Universal Measuring Device UMG 500 A

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Universal Measuring Device UMG 500A

Content

Edition notes

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08.10.96	Application as prescribed, Installation, Current mean value

Universal Measuring Device UMG 500A

Application

Universal Measuring Device UMG 500A is suited for fixed front panel mounting and to meaure voltage, current, power etc. in low voltage distributions. Current measurement is performed via external current transformers with 5 A secondary (1 A optional). Voltage within the given measuring range can be connected directly to the device.

Compared with individual analogue measuring instruments, the Universal Measuring Device has the advantage of requiring considerably less mechanical content and wiring content. Stocking is easier, because with the Universal Measuring Device UMG 500A, practically all standard measurement ranges in low voltage installations can be achieved.

Applications include:

- monitoring and control of electrical parameters in energy distribution systems
- sensor in building wiring systems

The following measured values can be called up:

- **voltage**
- **current**
- **mean current**
- **apparent power**
- **real power**
- **mean real power**
- **reactive power**
- **frequency of voltage**
- **harmonic wave content of voltage**
- **power factor**
- **peak values with date and time *1)**
- **real work**
- **reactive work**

Outputs:

- **analogue output**
- **threshold contacts**
- **serial interface (designed for networking)**

Construction features

Universal Measuring Device UMG 500A is housed in a 144 mm x 144 mm plastic case suitable for front panels mounting.
Operation and programming are achieved via a membrane keyboard and four-digit display with 20 mm characters. The auxiliary voltage, measurement inputs etc. are connected at the rear panel via protective plug terminals.

Functional description

The three phase electronic measuring system measures and digitizes the effective value of voltages and currents in a 50 Hz or 60 Hz power supply. Every 2 seconds, a sampling measurement is carried out. By means of these measurements, the built-in microprocessor computes the electrical values. The desired values can be displayed on keystroke, the dimensions of the values being indicated by the relevant LED.
Peak values and programming data are stored in a battery-supplied memory.

Warning note
In case of **three-wire** connection, the measuring part is configured as an "Aron"- connection. Due to this, current in L2 will be ignored for power measurement.
For this reason, the results of the following functions:

P, Q, S, power factor, W, and B

are valid only as the sum. The real power is calculated as follows:

$P_{\Sigma} = P1 + P3$

*1) Peak values of harmonics are stored **without** date and time.

Installation

When installing and mounting the Universal Measuring Device UMG 500A, the VDE Regulation 0113 must be adhered to. Before connecting up, ensure that the local supply conditions agree with the data given on the nameplate.
The installation facilities must provide a switch or a power switch. The switch must be installed close to the device, easy to be operated by the user. The switch must be marked as a disconnection device for the UMG 500A.

Auxiliary voltage

Terminals L, N
For auxiliary voltage see nameplate. The auxiliary voltage must be connected via a 2A time-lag auxiliary fuse to the terminals "auxiliary voltage" L and N at the rear of the instrument.

Measurement inputs

Terminals L1, L2, L3, 1k-3l
The voltages to be measured, L1, L2 and L3 must be similarly connected via a 2A auxiliary fuse to the terminals L1, L2 and L3.
The currents to be measured must be connected in a like manner to the terminals 1k to 3l. Please note that the continuous measurement current must not exceed 5A, (1 A for instruments with .../1 A transformers), whether measuring directly or via a current transformer.

Relay outputs K1 and K2

Terminals 1-3, 4-6
The instrument is equipped with two floating threshold value contacts "min" and "max" which are available as change-over contacts with terminals 1 to 3 or 4 to 6. If the reading falls below the "min" value programmed for the threshold function or rises above the "max" value, the appropriate relay is activated. The threshold values "min" and "max" can be programmed via keystrokes.

Analogue output "0..20 mA"

Terminals 7, 8
The measured values displayed are converted by the UMG into a 0..20 mA analogue signal. The analogue signal can be tapped at terminals 7 and 8 and passed on, for example, to a recorder. It is possible to connect several instruments in series, but the total load may not exceed 500 Ω. The analogue output is scaled with the help of key "0..20 mA". Optionally, the device can be provided with 4..20 mA analogue output.

"Clear work" input

Terminals 9, 10
A contact can be connected to terminals 9 and 10 which when closed, erases the real work and reactive work which has been registered up to this point and restarts the time measurement. Measurement of real and reactive work then recommences synchronously with the value 0 kWh or 0 kvarh.

"Remote" input

Terminals 11, 12
A switch, key switch or similar can be connected to terminals 11 and 12. When the switch is closed, the instrument cannot be operated from the keypad, and the LED "remote" at the front of the panel lights up. Unauthorised or inadvertent operation can thus be prevented. The contact has no influence on the choice of the measurement function or on the storage of peak values.

"RS 485" Serial interface

Terminals TxD A,B and RxD A,B
These terminals are required in conjunction with the PC software option for communicating with the computer used. (see *serial interface*)

Commissioning

1. Connect auxiliary voltage.
   The 7-segment display shows “0”, or if a measured voltage is already present, another reading.

2. Programming
   When the auxiliary voltage is present, the device is ready for use and can be programmed.
   To do this, the “local/remote” contact must be open (the LED must not light up).

2.1 Programme the current transformer.
2.2 Programme the voltage transformer.
2.3 If required, programme the analogue output.
2.4 If required, programme the relay outputs
2.5 If required, alter the device address.

Four-wire measurement

3. Measured voltage
3.1 Switch off voltage to UMG 500A and connect voltage path L1 - N.
3.1.1 Switch on auxiliary voltage and measured voltage.
3.1.2 Using the operating keys of the UMG 500A, cause the voltage in L1 to be displayed and compare it with the voltage applied at L1 - N.
3.2 Repeat the steps under 3.1 for the voltage paths L2 and L3.

Warning! Because the frequency is measured in L1, voltage **must** be present at this terminal. If not, the device assumes that the frequency is 50 Hz, which results in measuring errors.

4. Measured current
4.1 Switch off voltage to UMG 500A and connect current path for L1.
4.1.1 Switch on auxiliary voltage, measured voltage and measured current.
4.1.2 Using the operating keys of the UMG 500A, cause the current in L1 to be displayed and compare it with the current applied at “k-l”.
4.1.3 Using the operating keys of the UMG 500A, cause the real power in L1 to be displayed.
If the display shows a “-” it indicates that generating mode is present or that “k” and “l” have been transposed.
4.2 Repeat the steps under 4.1 for the current paths L2 and L3.

Three-wire measurement

3. Measured voltage
3.1 Switch off voltage to UMG 500A and connect voltages L1, L2 and L3.
3.1.1 Switch on auxiliary voltage and measured voltage.
3.1.2 Using the operating keys of the UMG 500A, cause the voltages to be displayed and compare it with the voltages applied.
3.1.3 Check rotary field.

4. Measured current
4.1 Switch off voltage to UMG 500A and connect current path for L1.
4.1.1 Switch on auxiliary voltage, measured voltage and measured current.
4.1.2 Using the operating keys of the UMG 500A, cause the current in L1 to be displayed and compare it with the current applied at “k-l”.
4.1.3 Using the operating keys of the UMG 500A, cause the real power in L1 to be displayed.
If the display shows a “-” it indicates that generating mode is present or that “k” and “l” have been transposed.
4.2 Repeat the steps under 4.1 for the current paths L2 and L3.

Universal Measuring Device UMG 500A

Functional plan

	Measurement function		Voltage U	App. current I	Mean current	Mean real power	Real power P	App. power S	React. power Q	React. work	Real work W	Fre-quency f	power factor cos phi	5.	7.	11.	13.
														Harmonic wave			
Mea-sured values	Measuring method		Ueff	Ieff	15 min./ 99.5%	W / rem.time	measure P	S = Ueff* Ieff	Q = sqrt (S^2-P^2)	Q*t	W = P*t	zero crossing	P/S	Fourier analysis			
	Summation 4-wire measurement		-	-	-	P1+P2 +P3	P1+P2 +P3	S1+S2 +S3	Q1+Q2 +Q3	(Q1+Q2 +Q3)*t	(P1+P2 +P3)*t	-	Sum (P) / Sum (S)	-	-	-	-
	Summation 3-wire measurement (option)		-	-	-	P1+P3	P1+P3	(S1+S2 +S3) /sqrt (3)	Q1+Q3	(Q1+ Q3)*t	(P1+ P3)*t	-		-	-	-	-
Dis-play func-tions	Sign	ind / cap	-	-	-	-	-	-	x / x	x / -	-	-	x / x	-	-	-	-
		Motor/ gener.	-	-	-	x / -	x / x	-	-	-	x / -	-	x / x	-	-	-	-
	Transient values	L1	0 .. 9999 V / opt.: 0.00 .. 99.99 kV	0 .. 5500 A	0 .. 5500 A	-	0 .. 9999 kW / opt.: 0.00 .. 99.99 MW	0 .. 9999 kVA / opt.: 0.00 .. 99.99 MVA	0 .. 9999 kvar	0.000 .. 9999 kvarh (*255)	0.000 .. 9999 kWh (*255)	48.00 .. 62.00Hz	100	0.0 .. 25.5%			
		L2				-						-					
		L3				-						-					
		Sum	-	-	-	0 .. 9999 kW						-		-	-	-	-
	Peak values	L1	0 .. 9999 V / opt.: 0.00 .. 99.99 kV	0 .. 5500 A	0 .. 5500 A	-				-	-	48.00 .. 62.00Hz		0.0 .. 25.5%			
		L2				-				-	-	-					
		L3				-				-	-	-					
		Sum	-	-	-	0 .. 9999 kW				-	-	-		-	-	-	-
		Date/ Time	x	x	x	x	x	x	x	-	-	x	x	-	-	-	-
Accuracy referred to full scale value			+/- 2 digit	+/- 2 digit	+/- 2 digit	+/- 5 digit	+/- 5 digit	+/- 5 digit	+/- 5 digit	+/- 5 digit	+/- 5 digit	+/- 2 digit	+/- 2 digit	+/- 10 digit			
			+/- 0.5 %	+/- 0.5 %	+/- 0.5 %	+/- 1.5 %	+/- 1.0 %	+/- 1.0 %	+/- 1.5 %	+/- 1.5 %	+/- 1.0 %	+/- 0,5 %	+/- 1.0 %	+/- 10 %			
Scaling of analogue output 0..20 mA / optionally 4..20 mA (resolution 8 bit)			0 .. 9999 V / opt.: 0.00 .. 99.99 kV	0 .. 9999 A	0 .. 9999 A	0 .. 9999 kW	0 .. 9999 kW / opt.: 0.00 .. 99.99 MW	0 .. 9999 kVA / opt.: 0.00 .. 99.99 MVA	9999 ind. .. 0 .. 9999 cap. 0=10mA	0 .. 9999 varh / pulse (see "scaling of ana-logue output")	0 .. 9999 Wh / pulse (see "scaling of ana-logue output")	Variation from 50/60 Hz in 0.01 Hz steps 50/60 Hz =10 mA	Variation from 1.00 in 0.01 steps 1=10mA	0 .. 25%			
Setting range of threshold contacts			0 .. 9999 V / opt.: 0.00 .. 99.99 kV	0 .. 9999 A	0 .. 9999 A	0 .. 9999 kW	0 .. 9999 kW / opt.: 0.00 .. 99.99 MW	0 .. 9999 kVA / opt.: 0.00 .. 99.99 MVA	9999 ind .. 0 .. 9999cap	0 .. 9999 kvarh (without over-flows)	0 .. 9999 kWh (without over-flows)	00.00 .. 99.00Hz	0.00ind ... 1.00 ... 0.00capp	0 .. 25%			

"opt.": optional; see *Special versions*
"sqrt": square root
"Ref.": reference conditions for the accuracy data:

frequency	49.5 .. 50.5Hz or 59.5 .. 60.5Hz
harmonic content	<10% of basic wave
ambient temperature	+18°C ... +27°C
current and voltage	in the range 20% ... 90% of measuring range
cos phi	in the range 0.5 ind -1 - 0.5 cap

Universal Measuring Device UMG 500A

Factory presettings

- Current transformer: 5000A/5A
- Voltage transformer factor 1.0
- Measuring function voltage
- Measurement phase L1
- Device address (RS485) 1
- Measuring period for real power mean value 900 seconds
- Analogue output
  - Function current
  - Phase L1
  - Scaling 20 mA = 2000 A
- Relay output
  - Function current
  - Phase L1
  - K1 (min.) switching threshold 0 A
  - K2 (max.) switching threshold 9999 A
- Date and time actual time (without automatic changing summer /winter)

Special versions

The following special versions are available:	**Standard**	**Option**
• Current transformer inputs	**5 A**	1 A
• Voltage display	**9999 V**	“kV” + “3-wire”: up to 99.99 kV “kV”: up to 30.00 kV
• Real and apparent power display	**9999 kW/kVA/kWh**	99.99 MW/MVA/MWh
• Analogue output	**0 .. 20 mA**	4 .. 20 mA
• Wiring of voltage measurement inputs	**4-wire**	3-wire Power measurement in “Aron” connection and display of current in L2.

If used in conjunction with an external adapter transformer the device is also suitable for the following voltages:

- **525, 600 and 1000 V**

Maintenance note

The built-in batteries must be changed by trained staff after a period of about 5 years. The batteries have a design life of approx. 8 to 10 years.

Batteries: 2 off Lithium batteries, voltage 3 V, diameter 12.5 mm, 2.5 mm thick, Panasonic, order code BR-1225

Key functions and Programming

Programming of Universal Measuring Device UMG 500A is carried out with the remote/local contact open, using the keyboard and the digital display. Following a power failure, it is not necessary to reprogram the device, because the programmed data and peak values are stored.

"+" key

This key is used - partly in conjunction with other keys - for the following functions:

- **Changing set values**
- **Reading the peak value of the displayed function.**
- **Indicating overflows of work measurements (W)**

"-" key

This key is used - partly in conjunction with other keys - for the following functions:

- **Changing set values**
- **Erasing the peak value of the displayed measurement function.**
- **Erasing the accumulated work**
- **Restart of averaging power and current**

Primary current of current transformer

When this key is pressed, the programmed state is displayed and can be altered by additionally pressing the "+" or "-" keys. Setting range: 1 ... 5000 A in 1 A steps.
The set value is always based on a current transformer secondary current of 5 A (standard).
Example: for a current transformer of 500/5, "**500**" must be set.
For instruments fitted with a 1A transformer secondary (optional), the primary current must be set similarly
Example: for 1000/1 the value is "**1000**".

Note
In case of option ../1 A, primary current may not be set higher than 1000 A, otherwise calculation of current and other dependent values (power, power factor, work) will be incorrect!

Voltage transformer

If required, the ratio of the voltage transformer used can be set with the aid of this key. The factor is displayed with one decimal place. In combination with the "+" or "-" keys, the displayed value can be altered. Setting range: 0.1 ... 999.9

Example:	**Transformer**	**Displayed / set value**
	10,000 V/100 V	**100.0**
	12,000 V/110 V	**109.1**

Note
The voltage transformer ratio is set to 1.0 for the standard version. If this value is wrongly set by mistake, this will result in the measured voltage and the values derived from it being incorrectly calculated and displayed!

Selection of outer conductor L1, L2 or L3

The outer conductor, for which the associated measurement values are to be displayed, is selected with this key. The selected outer conductor is indicated by the LED "L1", "L2" or "L3". The frequency is only measured in L1.

Selection key "sum"

With this key, the sums of the measurement functions real power, apparent power, reactive power, real work, reactive work and power factor, from L1, L2 and L3 are displayed. For all measurement functions other than those referred to, this key is inoperative.

U

Voltage

When this key is pressed, the device displays the effective value of the voltage to neutral or to the next phase (L1-L2; L2-L3; L3-L1). The unit is indicated by the LED “V”. Instruments with the option “kV” display the measurement value in the format ##.## kV. Instruments with the option “3-wire” only display voltage against next phase.

Display range:	1 ... 9999 V	(standard)
	0.01 ... 30.00 kV	(option “kV”)
	0.01 ... 99.99 kV	(option “kV” + option “3-wire”)

I

Current

This function displays the effective value of the current in the selected current path. The LED “A” indicates the unit of measurement.

I min

Mean Current

By holding down the “I” key and operating the “min” key, the mean current is displayed. To select a measuring phase oder to erase the maximum value key “I” must be kept pressed. To differentiate this function from the display of the present value of current, a decimal point appears on the right of the quantity.

This function shows the mean value of the current over a period of 15 minutes. With the method for generating the mean value used here, the mean value over the given time approaches to within 99.5% of the present value.

U I

Apparent power

This function shows the apparent power of the measured items. The unit is **kVA**; in this instance it is indicated by the LEDs “V” and “A”. As an option, the instrument can display the apparent power in MVA to two decimal places.

P

Real power

This function displays the real power in the outer conductors or the sum of all three real powers is displayed. The unit of measurement “kW” is indicated by an LED. With generator operation (power supply service), the real power is displayed with three digits as “-###”. As an option, the instrument can display the real power in MW to two decimal places.

P min

Mean real power

By holding down the “P” key and operating the “min” key, the mean real power is displayed. To differentiate this function from the display of the present value of real power, a decimal point appears on the right of the quantity. The instrument accumulates work only by the consumed real power. The mean value calculates mean power as follows:

Mean real power = accumulated work in present measuring period / remaining time of meas. period

.. / 5A %

Measuring period

The measuring period to calculate mean real power can be read out by means of these keys. In addition with the “+” and “-” key, the value can be set in steps of 1 second.

Setting range: 60 ... 9999 seconds.

.. / 5A I

Remaining time

By means of these keys, the remaining time in the present measuring period will be displayed in seconds. After a measuring period has been elapsed, i.e. the remaining time has reached zero, a new measuring period starts with the set value. By erasing the real work, the measuring period will also be restarted.

Q

Reactive power

This function displays the reactive power in the outer conductors or the sum of their reactive powers. The unit "kvar" is indicated by an LED. The direction of the phase displacement between voltage and current is indicated by the LEDs "ind" or "cap".

W

Real work

After this key has been pressed, the device displays continuously the sum of the real work extracted in the selected outer conductor or the total real work. With generator operation, real power returned to the supplier is not subtracted. The unit is indicated by the LED "kWh".
The display range is 1 to 9999 kWh. If the full scale value is exceeded, the display restarts at 0 kWh and the number of overflows can be read off by pressing the "+" key. In this case, the work is given by the following expression:

number of overflows * 10000 kWh + displayed value

In addition, the device counts the time from the start of measuring work. It can be read off by using the following key combinations:

1.) Press and keep pressed down	2.) Additionally operate	Display
W	Σ	days (max. 9999)
	L3	hours
	L2	minutes
	L1	seconds

The value of the work and the elapsed time are erased if the contact "clear work" at the rear of the device is closed or if key "W" is kept pressed down and the "-" key pressed simultaneously. Measurement of work starts afresh immediately after erasure. If there is a power failure, the time measurement will be interrupted.

W Q

Reactive work

By keeping key "W" pressed down and simultaneously pressing key "Q", reactive work is displayed. LEDs "kWh" and "Q" light up. The information given under *measurement function real work* applies in a similar way for this measurement function.
Attention:
• Only inductive power will be registered.
• The registered duration of the work measurement is valid for both real and reactive work.
• If the work is erased, either via contact "clear work" or via the key combination given in the previous section, not only real work but also reactive work are erased.

f

Frequency

This function displays the frequency of the voltage in L1. The unit of measurement is indicated by the LED "Hz".

cos φ

Power factor

This key is used to display the power factor cos phi in L1, L2 or L3 or to measure the total power factor. The LED "cos φ" indicates the operation of this function. The direction of phase displacement is indicated by the LEDs "ind" or "cap". With generator operation (power supply service), the power factor is displayed as "-#.##".

Harm. %

Harmonic wave content of voltage

This function displays the harmonic wave content of the measured voltage. The LED "%" indicates the unit. The percentage shown is based on a voltage of 230 V. At the left hand side of the display an ordinal number appears which shows which harmonic is currently being displayed (5th, 7th, 11th, A=13th). The percentage value is displayed in the two right-hand segments. With each successive use of the "Harm" key, the value of the next harmonic wave is shown.

Analogue output

Allocation

In order to allocate a particular measuring function to the output, the desired measuring function and the measurement phase must first be selected. After this, the function set is allocated to the analogue output by operating the keys illustrated on the left.

Scaling

The analogue output can be scaled for any quantity to be measured, independently of the choice of display function. The object of this scaling is to make maximum use of the range 0 (4) to 20 mA in order to achieve the largest possible resolution of the measured value, without going outside the scale. The setting range of the scale value depends on the function selected, and can therefore vary from function to function. (see table *Functional plan*.

The data in brackets applies to devices fitted with a 4 .. 20 mA analogue output.

Attention: If real power is assigned to a 4 .. 20 mA analogue output, the output current will decrease below 4 mA in case of generating mode.

Work pulses

Output of real or reactive work presents a special case. In this case, a proportional analogue signal is not provided, but pulses, whose frequency is proportional to the real or reactive power. The analogue output thus behaves like a metering pulse sender. The pulse valence is set via scaling of the analogue output in Wh (varh)/ pulse. This can be selected between 1 and 9999 in steps of 1 Wh (varh)/pulse.

The maximum pulse frequency of the analogue output is 0.25 Hz, i.e. one pulse in four seconds. If the power exceeds the maximum pulse frequency, the surplus of pulses are stored and will be transmitted later, if possible. In this case, the momentary pulse duration does not represent the momentary power.

Calculation of the pulse valence:

$$Iw >= P$$

[Wh/pulse]

expected real power [kW]

Iw: Pulse valence

P: Maximum

Example 1:

The maximum pulse valence is to be calculated for a three-phase network for which P = 500 kW.

Iw >= P
Iw >= 500 kW

This indicates that the pulse valence must be set equal to or bigger than 500, if the maximum pulse frequency of 0.25 Hz should not be exceeded.

Example 2:

A pulse receiver can only evaluate a pulse valence of maximum 1500 Wh/pulse.

Iw >= P
1500 >= P

The maximum power which can be evaluated is 1500 kW.

Peak values

Universal measuring device UMG 500A stores the peak value and the date and time of registering for most of the measuring functions. There is no storage of peak values for real work and reactive work. In the case of harmonic waves, the peak values are stored without date and time. In the case of measurement function reactive power and cos φ, the highest inductive value is stored.
To display the peak value, the respective measurement function must be selected. The peak value is displayed by pressing the "+" key.
The peak value can be erased by pressing the appropriate function key (e.g. "P" for real power) and keeping it pressed and additionally pressing the "-" key.
The date and time of the respective peak value can be called up by operating the following keys (in this example, date and time are displayed for the peak value of current):

1.) Press and keep pressed down	2.) Additionally operate	Display
I	**max**	**year**
	Σ	**days**
	L3	**hours**
	L2	**minutes**
	L1	**seconds**

Date and time

The actual date or actual time can be displayed by using the procedure described under *Peak values*, but using key "../ 5A" instead of the function key for the corresponding measurement value. In combination with the keys "+" and "-", the settings can be changed. There is no automatic changeover for summer time and winter time.

1.) Press and keep pressed down	2.)Additionally operate	Display
.. / 5A	**max**	**year**
	Σ	**days**
	L3	**hours**
	L2	**minutes**
	L1	**seconds**

Threshold contacts

The functions "min" and "max" can be used to monitor a quantity to be measured. If the threshold contacts are used to monitor real or reactive work, only the places in front of the decimal point of the measured value and the overflows are taken into account. If the threshold contacts are used to monitor mean real power, the relays will switch only after a fixed delay time of 30 seconds, which starts simultaneously with a new measuring period.

min max

Allocation

In order to allocate the threshold function to a particular measurement function, the measurement function and the measurement phase must first be selected. Following this, the function which has been set is allocated to the threshold function by simultaneous operation of the keys shown on the left.

min
max

Programming

With the aid of these keys, the value can be set, which if exceeded or underscored, causes the corresponding relay to operate.

.. / 5A w

Device Address

The device address, which can be set by means of DIP- switches at the left hand side panel, can be displayed by pressing these keys.

.. / 5A f

Software release

By pressing the two keys simultaneously, the number of the software version fitted in the instrument can be displayed, e.g. "1.00".

Serial interface

Universal Measuring Device UMG 500A is fitted with an RS-485 serial interface. This enables up to 32 Universal Measuring Devices to be driven on a common bus with a total length of up to 1000 m. With the aid of a communications protocol, measurement data can be read from each connected UMG and setting data (e.g. current transformer) can be transmitted to each UMG.

Communication parameters

The following transmission parameters are permanently set on the UMG 500A:

baud rate	**9600 bd**
data bits	**8**
parity	**N**
stop bits	**1**

These parameters must also be set at the PC, e.g. using the DOS command:

mode com1:9600,n,8,1

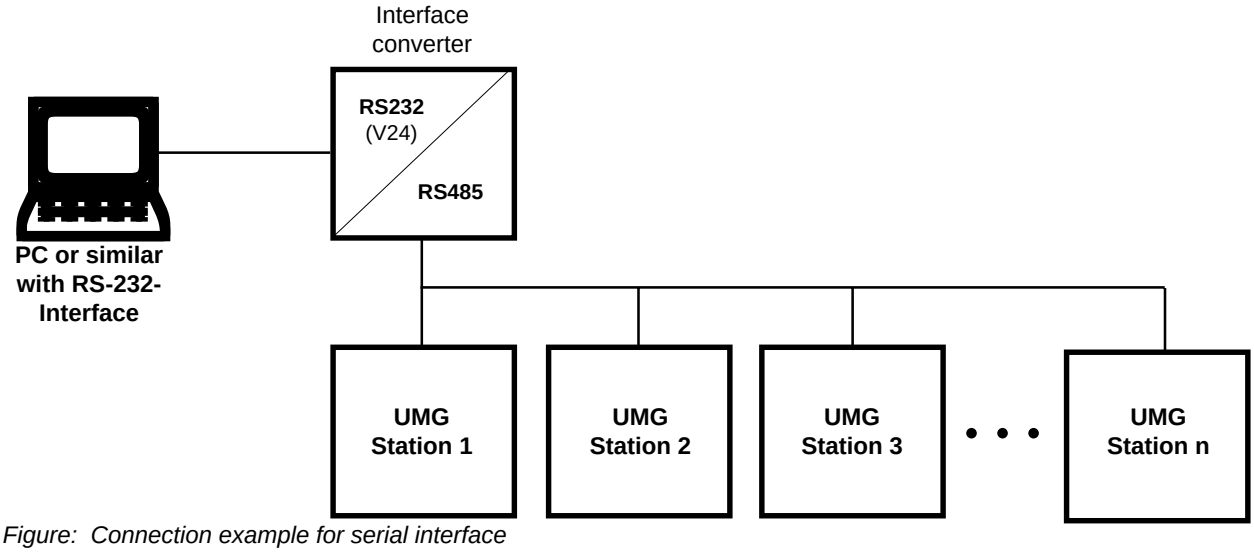


Figure: Connection example for serial interface

Connection PC to interface converter

The interface converter can be plugged in directly to the COM port of a PC (25-pin plug) via the adapter provided (socket-socket).

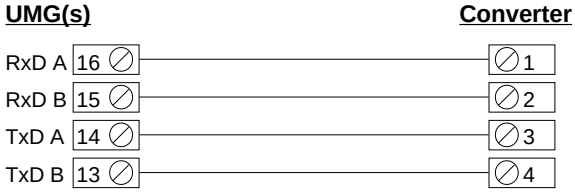
Great care must be taken to ensure that the parallel port of the PC (25-pin socket) is not used, because otherwise damage to the device can occur.

Alternatively, a connecting cable (25-pin, socket-socket) can be used instead of the adapter. This cable must not be longer than 5 m.

The RJ-11 socket of the interface remains unused.

Bus connection

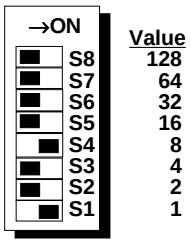
All measuring stations (UMG 500 A) are connected with one another via a four-core screened cable and to the 4-pin terminal strip of the interface converter, whereby the screening is not connected. The pin assignment is given in the following plan:



Recommended cable type: JY(St)Y 2 x 2 x 0.6 or similar.
Maximum cable length: 1000 m.

Setting the device address

The device address is set via an 8-fold DIP switch, which can be reached through a cutaway on the left hand side of the device. Addresses from 0 to 255 can be set.
The switches are marked with the numbers 1 to 8. An arrow symbol, marked with ON, indicates the position of the switch.
These switches S1 to S8 are coded in the DUAL SYSTEM, i.e. each switch has double the value of the previous one (1-2-4-16-32-64 etc.).



S4 = ON 8
\+
S1 = ON 1
=
Address 9

Figure: Example shows address 9

The position of the switches can be changed as required using a ballpoint pen or narrow tweezers.
Do not use a pencil for this adjustment, because the lead can break off and cause a short circuit.

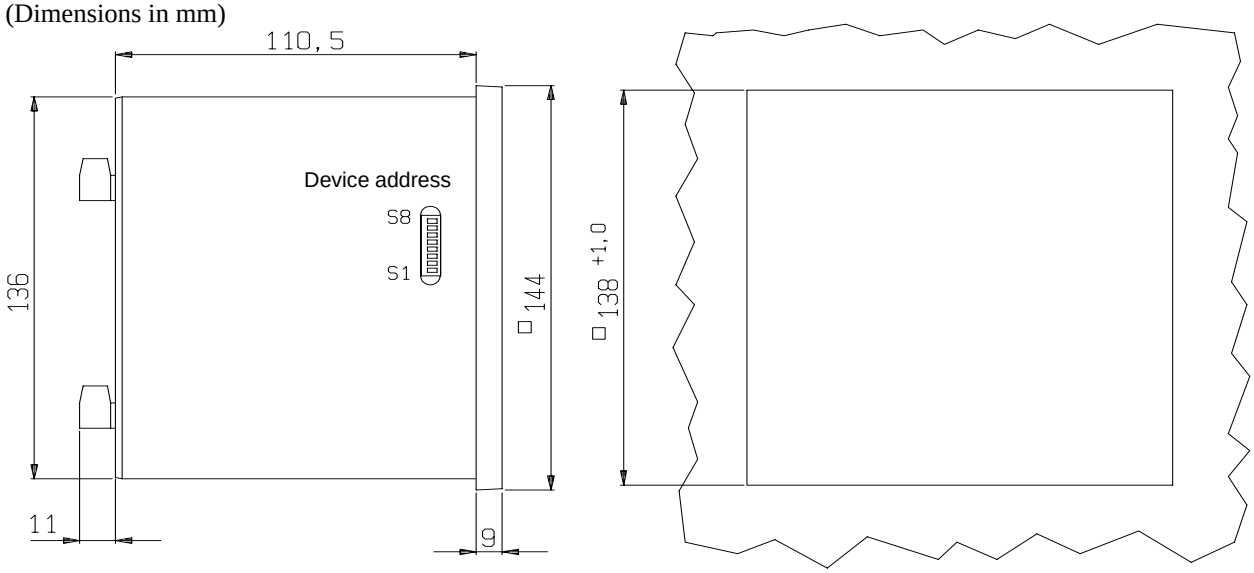
Communication protocol

The communication protocol enables communication to take place between the host system (the PC) and the measuring stations using the master-slave principle, i.e. the measuring stations never transmit independently, only after being called up by the host system. The protocol consists essentially of control characters for beginning and end of protocol, the device address of the selected measuring station, start address and content of desired data and an end of protocol or acknowledge character. It does not use a handshake signal.
All UMGs which are connected on the bus receive the data transmitted from the PC. As soon as the device address has been transmitted, the relevant device starts to answer the message in relation to the required operating mode. The other stations remain passive.

Note: Only stations with different device addresses can be driven from a bus.
A message is only evaluated by the UMG after complete and error-free transmission. The UMG breaks off the connection if it does not receive further characters after 120 ms.

Dimensions

(Dimensions in mm)



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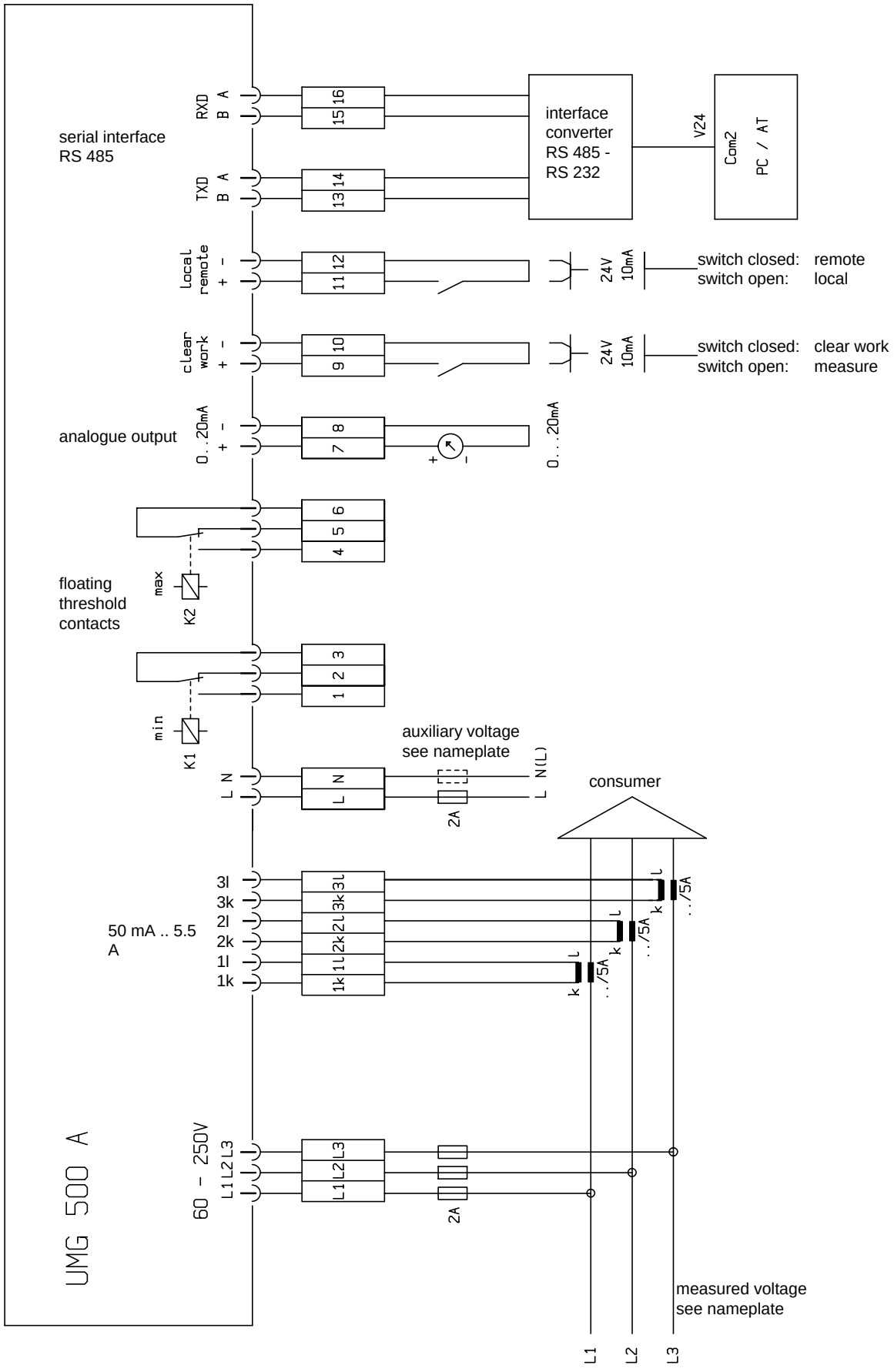
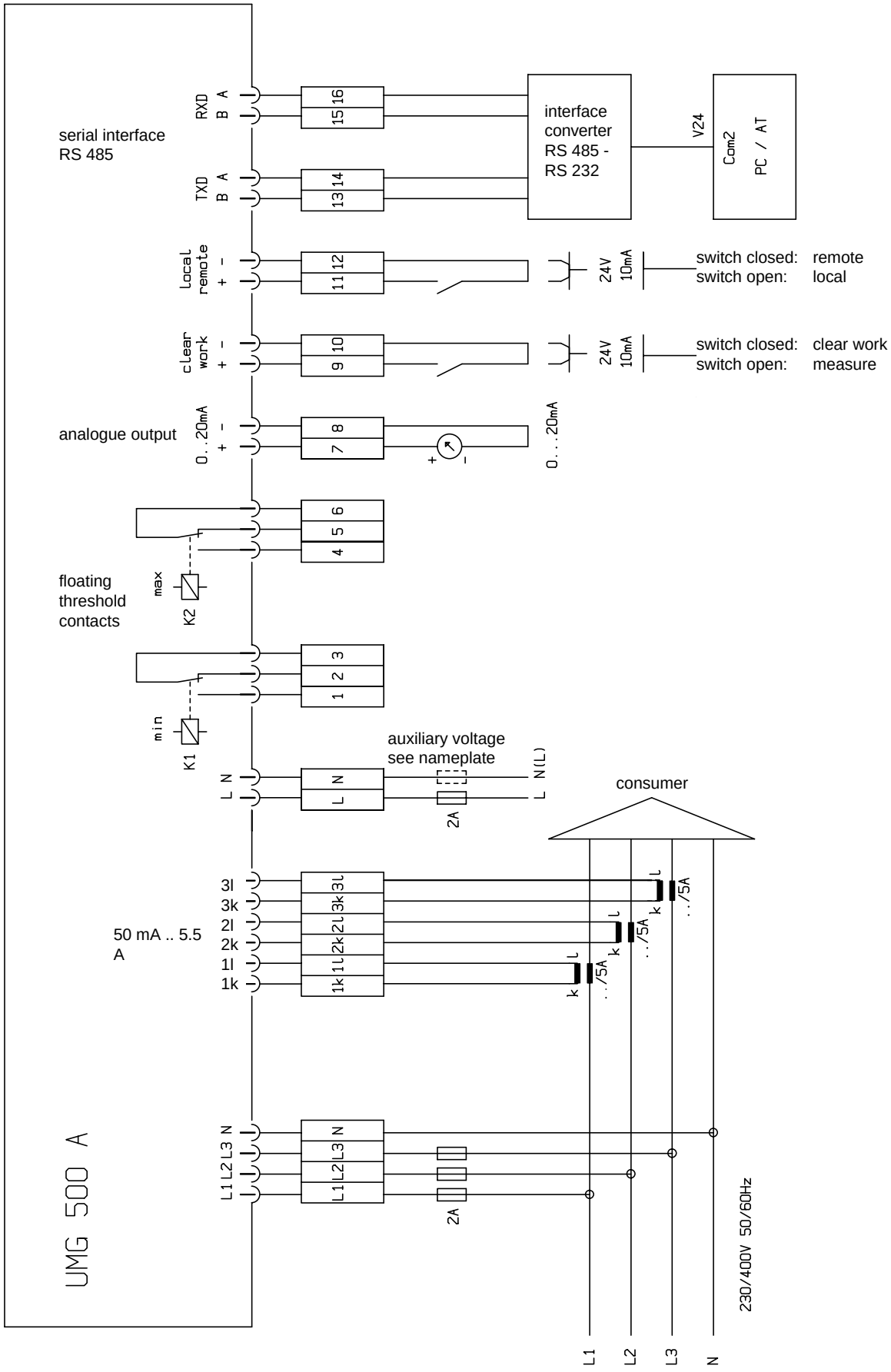
Technical data

Auxiliary voltage:	see nameplate
Mains frequency:	50 Hz / 60 Hz
Power consumption:	approx.. 10 VA
Measuring inputs	
Signal frequency:	45 ... 750 Hz
Voltage paths	
Power consumption:	2.75 VA at 230 V
Nominal measured voltage	
Standard:	U_n = 230 V (80 ... 250 V)
Optional:	Un = 120 V (40 ... 130 V)
Current paths	
Power consumption in each current path:	1.25 VA at 5 A
Nominal measured current	
Standard:	I_n = 5 A (50 mA ... 5.5 A)
Optional:	In = 1 A (10 mA ... 1.1 A)
Continuous rating:	1.2*I_n
Short-time rating:	2.4*I_n (continuous: 5s, interruption with max I_n: 1h)
Analogue output load:	max. 500 Ω
Sampling period:	2 seconds, device shows the average value of 5 samples
Accuracy in relation to full scale value	
V, A, Hz	± 0.5%, ±2 digit
kW, kVA, cos phi, kWh	± 1%, ±5 digit
kvar, kvarh	±1.5%, ±5 digit
Harmonic wave content	± 10%, ±10 digit
Environment	
Operating temperature:	- 10°C ... +45°C
Storage temperature:	- 20°C ... +60°C
Humidity class:	F to DIN 40040 (15 ... 95 % without condensation)
Operating altitude:	0 ... 2000 m above sea level
Rated impulse voltage:	4 kV
Overvoltage category:	III
Test voltage	
Measuring inputs vs. aux. voltage:	2.2 kV
Measuring inputs vs. interface:	2.2 kV
Auxiliary voltage vs. interface:	2.2 kV
Protection class:	II, protection isolation, without protective ground
Standards considered	
EN 61010-1 03.1994	Safety reglementations for electrical measuring, control, regulation and laboratory instruments
EN 55011 06.1992	RFI product standard Group 1, Class B (residential and commercial premises)
EN 50082-2 03.1995	EMC basic standard, part 2: industrial premises
Weight:	1,5 kg
Protection class	
Front:	IP 50
Rear:	IP 20
Attachable screw terminals:	IP 20
Real time clock:	+/- 1 minute / month

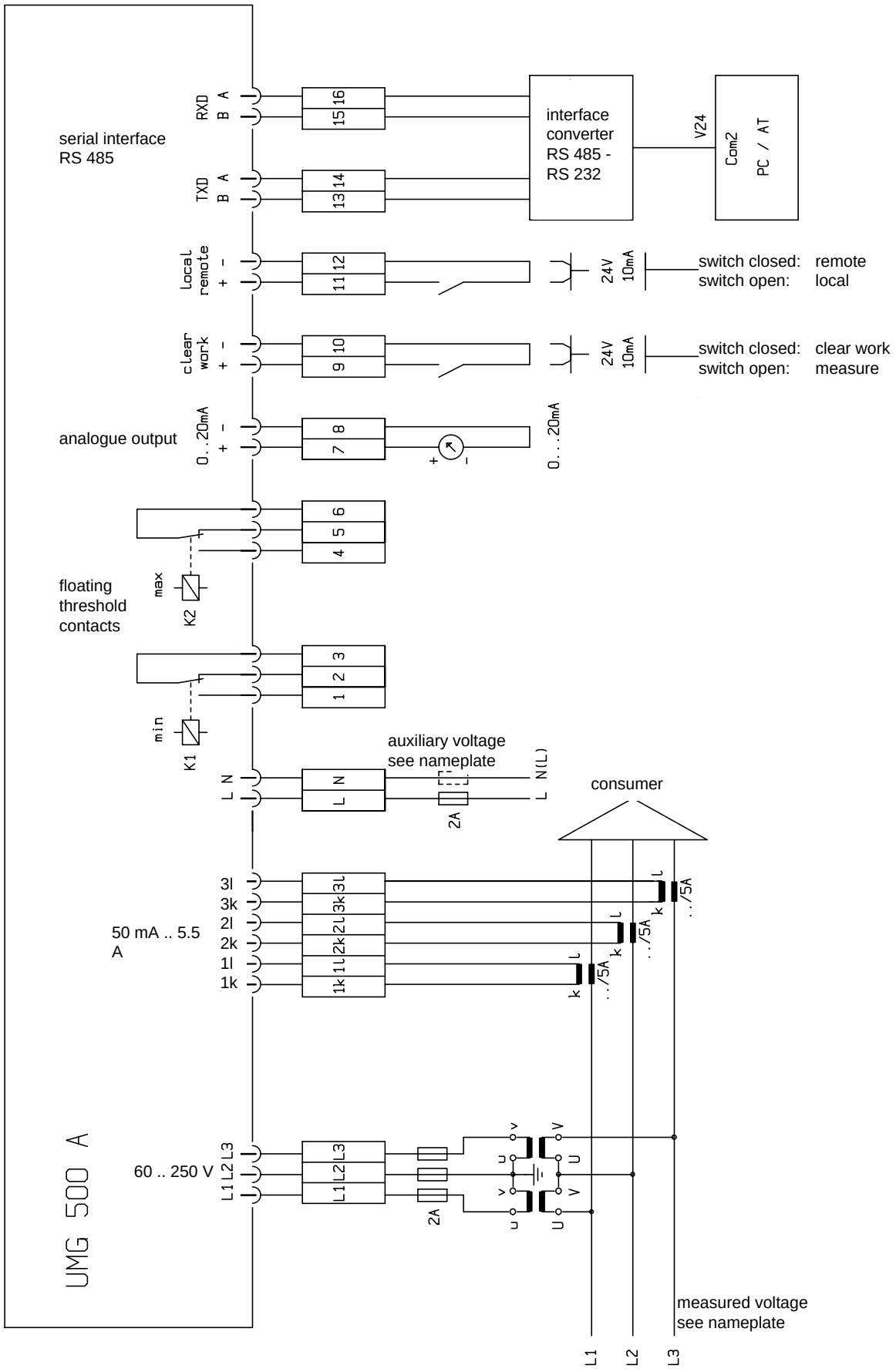
Connection example (3-wire, internal Aron-connection)



Connection example (4-wire)



Connection example (Aron-connection)



Declaration of Conformity

The manufacturer

Janitza electronic GmbH

Vor dem Polstück 1
D-35633 Lahnau
Tel. (0 64 41) 96 42-0
Fax (0 64 41) 96 42-30/-40

herewith confirms that the product

Description:	Universal Measuring Device
Type:	UMG 500A

agrees with the following requirements of the European Community:

EC- Directive: 89/336/EWG (electromagnetic compatibility)
73/23/EWG (low voltage)

Standards considered:

EN 61010-1	03.1994	Safety reglementations for electrical measuring, control, regulation and laboratory instruments The device corresponds to protection class II (without protective ground terminal) and is suited for applications in overvoltage category III and contamination level 2.
EN 55011	06.1992	RFI product standard Group 1, Class B (residential and commercial premises)
EN 50082-2	03.1995	EMC basic standard Part 2: Industrial premises

Lahnau, 21.06.1996

Signature

Markus Janitza