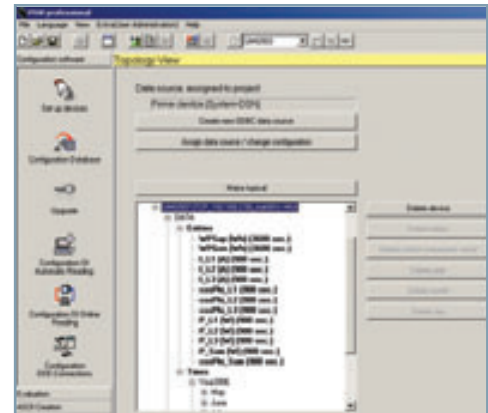
Key features

- Visualisation of measured values
- Handling of up to 255 measuring devices in each project
- Any number of projects possible
- Automatic reading of the ring buffer
- Online reading and storage of measured values for devices without internal memory
- DDE data exchange for the indication of instantaneous values in Excel or other visualisation (via external OPC server)
- Storage of data in Access or MySQL database
- Transformation of the data into ASCII format
- Integrated measured value manager for up to 40 cost centers
- Free Excel macros
- User defined topology in multiple screens
- Configuration of the measurement devices within evaluation software
- The following languages are supported: English / German / Spanish / Turkish / Dutch / Chinese

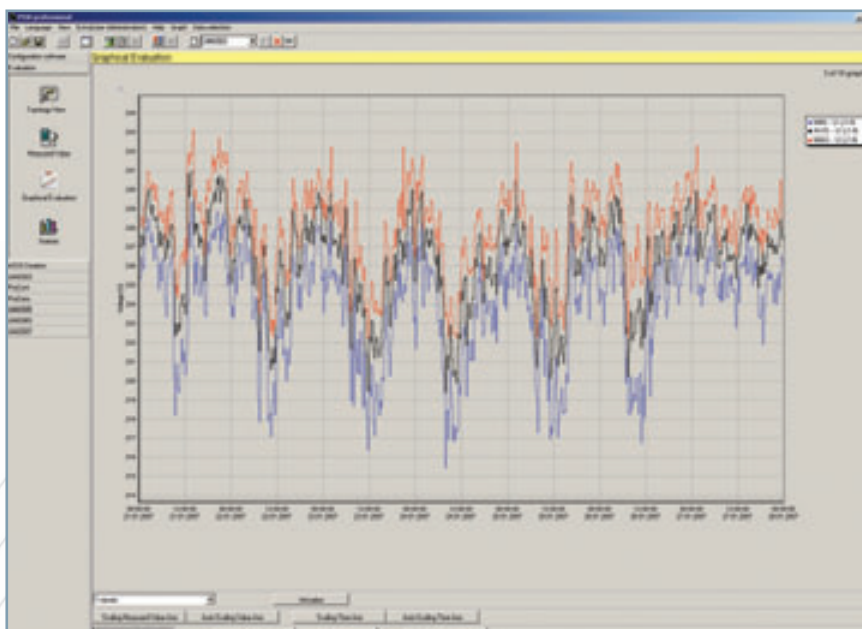
For the devices UMG 96S, UMG 503, UMG 505, UMG 507 and ProData the free programming software PSWbasic belongs to the contents of delivery. This software enables a very simple and complete configuration of the respective instruments and ,furthermore, to read out the memory of the instruments if available. The data are saved as .txt file and are available for Excel for further processing. A more simple handling with those data can be granted by using software PSWprofessional. Software PSWprofessional can also visualise measured values of UMG 510 and Prophi online within the topology.

Data can be saved in a data base. Data are saved for each measured value in calendrical form. For small projects, the ODBC Access database driver can be used, which is delivered along with Windows as a standard. For projects with more than 10 power meters, the use of a MySQL database is recommended. MySQL can be downloaded from MySQL.org free of charge.

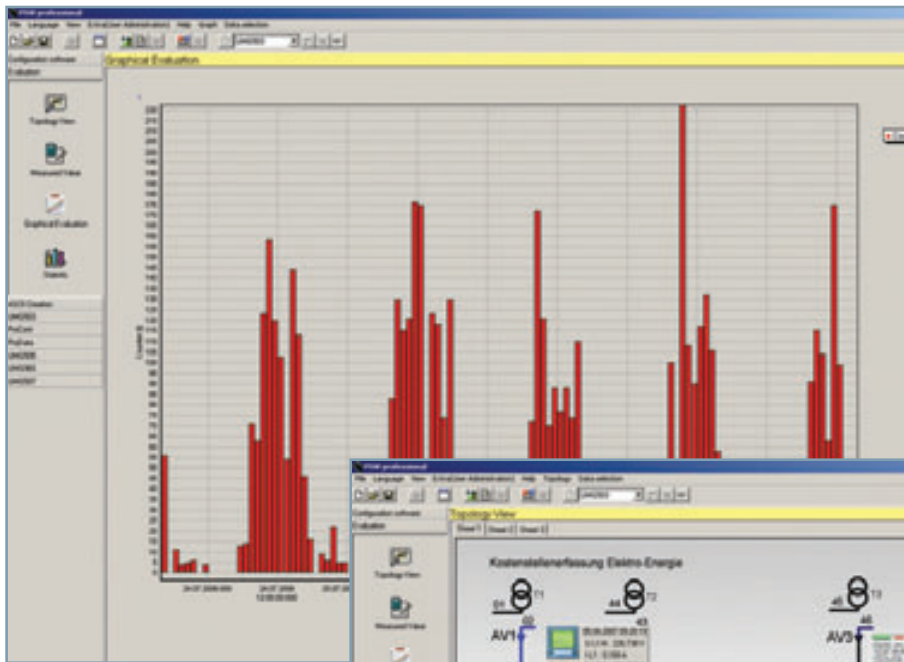
The measured data from the database are processed directly and indicated graphically within the software, or converted to energy costs. Two different scales can be indicated in one graph, which means two different units can be displayed. Up to eight graphs can be operated simultaneously.



Database administration in PSWprofessional

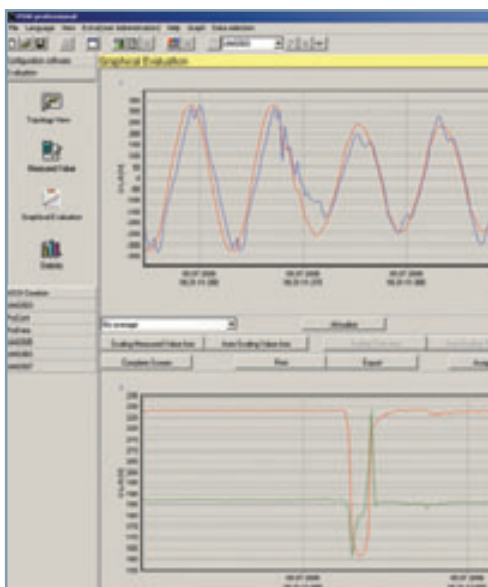
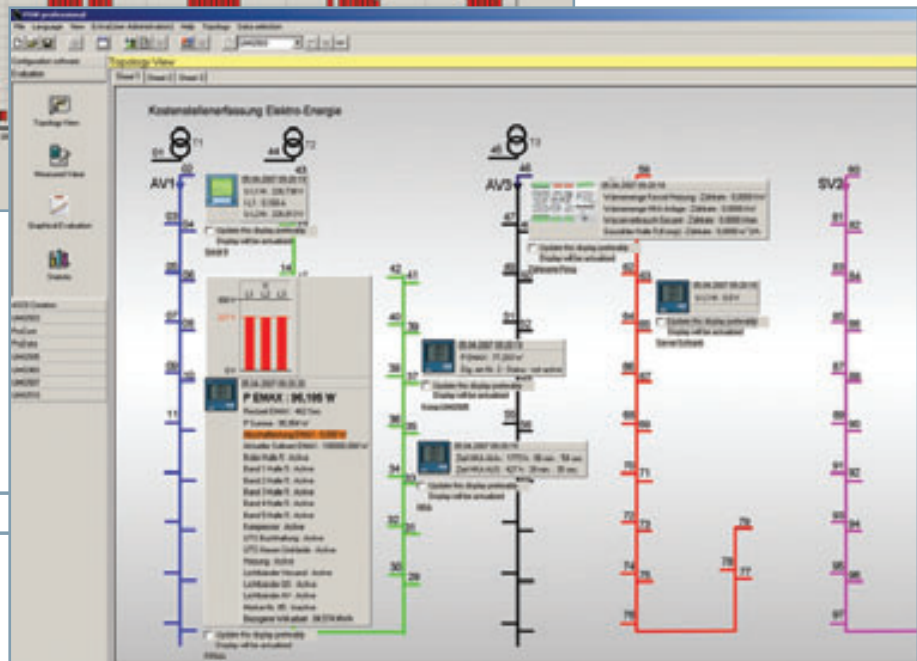


voltage sequence
UMG507 with minimum
and maximum value (200ms)



Counter values of ProData
(e.g. water consumption,
gas consumption, heat flow
volume)

Topology View

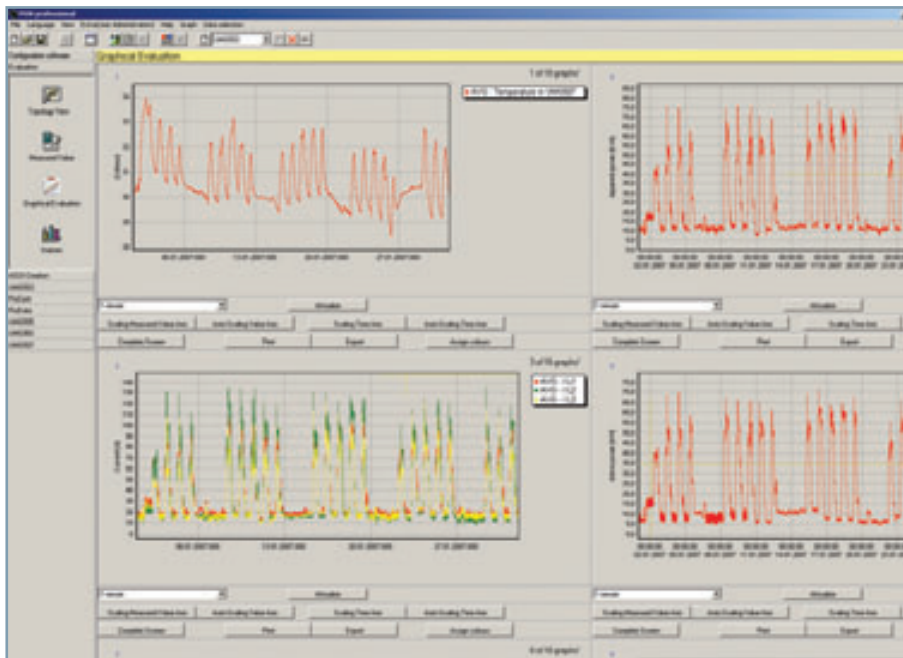


UMG507 Short term interruption voltage / current

PSWprofessional separates online from offline evaluation of measured data. For online visualisation, two methods of evaluation are available. The first possibility is the so called topology overview. A user defined background in .jpg format can be deposited, for example a sketch of the existing energy distributions.

The measuring devices can now be allocated on the sketch according to their real position, and the selected values can be shown online. Threshold violations are clearly marked with selected colours.

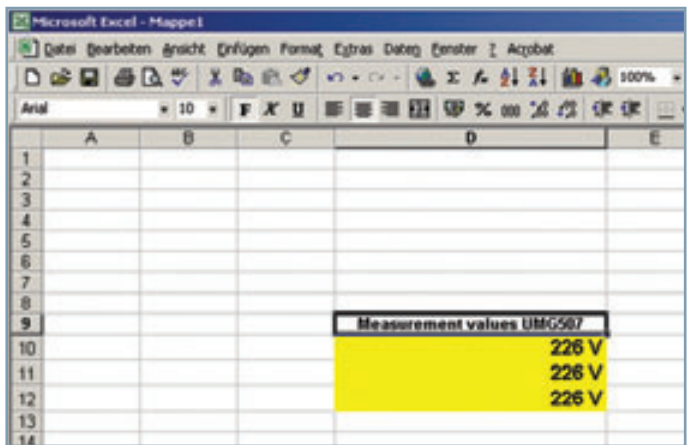
The status of the inputs and outputs can also be indicated. Topology view, therefore, allows a fast overview over the complete energy grid with the possibility to locate interferences, for example caused by harmonic sources, by comparing every single measuring point, and check the customer set tolerances.



UMG507
Temperature sequence, current
sequence, power sequence

The second option of the online visualisation is the graphical line writer function. Selected values can be supervised online. The graph is permanently expanded by new measured values. Up to 1000 values can be assembled in one graph, and the most obsolete values will be omitted.

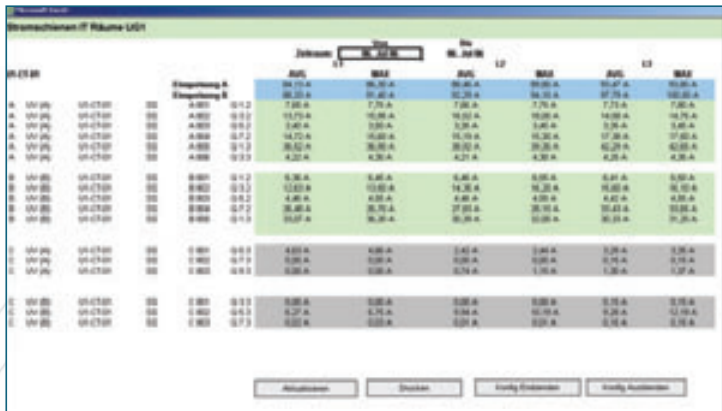
Devices with internal memory can either be read out manually or in automatic periods. Also online values can be written into the data-base automatically. Via DDE server, actual data can be transmitted into MS Excel.



Indication of online values in Microsoft Excel 2003 (DDE)

In order to offer another low cost solution for cost center management, Janitza offers user defined Excel solutions. An expensive control technological solution becomes needless. The most commonly measured data of Janitza's products are available as Excel macro or Excel function.

Those macros get the corresponding measured values from the database, generated by PSWprofessional, and insert those in an Excel sheet. For example, only time periods are entered, and the corresponding consumption, costs or graphs are given out. For the construction of the Excel sheets, all tools and instruments of Excel can be used. The Excel macro is bound into Excel as an Add-In.



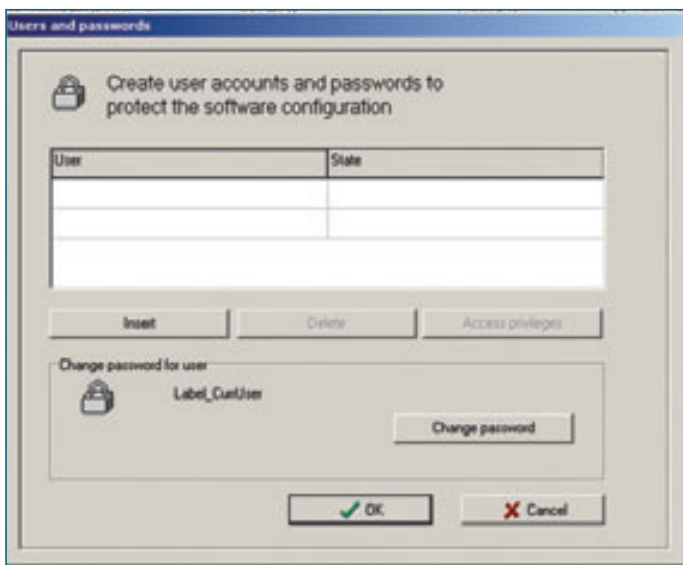
User defined Excel solutions for the indication of peak values for each current.



User defined Excel solutions with general arrangement drawing for the single measured points.

Debugging

With a debug function all protocol activities can be checked. In case telegrams failed, the corresponding error messages are released. During a running online operation the communication to the meters is permanently checked. An error alarm is released in case of communication problems. From PSWversion 9 onwards, additionally an alarm tone via the PC loudspeaker can be sent.



Password protection

The user administration in the software allows the comfortable awarding of user rights (password protection).

03

Gateway Function

Using the Modbus gateway function, also devices without Ethernet interface (for example UMG503, UMG96S etc.) can be read via the Ethernet network. For this purpose, only one UMG507E, EP or UMG510 is required. For example, an UMG 96S is connected to the RS485 interface as a slave. Up to 31 other Modbus RTU instruments can be adapted to Ethernet via UMG507E/EP or UMG510.

System Requirements

The system software PSWbasic/professional enables to program, read out and visualise the power meters, data collectors and power factor controllers of Janitza electronics GmbH. The software runs under the following conditions:

- PC Pentium 1Ghz and above
- 512 MByte main memory.
- about 20MB hard disk memory for the main program
- about 1MB hard disk memory per month for every connected device for a storage of 10 measured values per device in MySQL database
- 19" colour monitor with a resolution of 1280 x 1024 pixels.
- Graphic board with at least 64MB.
- CD - ROM drive.
- Ethernet interface.
- USB or RS232 interface.

Order data

Description	Item no.
PSW Demo	51.00.111
PSWbasic	51.00.104
PSWprofessional	51.00.114
PSW release code 2-20 devices	51.00.101
PSW release code 21-255 devices	51.00.102

Current transformers (CTs)

Application:

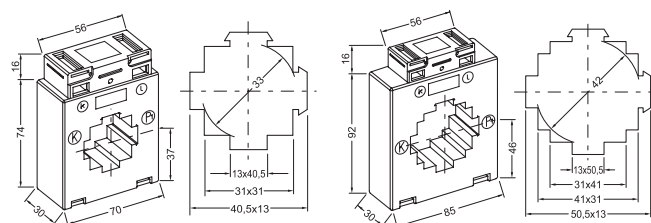
Current transformers are used in cases where it is impossible or difficult to measure currents directly. CTs are special transformers which transform the primary current into a (mostly) lower secondary current and which separates (galvanically) both circuits. By means of the physical principle of saturation of the core material an additional protection of the secondary circuit from high currents produced in the event of system faults is ensured.

General Mechanical Features:

- unbreakable plastic casing
- difficult to inflame, according to UL 94 VO and self-extinguishing
- nickel-plated secondary terminals with „plus minus“ screws (0.5Nm)
- integrated secondary terminal covers

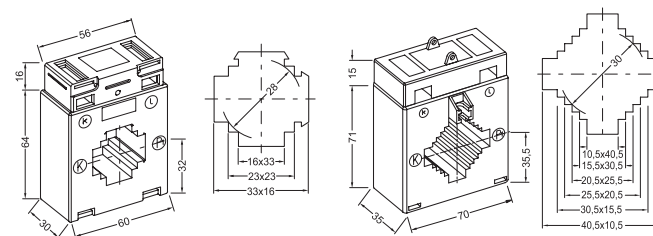
Technical data

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current $I_{th} = 60 \times I_N$
- nominal surge current $I_{dyn} = 2.5 \times I_{th}$, minimum 100kA at all window type
- maximum voltage $U_m = 0.72$ kV (other voltages on request)
- rated power-frequency withstand voltage 4kV/1min (other voltages on request)
- instrument security factor FS5 or FS10



Dimension drawing 7A412.3

Dimension drawing 8A512



Dimension drawing IPA 40

Dimension drawing 6A315.3



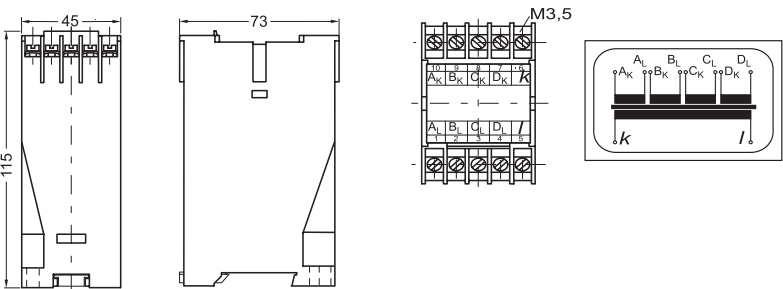
Overview Current transformers Product Range

Description	Type	primary rated current	secondary rated current	power in VA	class	Busbar	Round conductor	Width	Item no.
Current-Transformer	IPA 40	50	5	2,5	1	40x10mm, 30x15mm, 25x20mm	30mm	70mm	15.02.150
Current-Transformer	IPA 40	75	5	2,5	1	40x10mm, 30x15mm, 25x20mm	30mm	70mm	15.02.170
Current-Transformer	6A315.3	100	5	2,5	1	30x15mm, 20x20mm	28mm	60mm	15.02.181
Current-Transformer	6A315.3	150	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.190
Current-Transformer	6A315.3	200	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.200
Current-Transformer	6A315.3	250	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.210
Current-Transformer	6A315.3	300	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.221
Current-Transformer	6A315.3	400	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.230
Current-Transformer	6A315.3	500	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.240
Current-Transformer	6A315.3	600	5	5	1	30x15mm, 20x20mm	28mm	60mm	15.02.250
Current-Transformer	7A412.3	800	5	5	1	40x12mm, 2x30x10mm	33mm	70mm	15.02.270
Current-Transformer	7A412.3	1000	5	5	1	40x12mm, 2x30x10mm	33mm	70mm	15.02.280
Current-Transformer	8A512.3	1250	5	5	1	50x12mm, 2x40x10mm	42mm	85mm	15.02.290
Current-Transformer	8A512.3	1500	5	5	1	50x12mm, 2x40x10mm	42mm	85mm	15.02.295
Accessories									
snap-on mounting bracket		for profile mounting bar to EN 50022-35 for IPA 30 and IPA 40							15.02.159
snap-on mounting bracket		for profile mounting bar to EN 50022-35 for 6A315.3, 7A412.3 and 8A512.3							15.02.199

Summation current transformers

Application

Summation current transformers are used to add secondary currents of several main CTs in order to measure with one instrument only. The output current again constitutes a standardized quantity. That means, the primary currents are not only added but also divided by the number of inputs.



Features:

- unbreakable plastic casing, IP40
- difficult to inflame to UL 94 VO and self-extinguishing
- nickel-plated secondary terminals with „plus minus“ screws
- integrated terminal protection, IP10
- rated frequency 50 - 60 Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current $I_{th} = 60 \times I_N$
- nominal surge current $I_{dyn} = 2,5 \times I_N$
- maximum voltage $U_m = 0,72 \text{ kV}$ (other voltages on request)
- rated power-frequency withstand voltage 4 kV/1min (other voltages on request)
- instrument security factor FS5 or FS10

04

Summation Current Transformers Product Range:

Description	Type	primary rated current	secondary rating current	power in VA	class	Dimensions	Item no.
Summation current transformers	IPS20	5+5	5	15	1	15VA	15.02.510
Summation current transformers	IPS30	5+5+5	5	15	1	15VA	15.02.515
Summation current transformers	IPS40	5+5+5+5	5	15	1	15VA	15.02.520

Comment: Using unequal main CTs the ratio of the lowest primary main CT current to the highest one should not exceed 1:10. When ordering in case of unequal main CTs the ratio of each of them has to be specified absolutely.

KUW Split-Core Current Transformer

Application

The KUW is ideal for energy monitoring applications due to its easy mounting with ty-straps and compact dimensions. Every current sensor is supplied with colour coded leads of 5 meters length. The burden and class specification apply to the conditions at the cable ends.

The rubber encasement clamps the transformer parts tightly and protects the current sensor from environmental influences. The transformer can be easily mounted on the primary conductor by 2 UV-resistant ty-straps. The accuracy class is guaranteed for each burden in the specified range.

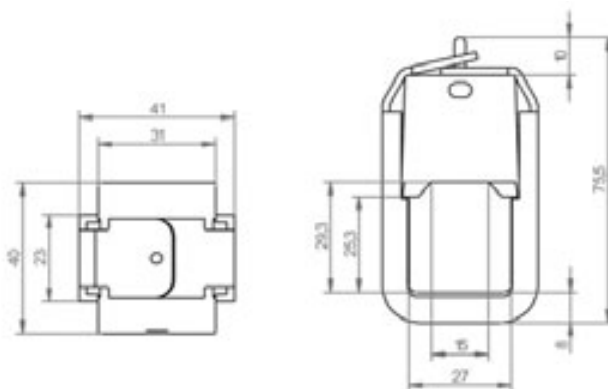
Remark: KUW may be used only for insulated cables but not for busbars or any live conductor.



Technical Data

Application: Indoor use
 Max. overload capability I_{th} : $60 \times I_n/1s$
 Class of insulation: E
 Ambient temperature: $-5 \dots +40^\circ\text{C}$
 Frequency: 50/60Hz

Primary conductor Cable max. $\varnothing 27\text{mm}$
 Length Secondary leads: 5m colour coded
 Cross section: $0,75\text{mm}^2$
 Material: PVC



Product Range Split-Core Current Transformer

Type	primary rated current	secondary rated current	power in VA at 5m	Class at 5m	Item no.
KUW60	60	1	1	3	15.02.350
KUW75	75	1	1	3	15.02.351
KUW100	100	1	2	3	15.02.352
KUW125	125	1	2,5	3	15.02.353
KUW150	150	1	3,75	3	15.02.354
KUW200	200	1	3,75	3	15.02.355
KUW250	250	1	1	1	15.02.356
KUW300	300	1	1,5	1	15.02.357
KUW400	400	1	2,5	1	15.02.358
KUW500	500	1	5	1	15.02.359



Power Factor Correction

- Power Factor Controller Propri
- LV PFC Capacitors
- Conventional and de-tuned LV PFC Capacitors in sheet steel enclosure



-
- PFC Systems in various designs
 - De-tuned harmonic filters
 - PFC modules



05

-
- Active Harmonic Filter
 - Dynamic PFC





Power Factor Controller

Application

Power Factor Correction systems are used to decrease the load of cables and power distributions caused by inductive currents and to save reactive power costs. The power factor controller is a main part of such a system and connects or disconnects capacitor stages automatically. The power factor controller Prophi is suitable for the use in conventional or dynamic PFC systems, and a hybrid operation is possible as well, i.e. 6 steps with contactors and 6 steps with thyristor modules.



General operation

The one phase electronic measuring system detects the reactive and real vectors of current via current and voltage path. By means of these values the controller computes the phase divergence between the fundamentals of current and voltage, and compares it to the set phase divergence. In case of a difference capacitor contactors will be switched on or off. Here the reactive power controller distinguishes the switching of capacitors via contactors or semiconductor switches. The controlling via capacitor contactors is carried out optimized, which means, that the target $\cos\phi$ is reached by as less switching operations as possible. Transistor outputs for the controlling of semiconductor switches compensate any difference.

Ventilator control

One relay output can be used for ventilator control, where an upper and lower limit is programmable.

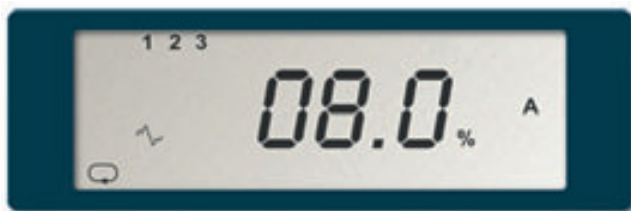
Overtemperature disconnection

With the overtemperature disconnection connected stages can be disconnected to lower the inner temperature and to protect the capacitors. An upper and lower limit can be set with a switch off time.

Properties

- Indication of U, I, f, Q, P, S, $\cos\phi$, all odd harmonics from 1-19 of current and voltage
- Indication of the capacitor currents measured indirectly
- Indication of the switching operations of each capacitor stage
- Indication of the total switch-on-time of each capacitor stage
- Zero voltage release within 15 ms
- Reactor degree in % for each stage programmable from 0-20%
- Setting of the discharge time for all contactor stages of 0-1200 seconds.
- Capacitor power programmable for each stage
- Temperature sensor for ventilator control
- Overtemperature disconnection programmable
- Controlling of external semiconductor switches (max. 50 switchings per second)
- Current transformer input for $\pm 1A$ and $\pm 5A$
- Automatic or manual configuration
- Password protection
- External switchable target $\cos\phi$
- Alarm output programmable for
 - Under voltage recognition
 - Over voltage recognition
 - Under compensation
 - Current interruption
 - Measuring current exceeding
 - Harmonic threshold
 - Supply of real power
 - Overtemperature

Example Displays



Technical data

Prophi Product Range

Relay outputs (conventionally)	Transistor outputs (dynamically)	Alarm output	Change over of target-cos-phi 1/2	Measurement. and supply voltage 400V AC;(+10%, -15%) ^{*1}	Interface RS485 ^{*2}	Software PSW professional	Type	Item no.
6	–	●	–	●	–	●	Prophi 6R	52.08.002
12	–	●	●	●	–	●	Prophi 12 R	52.08.003
–	6	●	–	●	–	●	Prophi 6T	52.08.005
–	12	●	●	●	–	●	Prophi 12 T	52.08.006
6	6	●	●	●	–	●	Prophi 6T6R	52.08.007
12	–	●	●	●	●	●	Prophi 12RS	52.08.008
6	6	●	●	●	●	●	Prophi 6T6RS	52.08.009
–	12	●	●	●	●	●	Prophi 12TS	52.08.091

*1 Option measurement and supply voltage 100V, 110V, 200V, 230V, 440V AC (+10%, -15%)

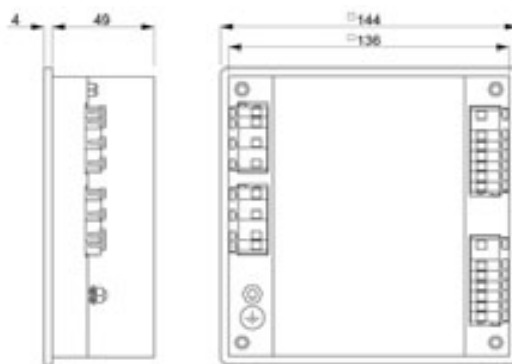
*2 not possible for 50 switchings per second

○ = Option – = not possible ● = included

Over voltage class:	III
Pollution degree:	2
Ambient temperature:	-10°C .. +55°C
Storage temperature:	-20°C .. +60°C
Mounting position:	optional
Protection class:	1=device with protective wire
Measurement and auxiliary voltage U _h :	(see versions)
Power consumption:	max. 7VA
Frequency of fundamental:	45Hz .. 65Hz
Current measurement:	.. /5A(1A)
Power consumption:	ca. 0,2 VA
Minimum working current:	10 mA
Measuring rate:	30 measurements per second (50 measurements per second)
Actualisation of display:	1 time per second
Tariff changeover (option)	
Current consumption:	ca. 2,5 mA .. 10 mA
Semiconductor outputs (option)	
Relay outputs	6 or 12 relays
Switching voltage:	max. 250 VAC
Switching power:	max. 1000W

Interface

Subject to the type ordered, the Prophi Power Factor Controller is equipped with a RS485 interface. With the RS485 the communication protocols Modbus RTU or Profibus DP V0 are available. So the Prophi can be easily integrated into SCADA systems, your energy distribution communication network or programmable logic controller (PLC).



05

Power Factor Correction

Conventional (without series reactors) PFC Power Capacitors in Delta Connection with Discharge Resistors

**Protection Class: IP00; Ambient Temperature: -10 up to +60°C,
Fixing Bolts: M12x12mm; Frequency: 50Hz**

Rated power in kvar at a voltage of:					Type	Item no.	Capacity in μF +10% -5%	Dimensions	Weight kg
400V	415V	440V	480V	525V					
2,4	2,6	2,9	3,5	4,17	LKT5,6-610-D52	19.02.575	3x16	D60xH225mm	0,71
2,5	2,7	3,0	3,6	4,3	LKT4,3-525-D52	19.02.505	3x16,6	D60xH150mm	0,48
3,5	3,77	4,17	5	5,9	LKT8,0-610-D52	19.02.570	3x22	D60xH225mm	0,75
4,8	5,2	5,8	7	8,33	LKT11,2-610-D52	19.02.549	3x32	D70xH225mm	0,93
5	5,4	6	7,2	8,6	LKT8,6-525-D52	19.02.510	3x33,2	D60xH225mm	0,77
5,8	6,3	7	8,33	10	LKT10-525-D52	19.02.550	3x38,5	D70xH225mm	0,80
6,25	6,8	7,6	9,0	-	LKT9,0-480-D52	19.02.511	3x41,7	D60xH225mm	0,69
7,2	7,8	8,7	10,5	12,5	LKT12,5-525-D52	19.02.580	3x47,9	D70xH225mm	1,13
7,5	8,1	9,1	10,8	-	LKT10,8-480-D52	19.02.515	3x49,9	D60xH225mm	0,71
9,3	10	11,2	-	-	LKT11,2-440-D52	19.02.519	3x61,4	D70xH225mm	1,10
10	10,8	12,1	-	-	LKT12,1-440-D52	19.02.520	3x66,3	D70xH253mm	1,04
12,5	13,4	15,1	-	-	LKT15,1-440-D52	19.02.525	3x82,9	D70xH293mm	1,03
20	-	24,2	-	-	LKT24,2-440-D52	19.02.528	3x132,6	D85xH285mm	2,4
23,3	25,1	28,2	-	-	LKT28,2-440-D52	19.02.526	3x154,6	D85xH355mm	2,5
25	26,9	30,2	-	-	LKT30,2-440-D52	19.02.527	3x165,5	D85xH355mm	2,6
Protective cover with cable gland, Height +77mm					SK60	19.02.620	For capacitors of a diameter of 60mm		
Protective cover with cable gland, Height +75mm					SK70	19.02.621	For capacitors of a diameter of 70mm		
Terminal adapter for D 60/70mm with spring type terminal 2x6qmm					ASS 1	19.02.610	Can height + 22mm		
Terminal adapter for D 85mm with spring type terminal 16qmm					ASS 2	19.02.612	Can height + 30mm		



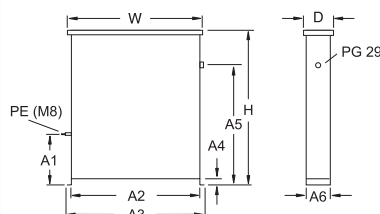
Standard connection: D60/70mm, fast on connectors 6,3x0,8mm, D85 fast on 9,5x1,2mm

Power Capacitors LK-440 V			
Rated power kvar	Type	Item no.	Weight kg
2,5	JF440/2,5H/LK	50.61.000	5
5	JF440/5H/LK	50.61.050	5
8,3	JF440/8,3H/LK	50.61.100	7
10	JF440/10H/LK	50.61.150	8
12,5	JF440/12,5H/LK	50.61.200	8
15	JF440/15H/LK	50.61.250	9
16,7	JF440/16,7H/LK	50.61.300	9
20	JF440/20H/LK	50.61.350	10
25	JF440/25H/LK	50.61.400	10
30	JF440/30H/LK	50.61.450	15
33	JF440/33H/LK	50.61.600	15
40	JF440/40H/LK	50.61.650	19
50	JF440/50H/LK	50.61.700	19
60	JF440/60I/LK	50.61.750	20
70	JF440/70I/LK	50.61.780	20
75	JF440/75I/LK	50.61.820	20
80	JF440/80K/LK	50.61.860	21
90	JF440/90K/LK	50.61.900	21
100	JF440/100K/LK	50.61.945	21

Other voltage upon request (example 525V)

PFC Power Capacitors in sheet steel enclosure.

**Protection Class: IP53,
Rated Voltage: 400V/50Hz,
Capacitor
Voltage: 440V/50Hz**



Drawing H:

H=500, W=465, D=135, A1=120, A2=450, A3=500, A4=20, A5=395, A6=130

Drawing I + K:

H=500, W=645, D=165, A1=120, A2=630, A3=680, A4=20, A5=395, A6=160

7% Power Capacitors with harmonic filter reactors

Protection Class: IP32

Rated Voltage: 400V/50Hz

7%-Reactors corresponding to a resonance frequency of 189Hz.



Power Capacitors LK-FK7

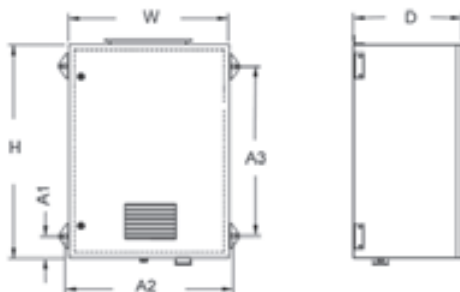
Rated power kvar	Type	Item no.	Weight in kg
5	JF440/5LK-KB4-FK7	50.24.050	23
10	JF440/10LK-KB4-FK7	50.24.100	28
12,5	JF440/12,5LK-KB4-FK7	50.24.130	29
20	JF440/20LK-KB4-FK7	50.24.170	36
25	JF440/25LK-KB8-FK7	50.24.220	38
30	JF440/30LK-KB8-FK7	50.24.280	40
40	JF440/40LK-KB8-FK7	50.24.350	49
50	JF440/50LK-KB8-FK7	50.24.450	82

14% Power Capacitors with harmonic filter reactors

Protection Class: IP32

Rated Voltage: 400V/50Hz

14%-Reactors corresponding to a resonance frequency of 134Hz.



KB4: H=600, W=400, D=250, A1=23, A2=430, A3=535

KB8: H=800, W=600, D=250, A1=23, A2=630, A3=735

Power Capacitors LK-FK14

Rated power kvar	Type	Item no.	Weight in kg
5	JF525/5LK-KB4-FK14	50.25.050	24
10	JF525/10LK-KB4-FK14	50.25.100	29
12,5	JF525/12,5LK-KB4-FK14	50.25.130	30
20	JF525/20LK-KB8-FK14	50.25.170	37
25	JF525/25LK-KB8-FK14	50.25.220	39
30	JF525/30LK-KB8-FK14	50.25.280	51
40	JF525/40LK-KB8-FK14	50.25.350	63
50	JF525/50LK-KB8-FK14	50.25.420	83

Other de-tuning factors or including of a fuse breaker upon request

05

Power Factor Correction Systems (without reactors)

Power factor correction systems are suitable to reduce high costs for reactive energy. Furthermore, they decrease high current loading of electrical cables and distribution equipments and increase their life expectancy. Besides of that, the environmental pollution is reduced by avoiding unnecessary CO₂ emissions.

Capacitors

Power capacitors in dry, gas filled technology with flat connection safety device (over pressure disconnector) low loss dielectric of metallized polypropylene, PCB free, non-flammable mineral filling with adhesive stabilisation.



Assembly

The space saving assembly of the compact series allows to build smaller systems for wall mounting without reactors or floorstanding cabinets with reactors in a highly economic design cost form. The slide-in (rack type) design makes it possible to build systems up to the highest power range.

Experienced consultants of electrical plants know, that the life expectancy of PFC systems is significantly increased by using series reactors for de-tuning (harmonic filters). The power factor controller with its various functions offers more than just power factor correction. Putting the system into service has been made easy by the automatic configuration. For maintenance, the measurement of the single stage currents makes it easy to find defective capacitors.

Compact Series KB4, KB6, KB8, KB10

Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
7,5	2,5/5	1:2	JF440/7,5ER3KB4**	50.39.005	25
10	2,5/2,5/5	1:1:2	JF440/10ER4KB4**	50.39.015	25
12,5	2,5/5/5	1:2:2	JF440/12,5ER5KB4**	50.39.030	25
15	5/10	1:2	JF440/15ER3KB4**	50.39.045	26
17,5	2,5/5/10	1:2:4	JF440/17,5/ER7KB4**	50.39.060	26
20	5/5/10	1:1:2	JF440/20ER4KB4**	50.39.075	29
25	5/10/10	1:2:2	JF440/25ER5KB4**	50.39.095	27
27,5	2,5/5/10	1:2:4:4	JF440/27,5ER11KB4**	50.39.120	27
31	6,2/12,5	1:2:2	JF440/31ER5KB4**	50.39.145	35
35	5/10/20	1:2:4	JF440/35ER7KB4**	50.39.175	35
40	10/10/20	1:1:2	JF440/40ER4KB4**	50.39.195	36
45	5/10/15..	1:2:3:3	JF440/45ER9KB4**	50.39.220	37
50	10/20/20	1:2:2	JF440/50ER5KB4**	50.39.235	38
55	5/10/20	1:2:4:4	JF440/55ER11KB8**	50.39.270	77
60	10/20/30	1:2:3	JF440/60ER6KB8**	50.39.295	78
70	10/20/40	1:2:4	JF440/70ER7KB8**	50.39.320	78
75	12/12/25	1:1:2:2	JF440/75ER6KB8**	50.39.345	70
80	20/20/40	1:1:2	JF440/80ER4KB8**	50.39.370	92
90	10/20/30	1:2:3:3	JF440/90ER9KB8**	50.39.395	94
100	12/12/25	1:1:2:4	JF440/100ER8KB8**	50.39.420	95
100	20/40/40	1:2:2	JF440/100ER5KB8**	50.39.430	95
110	10/20/40	1:2:4:4	JF440/110ER11KB8**	50.39.440	96
120	20/20/40	1:1:2:2	JF440/120ER6KB8**	50.39.450	97

Slide-in (rack type) design ES8124 W 800 x H 1200 x D 400 mm

50	10/20/20	1:2:2	JF440/50ER5ES8124 **	50.81.020	122
50	12/12/25	1:1:2	JF440/50ER4ES8124 **	50.81.000	122
75	12/12/25	1:1:2...	JF440/75ER6ES8124 **	50.81.050	123
100	25/25/25	1:1:1...	JF440/100ER4ES8124 **	50.81.075	125
100	10/10/20	1:1:2	JF440/100/ER10ES8124 **	50.81.090	125
100	12/12/25	1:1:2:4	JF440/100ER8ES8124 **	50.81.115	125
150	25/25/50	1:1:2...	JF440/150ER6ES8124 **	50.81.150	147
150	12/12/25	1:1:2:4...	JF440/150ER12ES8124 **	50.81.170	147
150	25/25/25	1:1:1...	JF440/150ER6ES8124 **	50.81.200	147

Slide-in (rack type) design ES8184 W 800 x H 1800 x D 400 mm

150	25/25/50	1:1:2...	JF440/150ER6ES8184**	50.81.400	208
150	12/12/25	1:1:2:4...	JF440/150ER12ES8184**	50.81.415	208
150	25/25/25	1:1:1...	JF440/150ER6ES8184**	50.81.425	208
160	20/20/40	1:1:2...	JF440/160ER8ES8184**	50.81.450	209
175	25/50/50	1:2:2...	JF440/175ER7ES8184**	50.81.475	210
175	12/12/25	1:1:2...	JF440/175ER14ES8184***	50.81.490	210
180	20/40/40	1:2:2...	JF440/180ER9ES8184**	50.81.515	211
200	50/50	1:1...	JF440/200ER4ES8184**	50.81.540	212
200	25/25/50	1:1:2...	JF440/200ER8ES8184**	50.81.550	212
200	12/12/25	1:1:2:4...	JF440/200/ER16ES8184**	50.81.560	212
200	20/20/40	1:1:2...	JF440/200ER10ES8184**	50.81.570	212
240	20/20/40	1:1:2...	JF440/240ER12ES8184***	50.81.600	232
250	50	1:1:1...	JF440/250ER5ES8184**	50.81.625	233
250	25/25/50	1:1:2...	JF440/250ER10ES8184**	50.81.635	233
250	12/12/25	1:1:2:4...	JF440/250ER20ES8184***	50.81.645	233
300	50/50	1:1:1...	JF440/300ER6ES8184**	50.81.670	236
300	25/25/50	1:1:2...	JF440/300ER12ES8184***	50.81.680	236
300	12/12/25	1:1:2:4...	JF440/300ER24ES8184***	50.81.690	236

Accessories

Socket 100mm high	SO 100/800/400	29.03.317	5
Socket 200mm high	SO 200/800/400	29.03.322	10

** with power factor controller Prophi 6R

*** with power factor controller Prophi 12R

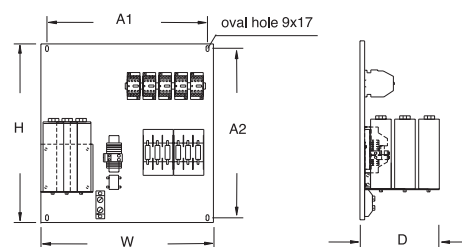
Expansion units upon request

Systems in insulated housing upon request.

Audio remote filtering systems upon request.

Ready made PFC System on mounting plates MP4, MP6, MP8, MP10

Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
7,5	2,5/5	1:2	JF440/7,5ER3MP4**	50.33.005	10
10	2,5/2,5/5	1:1:2	JF440/10ER4MP4**	50.33.015	10
12,5	2,5/5/5	1:2:2	JF440/12,5ER5MP4**	50.33.030	10
15	5/10	1:2	JF440/15ER3MP4**	50.33.045	11
17,5	2,5/5/10	1:2:4	JF440/17,5/ER7MP4**	50.33.060	11
20	5/5/10	1:1:2	JF440/20ER4MP4**	50.33.075	14
25	5/10/10	1:2:2	JF440/25ER5MP4**	50.33.095	14
27,5	2,5/5/10	1:2:4:4	JF440/27,5ER11MP8**	50.33.120	29
31	6,2/12,5	1:2:2	JF440/31ER5MP4**	50.33.145	26
35	5/10/20	1:2:4	JF440/35ER7MP4**	50.33.175	26
40	10/10/20	1:1:2	JF440/40ER4MP4**	50.33.195	28
45	5/10/15	1:2:3:3	JF440/45ER9MP4**	50.33.220	28
50	10/20/20	1:2:2	JF440/50ER5MP4**	50.33.245	29
55	5/10/20	1:2:4:4	JF440/55ER11MP8**	50.33.270	29
60	10/20/30	1:2:3	JF440/60ER6MP8**	50.33.295	30
70	10/20/40	1:2:4	JF440/70ER7MP8**	50.33.320	31
75	12/12/25	1:1:2:2	JF440/75ER6MP8**	50.33.345	32
80	20/20/40	1:1:2	JF440/80ER4MP8**	50.33.370	35
90	10/20/30	1:2:3	JF440/90ER9MP8**	50.33.395	37
100	12/12/25	1:1:2:4	JF440/100ER8MP8**	50.33.420	38
100	20/40/40	1:2:2	JF440/100ER5MP8**	50.33.430	38
110	10/20/40	1:2:4	JF440/110ER11MP8**	50.33.440	39
120	20/20/40	1:1:2:2	JF440/120ER6MP8**	50.33.450	40



MP4: H=555, W=350, D=250, A1=323, A2=525
MP8: H=750, W=550, D=250, A1=525, A2=723

Capacitor modules MO84

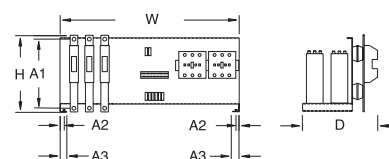
50	50		JF440/50EK1MO84	50.80.700	22
50	25/25	1:1	JF440/50/2EK2MO84	50.80.740	22
50	10/20/20	1:2:2	JF440/50/3EK5MO84	50.80.770	22
50	12/12/25	1:1:2	JF440/50/3/EK4MO84	50.80.774	22
60	20/40	1:2	JF440/60/2EK3MO84	50.80.775	23
60	10/10/20	1:1:2	JF440/60/4EK6MO84	50.80.776	23
75	25/50	1:2	JF440/75/2EK3MO84	50.80.800	24
75	25/25/25	1:1	JF440/75/3EK3MO84	50.80.810	24
75	12/12/25	1:1:2:2	JF440/75/4EK6MO84	50.80.811	24
80	40/40	1:1	JF440/80/2EK2MO84	50.80.835	24
80	20/20/40	1:1:2	JF440/80/3EK4MO84	50.80.837	24
100	50/50	1:1	JF440/100/2EK2MO84	50.80.875	25
100	25/25/50	1:1:2	JF440/100/3EK4MO84	50.80.880	25
100	25/25/25	1:1:1	JF440/100/4EK4MO84	50.80.900	25
100	20/40/40	1:2:2	JF440/100/3EK5MO84	50.80.902	25
100	12/12/25	1:1:2:4	JF440/100/4EK8MO84	50.80.903	25
Control module with 6 step PF Controller Propfi 6R, Control fuses, transformer terminals and 3m connection cable (mounted on capacitor module)				50.80.003	
Control module with 12 step PF Controller Propfi 12R, Control fuses, transformer terminals and 3m connection cable (mounted on capacitor module)				50.80.004	
Accessories					
Fixing bars for Rittal cabinets, left				29.12.435	
Fixing bars for Rittal cabinets, right				29.12.436	

** with controller Propfi 6R
Audio frequency rejection filters upon request.

Note

PFC systems without reactors may not be used in cases:

- the rectifier (non linear) load is more than 15% of the total load
- the PFC system power is more than 35% of the transformer power
- other de-tuned PFC capacitors with reactors are connected in the mains
- critical audio frequencies in the range of 270-425Hz are present with audio frequency rejection filters



MO84: H=330, W=703, D=333, A1=290, A2=14, A3=26.5

05

Passive and Active Harmonic Filters

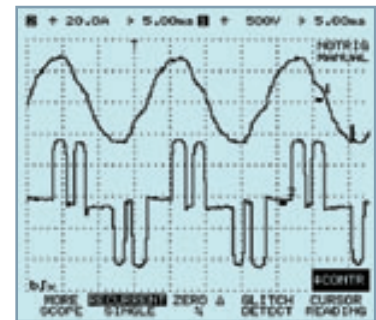
3 Solutions for Reduction of Harmonic Pollution, Elimination of Resonance Effects, Energy Saving and Stabilisation of Electricity Supply

1. Harmonic Filters, Passive - De-tuned

Nowadays an increasing amount of non-linear loads cause grid pollution, similar to well known air and water pollution.

Electrical generators shall produce a clean sinusoidal waveform at their output terminals. This sinusoidal waveform is regarded as the pure form of the AC voltage and any deviation from it is described as distortion.

More and more types of loads absorb non-sinusoidal currents from the power system. Analysing (FFT) such distorted waveforms we receive a spectrum of various frequencies which are so called harmonic frequencies – or simply harmonics.



Harmonics are harmful for electrical systems and connected loads are suffering from it, similar as polluted water is dangerous for the human body. Not only electronic and measurement equipments are malfunctioning, but as well electrical loads such as motors show overload and faster deterioration and in worst case early breakdowns. Harmonic pollution is one of the key root causes for invisible power quality problems with tremendous cost for maintenance and investment for replacing defective equipment.

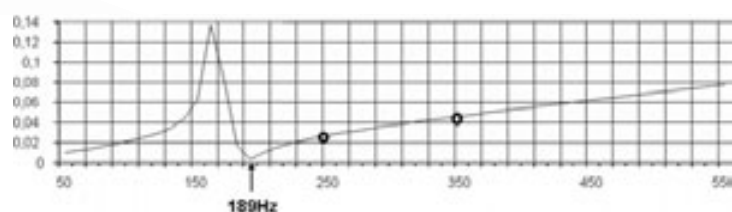
Janitza's harmonic filters are an one time investment avoiding such effects and paying back extremely fast considering a reliable power supply and high power quality standards.



Janitza's Harmonic Filters ensure:

- Reduction of electricity bill by reduction of kWh losses
- Cost saving by elimination of low power factor penalties
- Elimination of resonance effects and safety risks
- Cleaning of the electricity grid (reduction of THD-V)
- Stabilization of electricity supply
- Reduction of maintenance costs
- Reduction of investment by high equipment utilization

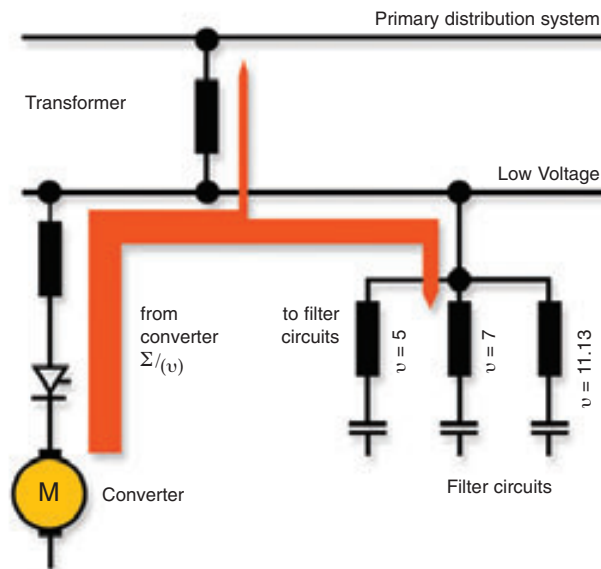
System busbar: impedance vs. frequency



2. Tuned Harmonic Filters

In case of weak grids and high harmonic pollution (e.g. DC-drive for ski lift) or in cases in which power utilities or critical production processes ask for very specific targets of THD-V levels, i.e. highest requirements for clean power (e.g. IT centres, semiconductor plants, continued processes ...) it may be necessary, to have a higher reduction of harmonics by more than what de-tuned systems can achieve. In such cases tuned harmonic filters can be a solution.

Tuned filters are closely tuned to the main harmonic frequencies (e.g. 5th, 7th and 11th) and provide very low impedance passes to these frequencies and, consequently, absorb currents of these frequencies – cleaning grids from harmful pollution.

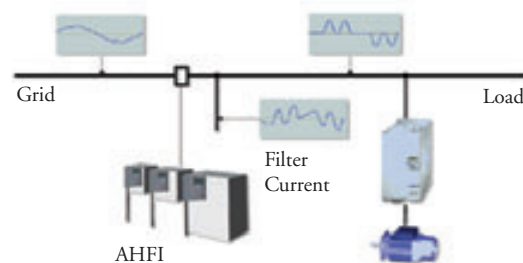


3. Active Harmonic Filters - AHFI

Active harmonic filters are used for cleaning polluted networks. Active harmonic filters are based on an electronic filter concept with a DC energy source.

This is the most sophisticated harmonic filter concept with the best filtering results.

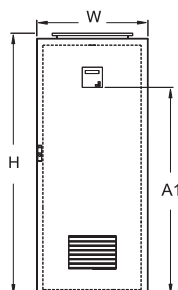
Due to higher costs compared to passive filters active harmonic filters are mainly used as follows:



- Ensures a clearly defined pollution level (THD-V), e.g. critical continued production processes (Chemical industry, Semiconductor industry, ...)
- Corrects high neutral conductor pollution (e.g. triplen harmonics), e.g. many single phase loads (IT center, office buildings, banks ...)
- Manages unbalanced systems
- Takes care in cases of extremely high distortion (e.g. conventional passive filters do not sufficiently reduce harmonic pollution)

7% De-tuned Harmonic Filters

Rated voltage: 400V, Capacitor voltage: 440V, Protection class: IP 32, 7%-reactors according to a resonance frequency of 189 Hz



KB6825: W=600, H=800, D=250, A1=410
KB6123: W=600, H=1200, D=300, A1=655



ES8206: H=2020, W=800, D=600,
 A1=537, A2=63, A3=737,
 A4=62, A5=1480

Compact Series KB6825			W 600 x H 800 x D 250 mm		
Compact Series KB6123			W 600 x H 1200 x D 300 mm		
Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
15	5/10	1:2	JF440/15ER3KB6825FK7**	50.52.020	112
20	5/5/10	1:1:2	JF440/20ER4KB6825FK7**	50.52.040	113
25	5/10/10	1:2:2	JF440/25ER5KB6825FK7**	50.52.080	116
31	6,25/12,5	1:2:2	JF440/31/ER5KB6825FK7**	50.52.110	118
35	5/10/20	1:2:4	JF440/35ER7KB6825FK7**	50.52.150	122
43,75	6/12/25	1:2:4...	JF440/43,75ER7KB6825FK7**	50.52.180	138
50	10/20/20	1:2:2	JF440/50ER5KB6825FK7**	50.52.210	142
60	10/20/30	1:2:3	JF440/60ER6KB6123FK7**	50.52.225	158
75	12/25/37	1:2:3	JF440/75ER6KB6123FK7**	50.52.240	167

Slide-in (rack type) design ES8206FK7 W800 x H2000 x D600 mm (per housing)					
60	10/20/30	1:2:3...	JF440/60ER6ES8206FK7 **	50.89.040	278
75	12/12/25	1:1:2...	JF440/75ER6ES8206FK7 **	50.89.080	278
100	25/25/50	1:1:2...	JF440/100ER4ES8206FK7 **	50.89.120	288
100	20/40/40	1:2:2	JF440/100/ER5ES8206FK7 **	50.89.160	288
100	12/12/25	1:1:2:4...	JF440/100ER8ES8206FK7 **	50.89.200	288
100	10/20/30/40	1:2:3:4	JF440/100ER10ES8206FK7 **	50.89.250	288
110	10/20/40	1:2:4...	JF440/110ER11ES8206FK7 **	50.89.280	329
120	20/20/40	1:1:2...	JF440/120ER6ES8206FK7 **	50.89.320	340
140	20/40/40	1:2:2...	JF440/140ER7ES8206FK7 **	50.89.360	361
150	25/25/50	1:1:2...	JF440/150ER6ES8206FK7 **	50.89.400	344
175	25/50/50	1:2:2...	JF440/175ER7ES8206FK7 **	50.89.440	367
200	50	1:1:1...	JF440/200ER4ES8206FK7 **	50.89.480	314
200	25/25	1:1:2...	JF440/200ER8ES8206FK7 **	50.89.520	314
200	12/12/25	1:1:2:4...	JF440/200ER16ES8206FK7 **	50.89.560	314
250	50	1:1:1...	JF440/250/ER5ES8206FK7 **	50.89.600	437
250	25/25/50	1:1:2...	JF440/250ER10ES8206FK7 **	50.89.640	437
300	50	1:1:1...	JF440/300ER6ES8206FK7 **	50.89.685	487
300	25/25/50	1:1:2...	JF440/300ER12ES8206FK7 ***	50.89.687	498
350	50	1:1:1...	JF440/350ER7ES8206FK7-1S ***	50.89.720	520
350	50	1:1:1...	JF440/350ER7ES8206FK7 ***	50.89.722	352/347
400	50	1:1:1...	JF440/400ER8ES8206FK7-1S ***	50.89.744	570
400	50	1:1:1...	JF440/400ER8ES8206FK7 ***	50.89.740	2x370
450	50	1:1:1...	JF440/450ER9ES8206FK7 ***	50.89.770	437/347
500	50	1:1:1...	JF440/500ER10ES8206FK7 ***	50.89.800	479/359
550	50	1:1:1...	JF440/550ER11ES8206FK7 ***	50.89.805	2x431
600	50	1:1:1...	JF440/600ER12ES8206FK7 ***	50.89.820	2x481

Accessories

Socket 100mm high	SO 100/800/600	29.03.325 & 326	8
Socket 200mm high	SO 200/800/600	29.03.327 & 319	15

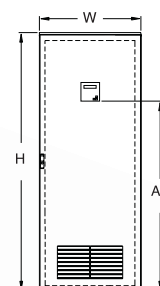
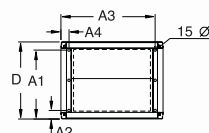
** with power factor controller Prophi 6R

*** with power factor controller Prophi 12R

Expansion cabinets and other dimensions upon request.

The above mentioned slide-in construction is available in 500mm depth as well.

The systems can be delivered with a choke degree of 5.67% against additional price.



7% and 14% De-tuned Harmonic Filter Modules

Rated Voltage: 400V; 50Hz, Protection Class: IP00
Capacitor Voltage: 440V at 7% and 525V at 14%

7% Capacitor Modules MO86FK7 Width 800mm Depth 600mm					
Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
10	10		JF440/10EK1MO86FK7	50.88.650	24
12,5	12,5		JF440/12,5EK1MO86FK7	50.88.680	26
20	20		JF440/20EK1MO86FK7	50.88.710	33
25	25		JF440/25EK1MO86FK7	50.88.740	33
40	40		JF440/40EK1MO86FK7	50.88.770	43
50	50		JF440/50EK1MO86FK7	50.88.800	45
20/2	10	1:1	JF440/20/2EK2MO86FK7	50.88.801	36
25/2	12,5	1:1	JF440/25/2EK2MO86FK7	50.88.830	38
30/2	10/20	1:2	JF440/30/2EK2MO86FK7	50.88.860	42
40/2	20	1:1	JF440/40/2EK2MO86FK7	50.88.890	55
40/3	10/10/20	1:1:2	JF440/40/3EK2MO86FK7	50.88.891	55
50/2	25	1:1	JF440/50/2EK2MO86FK7	50.88.930	56
75/2	25/50	1:2	JF440/75/2EK2MO86FK7	50.88.932	72
80/2	40	1:1	JF440/80/2EK2MO86FK7	50.88.933	72
100/2	50	1:1	JF440/100/2EK2MO86FK7	50.88.931	86

14% Capacitor Modules MO86FK14 Width 800mm Depth 600mm					
10	10		JF525/10EK1MO86FK14	50.92.650	34
12,5	12,5		JF525/12,5EK1MO86FK14	50.92.680	35
20	20		JF525/20EK1MO86FK14	50.92.710	40
25	25		JF525/25EK1MO86FK14	50.92.740	40
40	40		JF525/40EK1MO86FK14	50.92.770	52
50	50		JF525/50EK1MO86FK14	50.92.800	54
20/2	10	1:1	JF525/20/2EK2MO86FK14	50.92.803	53
25/2	12,5	1:1	JF525/25/2EK2MO86FK14	50.92.804	60
30/2	10/20	1:2	JF525/30/2EK2MO86FK14	50.92.849	45
40/2	20	1:1	JF525/40/2EK2MO86FK14	50.92.850	67
40/3	10/10/20	1:1:2	JF525/40/3EK3MO86FK14	50.92.851	72
50/2	25	1:1	JF525/50/2EK2MO86FK14	50.92.890	69
75/2	25/50	1:2	JF525/75/2EK2MO86FK14	50.92.893	78
80/2	40	1:1	JF525/80/2EK2MO86FK14	50.92.896	78
100/2	50	1:1	JF525/100/2EK2MO86FK14	50.92.892	92
Control module with Controller Propphi 6R, Control fuses, transformer terminals and 3m connection cable (mounted on capacitor module)				50.80.003	
Control module with Controller Propphi 12R, Control fuses, transformer terminals and 3m connection cable (mounted on capacitor module)				50.80.004	

Accessories	
Fixing bars for Rittal cabinets, left	29.12.431
Fixing bars for Rittal cabinets, right	29.12.432

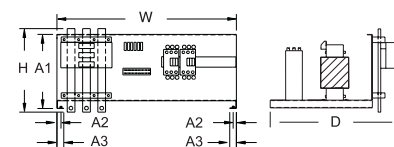
In mains with audio remote control frequencies the following filters have to be used:

Audio remote frequency	De-tuning factor	Filter Frequency
>168Hz	p=14%	fr=134Hz
168-183Hz	p=14/5,67%	fr=134/210Hz
>228Hz	p=7%	fr=189Hz
>350Hz	p=5,67%	fr=210Hz

M086FK7 / FK14

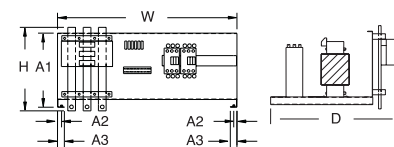


Cabinet depth 600mm



H=330, W=703, D=533, A1=290, A2=14, A3=26.5

Cabinet depth 500mm



H=330, W=703, D=433, A1=290, A2=14, A3=26.5

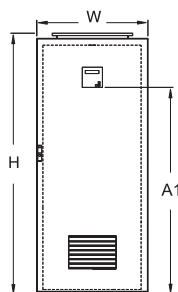
Control module



05

14% De-tuned Harmonic Filters

Rated Voltage: 400V, Capacitor Voltage: 525V, Protection Class: IP 32, 14%-Reactors corresponding to a resonance frequency of 134Hz



KB6825: W=600, H=800, D=250, A1=410
KB6123: W=600, H=1200, D=300, A1=655



ES8206: H=2020, W=800, D=600,
 A1=537, A2=63, A3=737,
 A4=62, A5=1480

Compact Series KB6825FK14			W 600 x H 800 x D 250 mm		
Compact Series KB6124FK14			W 600 x H 1200 x D 300 mm		
Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
15	5/10	1:2	JF525/15ER3KB6825FK14**	50.52.520	123
20	5/5/10	1:1:2	JF525/20ER4KB6825FK14**	50.52.540	124
25	5/10/10	1:2:2	JF525/25ER5KB6825FK14**	50.52.580	128
31	6,25/12,5	1:2:2	JF525/31/ER5KB6825FK14**	50.52.610	130
35	5/10/20	1:2:4	JF525/35ER7KB6825FK14**	50.52.650	134
43,75	6/12/25	1:2:4	JF525/43,75ER7KB6825FK14**	50.52.680	152
50	10/20/20	1:2:2	JF525/50ER5KB6825FK14**	50.52.710	173
60	10/20/30	1:2:3	JF525/60ER6KB6123FK14**	50.52.725	184
75	12/25/37	1:2:3	JF525/75ER6KB6123FK14**	50.52.729	195

Slide-in (rack type) design ES8206FK14 W800 x H2000 x D600 mm (per housing)					
60	10/20/30	1:2:3	JF525/60ER6ES8206FK14**	50.93.040	317
75	12/12/25	1:1:2...	JF525/75ER6ES8206FK14**	50.93.080	318
100	25/25/50	1:1:1...	JF525/100ER4ES8206FK14**	50.93.120	368
100	20/40/40	1:2:2	JF525/100/ER5ES8206FK14**	50.93.160	413
100	12/12/25	1:1:2:4...	JF525/100ER8ES8206FK14**	50.93.200	380
100	10/20/30/40	1:2:3:4	JF525/100ER10ES8206FK14**	50.93.250	387
110	10/20/40	1:2:4:4	JF525/110ER11ES8206FK14**	50.93.280	397
120	20/20/40	1:1:2...	JF525/120ER6ES8206FK14**	50.93.320	379
140	20/40/40	1:2:2...	JF525/140ER7ES8206FK14**	50.93.360	400
150	25/25/50	1:1:2...	JF525/150ER6ES8206FK14**	50.93.400	375
175	25/50/50	1:2:2...	JF525/175ER7ES8206FK14**	50.93.440	407
200	50	1:1:1...	JF525/200ER4ES8206FK14**	50.93.480	420
200	25/25	1:1:2...	JF525/200ER8ES8206FK14**	50.93.520	421
200	12/12/25	1:1:2:4...	JF525/200ER16ES8206FK14**	50.93.560	371
250	50	1:1:1...	JF525/250/ER5ES8206FK14**	50.93.600	478
250	25/25/50	1:1:2...	JF525/250ER10ES8206FK14**	50.93.640	490
300	50	1:1:1...	JF525/300ER6ES8206FK14**	50.93.685	500
300	25/25/50	1:1:2...	JF525/300ER12ES8206FK14**	50.93.690	500
350	50	1:1:1...	JF525/350ER7ES8206FK14-S***	50.93.720	550
350	50	1:1:1...	JF525/350ER7ES8206FK14***	50.93.722	424/365
400	50	1:1:1...	JF525/400ER8ES8206FK14-S***	50.93.740	600
400	50	1:1:1...	JF525/400ER8ES8206FK14***	50.93.742	2x424
450	50	1:1:1...	JF525/450ER9ES8206FK14***	50.93.770	2x478
500	50	1:1:1...	JF525/500ER10ES8206FK14***	50.93.800	364/484
550	50	1:1:1...	JF525/550ER11ES8206FK14***	50.93.805	3x365
600	50	1:1:1...	JF525/600ER12ES8206FK14***	50.93.920	3x424

Accessories

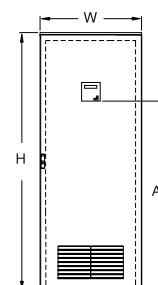
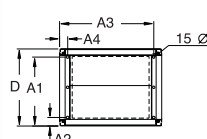
Socket 100mm high	SO 100/800/600	29.03.325 & 326	8
Socket 200mm high	SO 200/800/600	29.03.327 & 319	15

** with power factor controller Prophi 6R

*** with power factor controller Prophi 12R

Expansion cabinets or other dimensions upon request.

The combined filtering system 14/5,67% is available under the type description FKK instead of FK14.



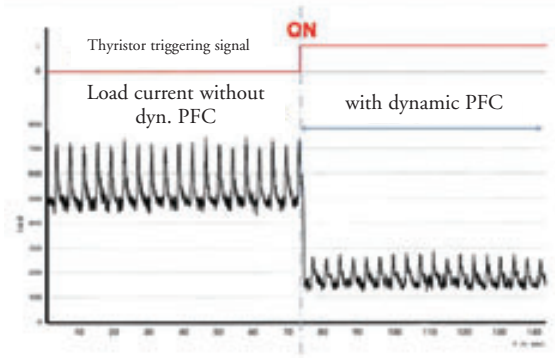
Dynamic Power Factor Correction

for increased safety, longer life time and ultra fast control of the power factor

Dynamic PFC

Dynamic PFC systems are used in applications with high and frequent load changes. In such cases conventional PFC systems are not fast enough to follow the load change, i.e. either the systems tends to be under- or overcompensated. And even more important is the fact that electromechanical contactors are not suitable for such high number of switching cycles.

A fast wear of contactors leads to damages and safety risk of PFC systems. Dynamic PFC systems overcome these challenges by means of replacing mechanical contactors with semiconductor switches. Semiconductor switches are smoothly switching capacitors without grid disturbances and high stress levels for capacitors.

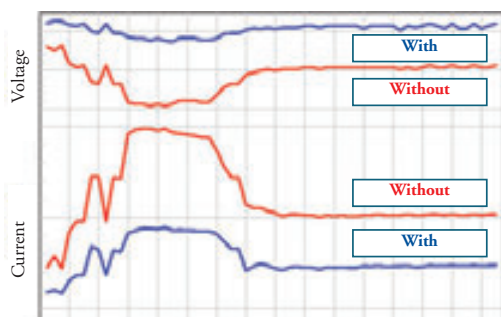


Consequently the following customer benefits are arising:



- Power quality is improved, i.e. inrush current of shunt capacitors are eliminated and harmful voltage transients avoided
- PFC system life expectancy is extended by far
- Safety enhanced (e.g. defect contactors causing oscillation effects and exploded capacitors)
- Ultrafast control of the power factor, consequently reduction of PFC penalties and kWh losses
- Voltage stabilization (e.g. grid support during motor start-up cycles)
- Higher utilization of electrical distribution facilities (transformers, cables, switchgear) due to power peak elimination

Dynamic PFC systems are typically used in following applications:



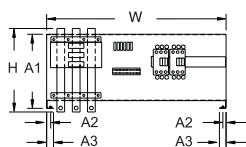
- Automotive industry (welding, presses, ...)
- Lift and cranes
- Large motor start-up compensation
- Crude oil drilling
- Wind turbines
- Welding
- Rolling mills
- Plastic extrusion
-

06



Dynamic PFC Modules (de-tuned)

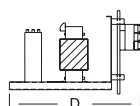
Rated Voltage: 400V; 50Hz, Protection Class: IP00
Capacitor Voltage: 440V at 7% and 525V at 14%



7% Harmonic Filter Modules MO86FK7 Width 800mm Depth 600mm

Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
10	10		JF440/10EK1MO86FK7Th	50.18.650	26
12,5	12,5		JF440/12,5EK1MO86FK7Th	50.18.680	28
20	20		JF440/20EK1MO86FK7Th	50.18.710	35
25	25		JF440/25/EK1MO86FK7Th	50.18.740	35
40	40		JF440/40EK1MO86FK7Th	50.18.770	45
50	50		JF440/50EK1MO86FK7Th	50.18.800	47
20	10	1:1	JF440/20/2EK2MO86FK7Th	50.18.801	40
25	12,5	1:1	JF440/25/2EK2MO86FK7Th	50.18.830	42
30	15	1:1	JF440/30/2EK2MO86FK7Th	50.18.860	46
40	20	1:1	JF440/40/2EK2MO86FK7Th	50.18.890	57
50	25	1:1	JF440/50/2EK2MO86FK7Th	50.18.930	58
75	37,5	1:1	JF440/75/2EK2MO86FK7Th	50.18.932	76
80	40/40	1:1	JF440/80/2EK2MO86FK7Th	50.18.933	77
100	50/50	1:1	JF440/100/2EK2MO86FK7Th	50.18.931	90

MO 86 H:330xW:703xD:550, A1=290, A2=14, A3=26.5



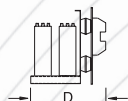
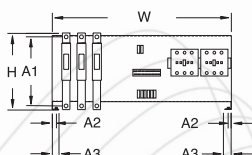
14% Harmonic Filter Modules MO86FK14 Width 800mm Depth 600mm

Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
10	10		JF525/10EK1MO86FK14Th	50.12.650	36
12,5	12,5		JF525/12,5EK1MO86FK14Th	50.12.680	37
20	20		JF525/20EK1MO86FK14Th	50.12.710	42
25	25		JF525/25EK1MO86FK14Th	50.12.740	43
40	40		JF525/40EK1MO86FK14Th	50.12.770	54
50	50		JF525/50EK1MO86FK14Th	50.12.800	56
20	10	1:1	JF525/20/2EK2MO86FK14Th	50.12.803	57
25	12,5	1:1	JF525/25/2EK2MO86FK14Th	50.12.804	64
30	15	1:1	JF525/30/2EK2MO86FK14Th	50.12.849	69
40	20	1:1	JF525/40/2EK2MO86FK14Th	50.12.850	71
50	25	1:1	JF525/50/2EK2MO86FK14Th	50.12.890	73
75	37,5	1:1	JF525/75/2EK2MO86FK14Th	50.12.893	82
80	40/40	1:1	JF525/80/2EK2MO86FK14Th	50.12.896	84
100	50/50	1:1	JF525/100/2EK2MO86FK14Th	50.12.892	96

MO 86 H:330xW:703xD:550, A1=290, A2=14, A3=26.5

Dynamic PFC Module without reactors

Rated voltage: 400V; 50 Hz, Protection Class: IP00
Capacitor voltage: 400V; 50 Hz

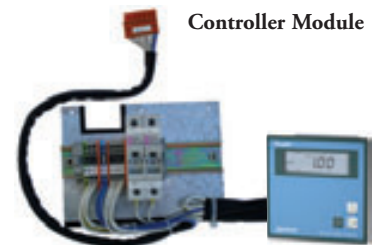


Capacitor Modules MO84Th Width 800mm Depth 400mm

Rated power kvar	Stage power kvar	Stage ratio	Type	Item no.	Weight in kg
50	50		JF440/50EK1MO84Th	50.81.700	24
50	25	1:1	JF440/50/2EK2MO84Th	50.81.740	28
60	20/40	1:2	JF440/60/2EK3MO84Th	50.80.775	28
75	25/50	1:2	JF440/75/2EK3MO84Th	50.80.800	30
80	40	1:1	JF440/80/2EK2MO84Th	50.80.835	32
100	50	1:1	JF440/100/2EK2MO84Th	50.80.875	34

MO 84 H:330xW:703xD:345, A1=290, A2=14, A3=26.5

Thyristor-Controller Modules	Item no.
Controller Module with 6 step Propfi 6T Fuses, CT terminals and 3m connection cable (to be connected to capacitor modules)	50.10.003
Controller Module with 12 step Propfi 12T Fuses, CT terminals and 3m connection cable (to be connected to capacitor modules)	50.10.004
Accessories Fixing bar for Rittal cabinets (left) MO84 Fixing bar for Rittal cabinets (right) MO84 Fixing bar for Rittal cabinets (left) MO86 Fixing bar for Rittal cabinets (right) MO86	29.12.435 29.12.436 29.12.431 29.12.432

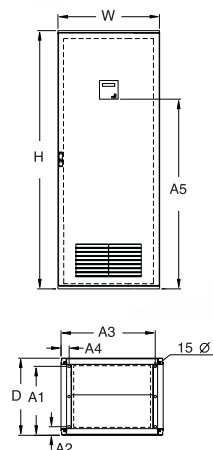


Dynamic PFC Systems

with thyristor modules for switching, de-tuned
Rated voltage: 400V; 50 Hz, Protection class: IP32
Capacitor voltage: 440V bei 7%

Slide-in (rack type) design ES8206 FK7Th W800 x H2000 x D600mm					
Rated Power kvar	Stage Power kvar	Stage Ratio	Type	Item no.	Weight in kg
60	10/20	1:2	JF440/60ER6ES8206FK7Th	50.19.040	290
75	12,5/25	1:2:2	JF440/75ER6ES8206FK7 Th	50.19.080	290
100	25/50	1:2:2	JF440/100ER4ES8206FK7Th	50.19.120	306
100	20/40	1:2:2	JF440/100/ER5ES8206FK7Th	50.19.160	306
100	12,5/25/50	1:1:2:4	JF440/100ER8ES8206FK7Th	50.19.200	306
100	10/20/30/40	1:2:3:4	JF440/100ER10ES8206FK7Th	50.19.250	306
110	10/20/40/40	1:2:4:4	JF440/110ER11ES8206FK7Th	50.19.280	351
120	20/20/40/40	1:1:2:2	JF440/120ER6ES8206FK7Th	50.19.320	362
140	20/40	1:2:2:2	JF440/140ER7ES8206FK7Th	50.19.360	373
150	25/50	1:1:2:2	JF440/150ER6ES8206FK7Th	50.19.400	366
175	25/50	1:2	JF440/175ER7ES8206FK7Th	50.19.440	379
200	50	1:1	JF440/200ER4ES8206FK7Th	50.19.480	381
200	25/50	1:2:2	JF440/200ER8ES8206FK7Th	50.19.520	381
200	12,5/25/50	1:1:2:4	JF440/200ER16ES8206FK7Th	50.19.560	385
250	50	1:1	JF440/250/ER5ES8206FK7Th	50.19.600	454
250	25/50	1:1:2:2	JF440/250ER10ES8206FK7Th	50.19.640	456
300	50	1:1	JF440/300ER6ES8206FK7Th	50.19.685	492
300	25/50	1:2:2	JF440/300ER12ES8206FK7Th	50.19.687	496
350	50	1:1	JF440/350ER7ES8206FK7Th	50.19.722	362/359
400	50	1:1	JF440/400ER8ES8206FK7Th	50.19.740	2x376
450	50	1:1	JF440/450ER9ES8206FK7Th	50.19.770	459/376
500	50	1:1	JF440/500ER10ES8206FK7Th	50.19.800	492/372
550	50	1:1	JF440/550ER11ES8206FK7Th	50.19.805	2x456
600	50	1:1	JF440/600ER12ES8206FK7Th	50.19.820	2x496

Accessories			
Socket 100 mm high	SO 100/800/600	29.03.325 & 326	8
Socket 200 mm high	SO 200/800/600	29.03.327 & 319	15



ES8206: H=2020, W=800, D=600,
A1=537, A2=63, A3=737,
A4=62, A5=1480

06

Active Harmonic Filter: AHFI - Series

Many electrical loads in industrial applications, e.g. rectifiers, variable speed drives, welding equipment, UPS, but as well in office buildings, commercial buildings, infrastructure buildings and transport applications, draw non-sinusoidal currents from the grid. Non-sinusoidal currents lead to grid pollution, i.e. these currents cause voltage drops on the network impedances, consequently leading to a voltage distortion, commonly called harmonic voltage distortion (THD-V). De-tuned PFC systems, passive harmonic filters, are not capable to filter selected harmonics. Depending on the grid conditions conventional PFC systems and passive harmonic filters may cause resonance conditions and overload of it as well as worsening of the overall power quality.

Excessive harmonic current loading leads to serious problems in your application

- Additional thermal losses in cable, neutral conductor, distribution panels, switchgear and transformer
- Blowing fuses and circuit breaker tripping without obvious reason
- Distortion of the voltage wave form, excessive THD-V, power quality problems
- Disturbance of other connected loads (reduced life expectancy, early breakdown)
- Unsymmetrical grid load (faster de-rating of motors and equipment, and additional losses)
- Faster wear out of electrical distribution equipment and electric as well as electronic loads
- Massive overload of electricity supply and in worst case resonance conditions and consequently destruction and in worst case fire damage
- Fast capacitor de-rating and in worst case bursting
- ...

Solution

Janitza active harmonic filters of the AHFI-series overcome the problems of conventional PFC and passive filters by means of latest power electronic solution, i.e. instead of shunt PFC capacitors the harmonics will be generated in an electronic way. Out from an integrated DC source the AHFI filter generates harmonics with opposite algebraic sign (180° phase shift) and injects it into the grid. AHFI active harmonic filters can independent of the harmonic order suppress, or better compensate, all harmonics up to the 49th order, i.e. 2450 Hz. Janitza's active harmonic filters actively eliminate the harmonics present in the supply system – "cleaning" the network from harmonics.

Features of the AHFI - Series

- Nominal outputs of 50 A, 100 A and 300 A
- High dynamic response (< 20 ms), i.e. fast suppression of harmonics
- Up to 5 AHFI harmonic filters can be operated in parallel
- Very compact design
- Easy to integrate into existing installations
- Suppression of all harmonic currents up to the 49th, 2450 Hz
- Comprehensive communication facilities
 - USB-Interface for PC connection (programming, firmware change and change of parameter set)
 - RS485
 - Free programmable in-/outputs (isolated and with LED for status visualisation)
 - 4 digital inputs
 - 4 digital outputs
 - 4 digital in-/outputs (function programmable)
 - 2 analogue outputs
 - 2 analogue inputs
 - CAN-Bus (CAN Open)
 - Ethernet connection
 - MMC memory card for data storage, long term recording, firmware change, parameter change (in preparation)
 - Additional interfaces optional as plug-on modules (in preparation)
- Harmonic attenuation factor up to 97 %
- Fulfilment of international power quality standards, e.g. G5/4, IEEE519, EN50160
- Closed loop control for highest accuracy
- AHFI filter can not be overloaded and do not provide a risk for resonance
- User friendly human-machine interface
- Takes care for unbalanced load



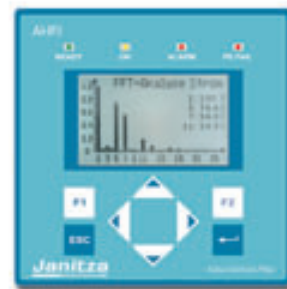
Typical applications

- IT and data centre
- Oil and gas industry
- Banks and insurance enterprises
- Ski lifts
- Office buildings
- UPS equipment
- Semiconductor industry
- Steel industry
- Automotive industry
- Plants with continued processes

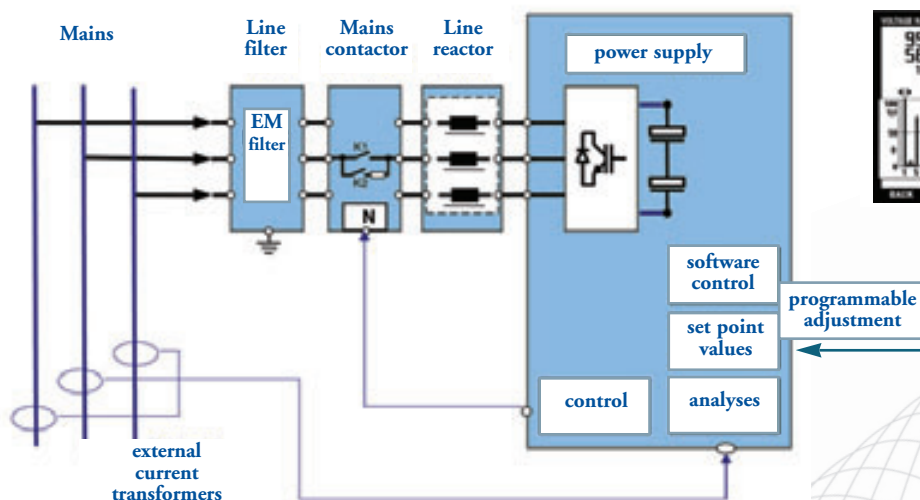
User interface:

User-friendly graphic display with high resolution (128 x 64 Pixel) ensures an easy and reliable reading of the information. The generous designed display allows the user to read multiple information at one glance.

The intuitive designed menu handling ensures a comfortable setting of parameters and retrieval of information. The help function gives additional user support.



Type	AHFI 050	AHFI 100	AHFI 300
Nominal voltage	3 phase AC 380 ... 480 V +/- 10 %		
Nominal frequency	50 and 60 Hz		
Grid systems	3-phase mains with and without neutral conductor		
	TN; TT; IT U phase-PE < 500 V)		
Nominal permanent current (effective)	50 A	100 A	300 A
Peak current	125 A	250 A	750 A
Pulse frequency	16 kHz		
Max extension	Up to 5 filters in parallel		
Filter range	Compensation of harmonic currents up to 49th harmonic order		
Item no.	50.20.001	50.20.002	50.20.003
Cooling, ambient conditions, EMC			
Cooling	Forced air cooling or natural convection		
Temperature range	0 to 40°C, with power derating up to 55 °C; (2 % per K)		
Losses [kW]	1.5	3.0	10.0
Cooling air volume [m³/h]	650	1,300	3,900
Altitude	up to 1,000 m above sea level; with power de-rating up to max. 2,000 m (1.7 % per 100 m)		
Moisture	< 95 %, non-condensation		
Radio interference level	EN 55011, Group 1, Class A		
Immunity	EN 61000-4-2 and EN 61000-4-5		
Classific. of environmental conditions	3K3 according to DIN IEC 721-3-3		
Certificates	CE (in preparation: UL and CSA)		



Project description industry

Issue:

In industrial applications the importance for transparency in electricity cost and power quality is gaining importance day by day. Energy consumption has to be dedicated to production process steps and finally products in order to have a proper cost controlling and to ensure a correct price definition for individual products.

Due to the continued trend for non-linear loads such as frequency converters as well as other modern power electronics and resulting pollution of the electricity supply, an increasing number of problems with electronic equipment and control circuits has been reported. PFC systems, power capacitors and harmonic filter systems are playing a special role and require a qualified engineering from power quality solution experts.

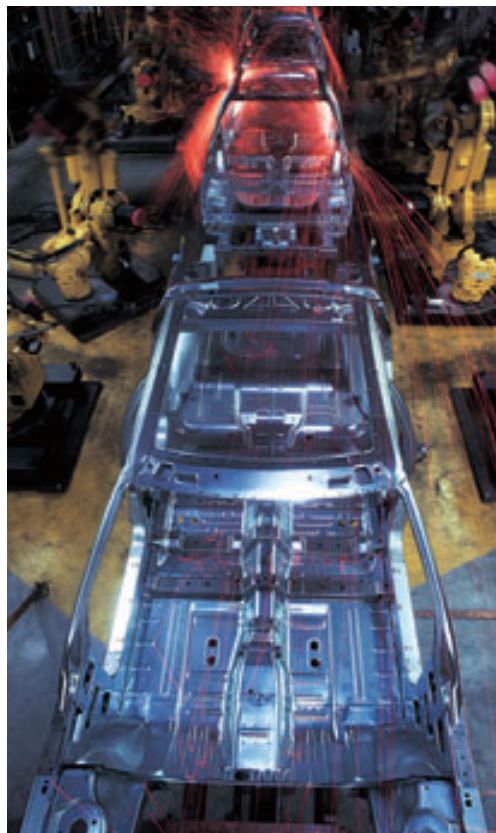
By means of an intelligent peak load management system costly and sometimes risky (because of system overload) load peaks can be avoided.

Task:

A German supplier for the automotive industry shifted the entire production from an existing place to a brand new production facility. In the new production facility the target was to monitor the consumed energy (kWh) of all welding robots, demand for compressed-air as well as quantity of heat produced and to supply these data to the controlling department.

Furthermore, the power quality of the four main feeders had to be monitored and the four PFC systems along with these feeders to be implemented into the energy management system. On top, a peak load management system had been requested in order to reduce electricity cost by means of intelligent load monitoring with load forecast and short term disconnecting of uncritical loads such as air compressors, air conditions, large electrical stoves etc.

For communication purpose the company internal Intranet was used.



Solution:

Power Management & cost centre management

For measuring the consumed electrical energy the UMG96 of Janitza electronics GmbH has been used. The UMG96 provides impulses related to the consumed energy to the ProData data collection system. Alike other pulse transmitter such as for compressed air and heat produced have been connected to the ProData system.

Power Quality Monitoring

In each of the four main feeders UMG 503V network analysers have been used in order to monitor the power quality of each individual feeder and generate alarm signals in case of critical levels.

Power Quality Solution

Beside the power quality monitoring and power management the power quality solution (PQS), here in this case de-tuned harmonic filters with dynamic PFC, played a major role in this project. The harmonic filter was necessary in order to reduce the high harmonic distortion and clean the grid. Beside the harmonic filter a dynamic PFC was mandatory due to the welding robots and resulting high and fast changing loads. The PQS systems used the innovative power factor controller Prophi 12TS with RS485 interface. With the PSWprofessional software the entire application with

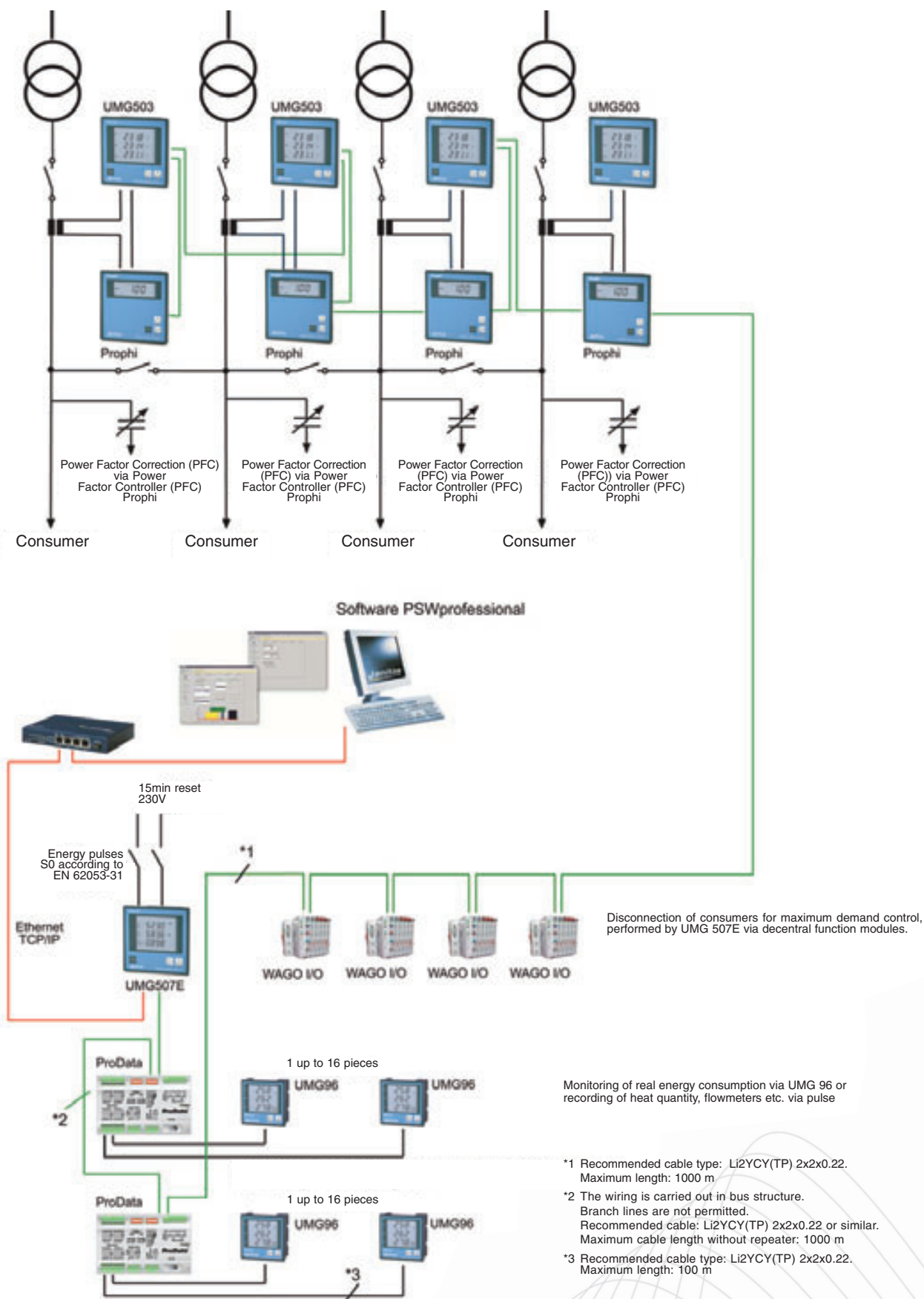
- Power Quality Monitoring
- Power Management
- Power Quality Solutions

was comfortably integrated and visualized.

Special feature:

The four PFC systems are designed in a so called hybrid solution. This means the basic load is compensated with conventional capacitor contactors. The fast changing peak loads caused by robot welding are corrected by dynamic PFC, i.e. PFC capacitors are connected by means of semiconductors in a very smooth way. This hybrid solution is an unique feature of the Prophi power factor controller, which reduces the cost of this solution by far. The UMG 507E works as peak load management system and as master for subsequent connected WAGO-Modules for disconnecting loads, as well as gateway for the RS485-bus to Ethernet/TCP/IP.

Application-Example: Industry



Project description supermarket

Issue:

The consumption of energy and peak power of supermarket branches can vary strongly in spite of similar construction and consumer structure.

The reasons for this can be found in different brands of cooling systems, illumination and ventilating systems, which often show a strongly varying energy efficiency, but on the other hand also in different sites, where preferred weather conditions (strong snow, yearly sun hours etc.), number of daily customers or the ecological awareness of the employees is noticeable.

Furthermore, non linear loads cause serious problems regarding the power quality. Hence it makes sense to measure the consumption and power as well as generally grid data in the branches and compare them to each other.



Task:

In a supermarket chain, the power, energy and power quality shall be measured in the main distribution and some important subdistributions within the respective branch. The data shall be collected in the headquarter on a PC. With those measured data, very intensive branches regarding the consumption and peak power shall be found out, and the reason for those significantly high consumption and therefore costs shall be detected.

The power peaks shall be reduced by a maximum demand controller. The power quality in the single sub-distributions must be supervised regarding high harmonics, as produced by deep freezers, for example. Additionally, the consumption of gas and water shall be measured. The data must be provided to the facility manager. As communication medium, ISDN is available in each branch.

Solution:

Branch:

In the main distribution of each branch, a UMG 507E was used, which allows a direct access via an ISDN router. This device supervises the power quality of the complete network and enables maximum demand control via its Emax function for 6 disconnection channels. The device could be expanded via external WAGO modules for up to 32 channels. Via the weekly switching clock additionally unnecessary consumption can be avoided, for example by automatic disconnection of lightings after closing time.

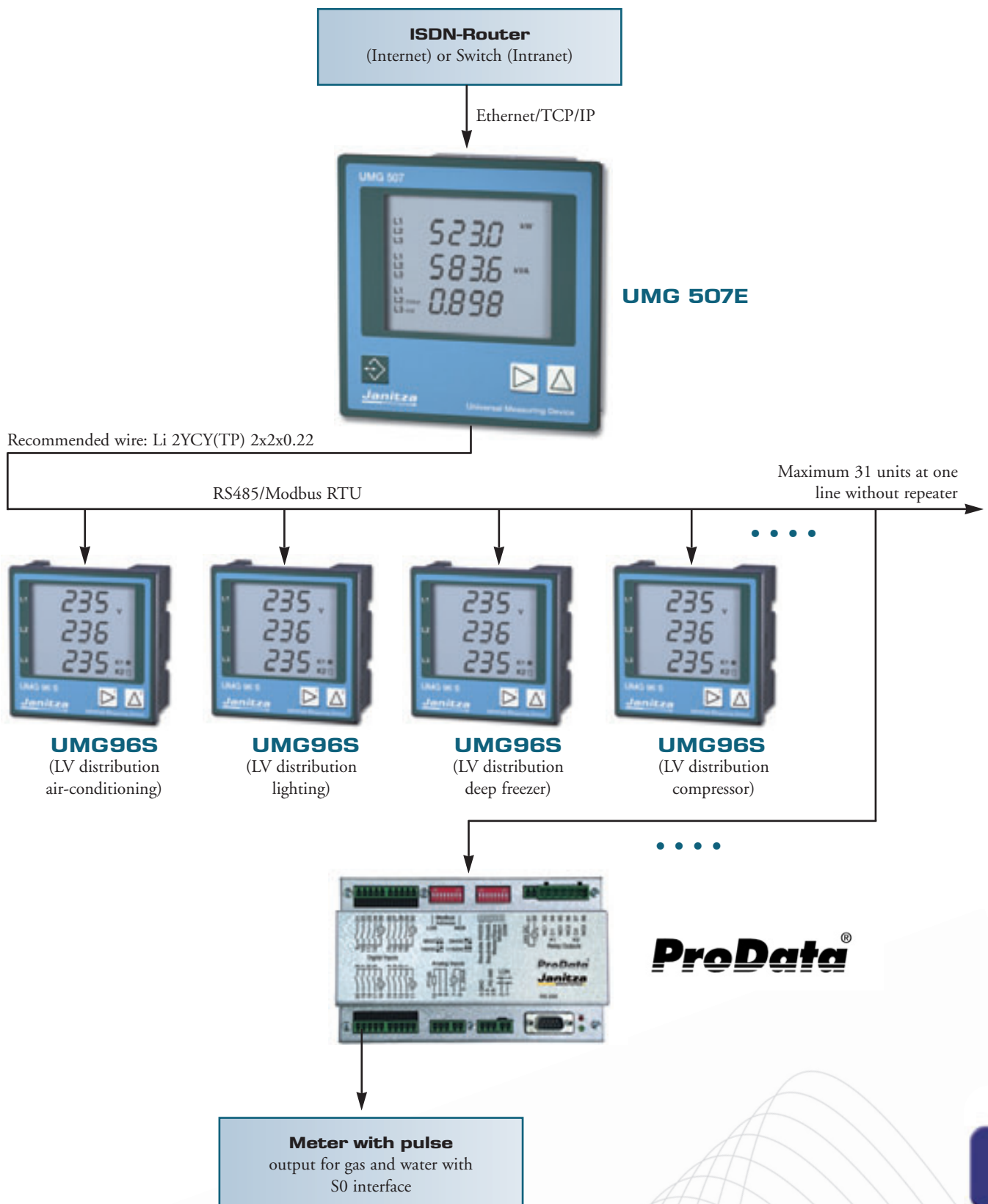
Voltage drops and other events can be sent by Email including file attachment. The sub-meters are connected via RS485 to the UMG 507, which serves as a gateway. Four sub-distribution (deep freezers, ventilation, lightings and compressors) are measured with four UMG 96S with clock and memory. The consumption of gas and water is measured with counters and connected via pulse outputs to the data collecting system ProData, which also is connected to UMG 507 by RS485.

Headquarter:

On a central PC in the headquarter, all data are collected. The memory of the devices of each branch are read out by the comfortable evaluation software PSWprofessional. Due to the high number of branches, the devices are only read once per month. The measured data can now be processed for the desired periods of comparison in Excel sheets.

They are bound in via Excel macros, which read the data from the MySQL database, provided by PSWprofessional.

Application-Example: Supermarket



Project description bank

Issue:



In the banking and insurance sector and other commercial buildings more and more power quality problems occur within the last years e.g. harmonics, flicker, voltage peaks and similar.

Furthermore, interference from the medium voltage grid are transported into buildings via supply transformers. The reasons for application internal power quality problems can usually be found in the high number of PC's and their power supply, UPS, office equipment, electronic ballast, ... Due to the widely spread five wire current grid so called vagabond currents, which are caused by insufficient earthing, can emerge in the PE conductor. Those currents lead to problems in data transmission, because they interfere in data cables.

Flicker lead to indisposition, headache and unusual fast fatigue of the employees. Such restrictions are very unwelcome, as working in such buildings can be hindered and even impossible without safe communication facilities.

For several years there are European guidelines for the evaluation of power quality parameters. Here, the EN 50160 classifies the power quality, which must be delivered by the energy supplier. A guideline for power quality within a building offers the EN 61000-2-4.

Task:

In a major bank the power quality shall be tested according to the standard EN 50160 and EN 61000-2-4. Furthermore, the root causes for numerous problems in data transmission shall be found. The employees of the facility management shall have permanent access to the measured data. For communication intranet can be used.

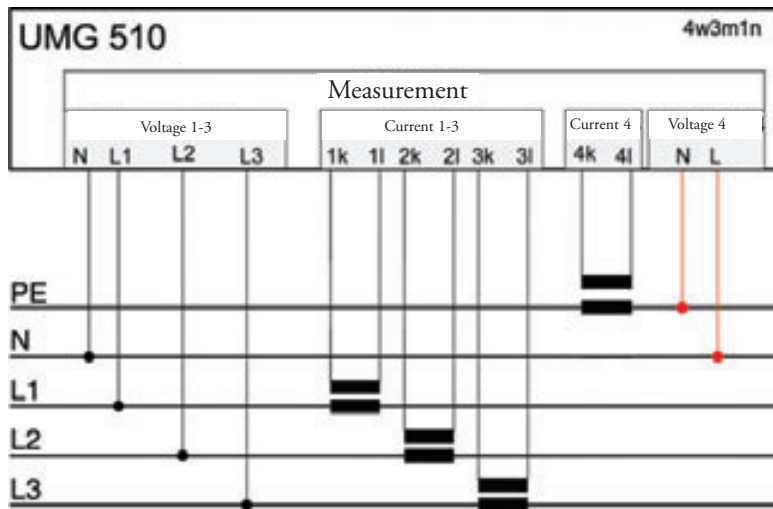
Solution:

In the main distributions and all important sub-distributions such as in server rooms etc. all in all 39 UMG 510 were mounted. An important feature in this context is the fourth current and voltage input of the device. Inserting the fourth current transformer in the PE conductor, it was possible to trace vagabond currents, and faulty earthing and the corresponding earth potentials can be monitored by the separate measurement between neutral and PE. Hence, faulty earthings can be identified and corrected. Of course, all relevant data regarding power quality and energy data are saved in the 128MB memory of the UMG 510. They can be read out with the software PAS510, if required, over Ethernet TCP/IP interface.

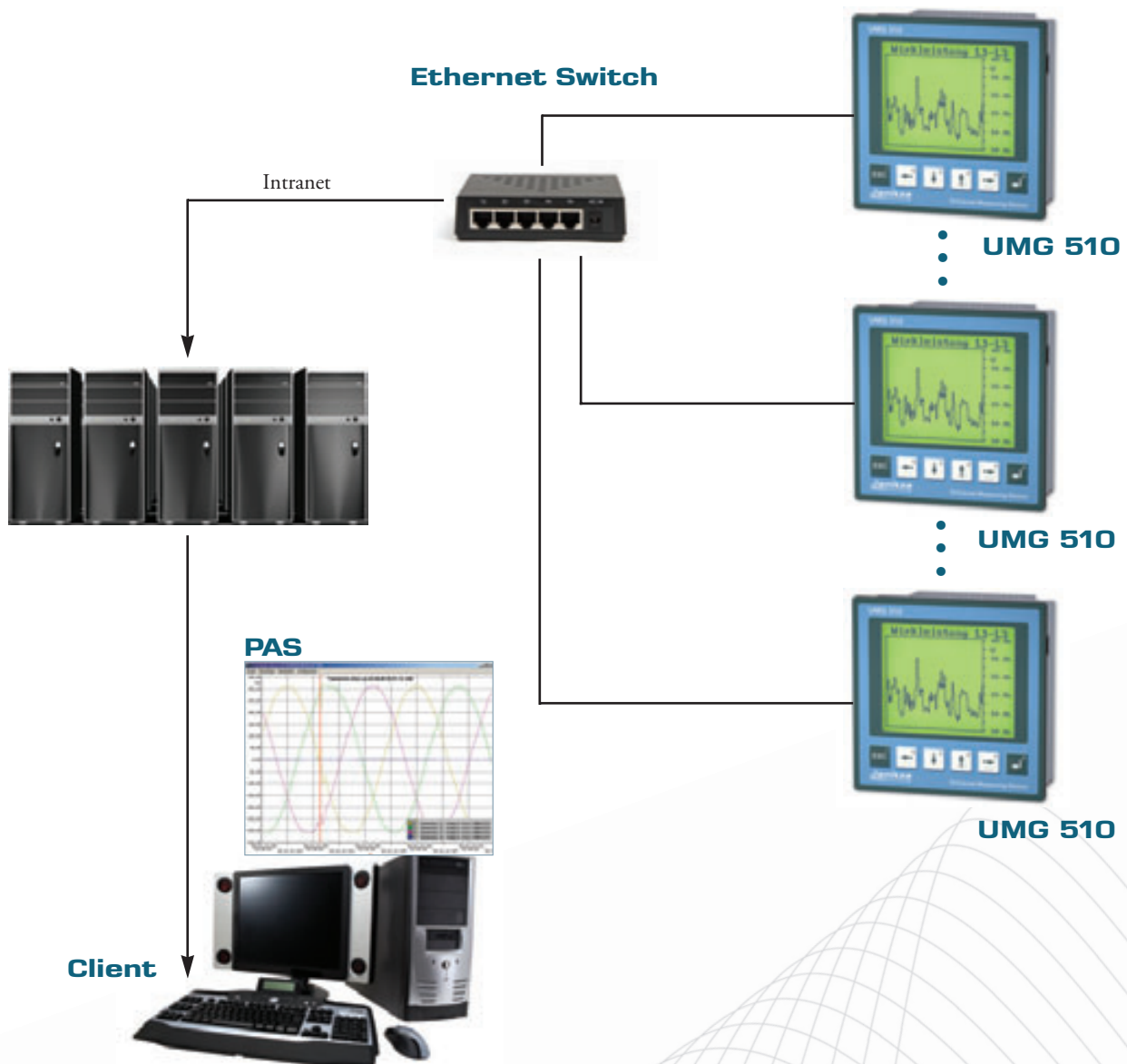
By these means, reasons for frequent communication failures in the data network can be found. And on the other hand important knowledge about power quality can be achieved. As an example, sources of harmonic distortion can be found, and equipment such as electronic control or server power supplies, which were sometimes destroyed by interference, can be protected by suitable harmonic filters.

Furthermore, a supervision of the power quality of the energy supplier according to EN 50160 has become possible. A very pleasant side effect is the control of the energy consumption respectively of the kWh-meter of the energy supplier

Application-Example: Bank



Measuring in a four wire system. Main measuring and auxiliary measuring with protective earth conductor.



Version 03/08 E

Representative