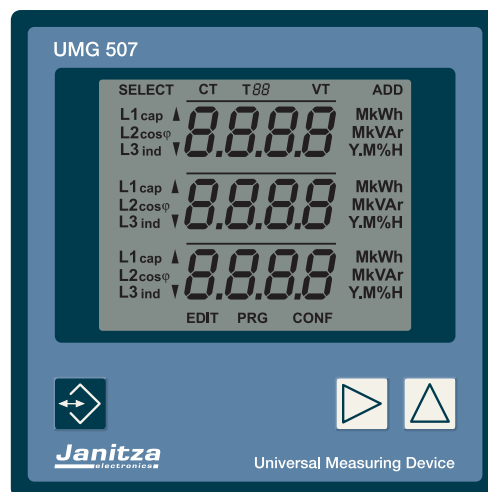


## Universal Measuring Device

# UMG507

### Functional description

UMG507 used as remote data display for external Modbus Slaves



# Generals

The UMG507 supports the protocols Modbus RTU, Modbus TCP/IP, Modbus over TCP/IP (Modbus Gateway) or Profibus DP V0, depending in the version. This functional description is an addition to the manual and describes the configuration of the corresponding function step by step.

More functional descriptions can be found on the CD-ROM PSWbasic/professional. At present, the following functional descriptions are available:

- UMG507 used as remote data display for external Modbus slaves
- OPC Server Port 502
- OPC Server Port 8000 (Modbus Gateway Function)
- The webserver of UMG507
- Description of the storage of UMG507
- Description of Profibus with examples

## Important note

**While using the UMG 507 Modbus Master Mode, please mind the following:**

1. The Modbus slaves must support protocol Modbus RTU (not Modbus ASCII ).
2. The data types of UMG507 must be supported by the slave (short, float etc.).
3. If the register addresses of the slaves can be read subsequently, 64 data arrays are available at UMG507. If not possible, a Modbus channel at UMG 507 must be opened for each Modbus telegram. For that purpose, the UMG507 has 32 channels available.
4. 6 Measured values or process data can be saved by the internal integrators within the ring buffer at maximum.
5. The following baud rates can be set: 9600, 38400, 115000 BAUD.
6. The Modbus Timeout of the slaves can be set individually.

Issue note:

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22.11.2004

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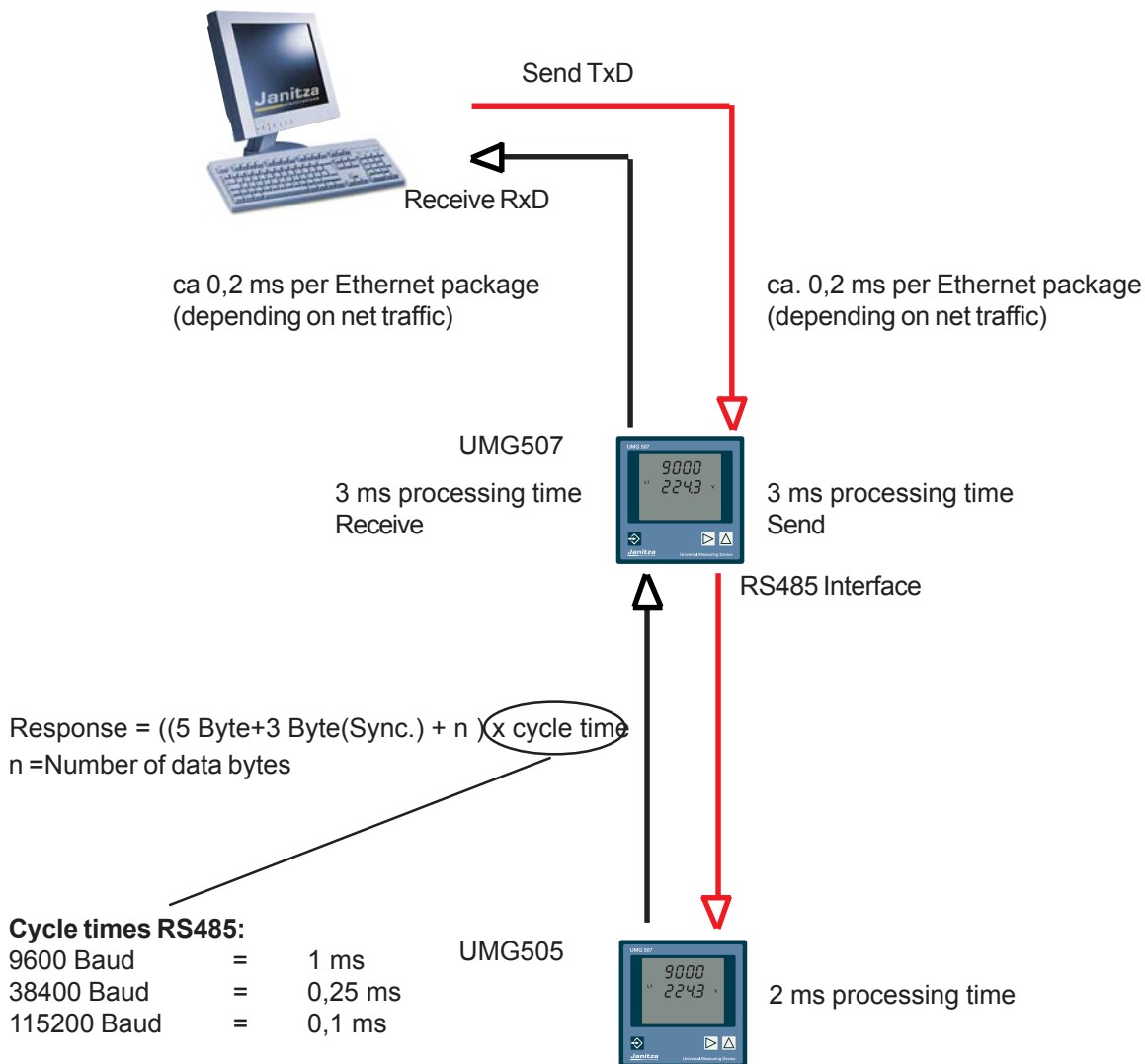
Revised

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## Transmission speed UMG507E/EP

The UMG507 has the following transmission speed in Modbus Master / Gateway mode:



**Example:** All three voltage values of the UMG505 on address 8003 to 8005 (6 Data bytes) shall be read via RS485 interface.

The maximum baud rate of UMG505 is 38400 Baud.

So, the following cycle times will be effected:

Send Ethernet package	=	0,20 ms
Processing time UMG507E/EP send	=	3,00 ms
Request $((8 \text{ Byte} + 3 \text{ Byte}(\text{Sync.})) \times \text{cycle time})$	=	2,75 ms
Processing time UMG505	=	2,00 ms
Response $((5 \text{ Byte} + 3 \text{ Byte}(\text{Sync.}) + n) \times \text{cycle time})$	=	3,50 ms
Processing time UMG507E/EP receive	=	3,00 ms
Receive Ethernet package	=	0,20 ms
Total time	=	14,65 ms

**Result:** In about 15 ms all three voltage values in this telegram are read.

Hint: It is advantageous to read as many measured values as possible in one telegram, rather than with several telegrams. But this is possible only, if the measured values of the slaves are deposited on subsequent register addresses.

Comparison: The reading time of three voltage values in three telegrams is 40,95 ms instead of 15 ms.

# Modbus Master and Modbus Gateway function

The UMG507 can read and display measured values or process data of Modbus devices (also those of other manufacturers) in „Modbus Master Mode“ via RS485 interface, and provide the information to other Modbus slave devices. The measurement or process data can be assigned additionally to logical or mathematical functions, and the result of those operations can be processed on the bus as well. Internal flags or arrays save the data and allow the output via the internal webserver.

The Modbus Gateway functionality additionally provides the possibility to visualize devices without Ethernet connection within Ethernet network. The UMG507E uses the Modbus over TCP/IP protocol for that purpose. A protocol changeover from Modbus/RTU to Modbus TCP/IP however is not possible.

## Data types

The UMG507 uses the following data types in Modbus Master Mode:

### Higbyte before Lowbyte

UMG507 description	Type	Size	Range
float	float	4 Byte	$\pm 3.8 \cdot 10^{-38}$ to $3.4 \cdot 10^{38}$ (floating point format)
short	short	2 Byte	-32768 to 32767
u_short	unsigned short	2 Byte	0 to 65535
int	int	4 Byte	-2147483648 to 2157583647
u_int	unsigned int	4 Byte	0 to 4294967296
char	char	1 Byte	-128 to +127
bit	Bit always reads a complete register (16Bit)		

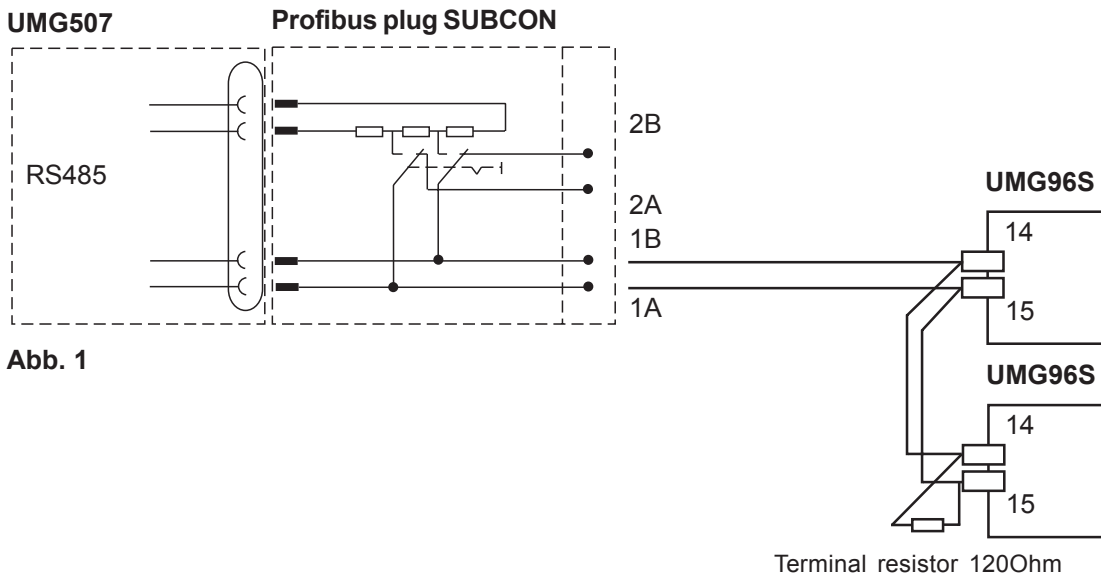
### Lowbyte before Highbyte

UMG507 description	Type	Size	Range
float.l	float	4 Byte	$\pm 3.8 \cdot 10^{-38}$ to $3.4 \cdot 10^{38}$ (floating point format)
short.l	short	2 Byte	-32768 to 32767
u_short.l	unsigned short	2 Byte	0 to 65535
int.l	int	4 Byte	-2147483648 to 2157583647
u_int.l	unsigned int	4 Byte	0 to 4294967296
char.l	char	1 Byte	-128 to +127
bit.l	Bit always reads a complete register (16Bit)		

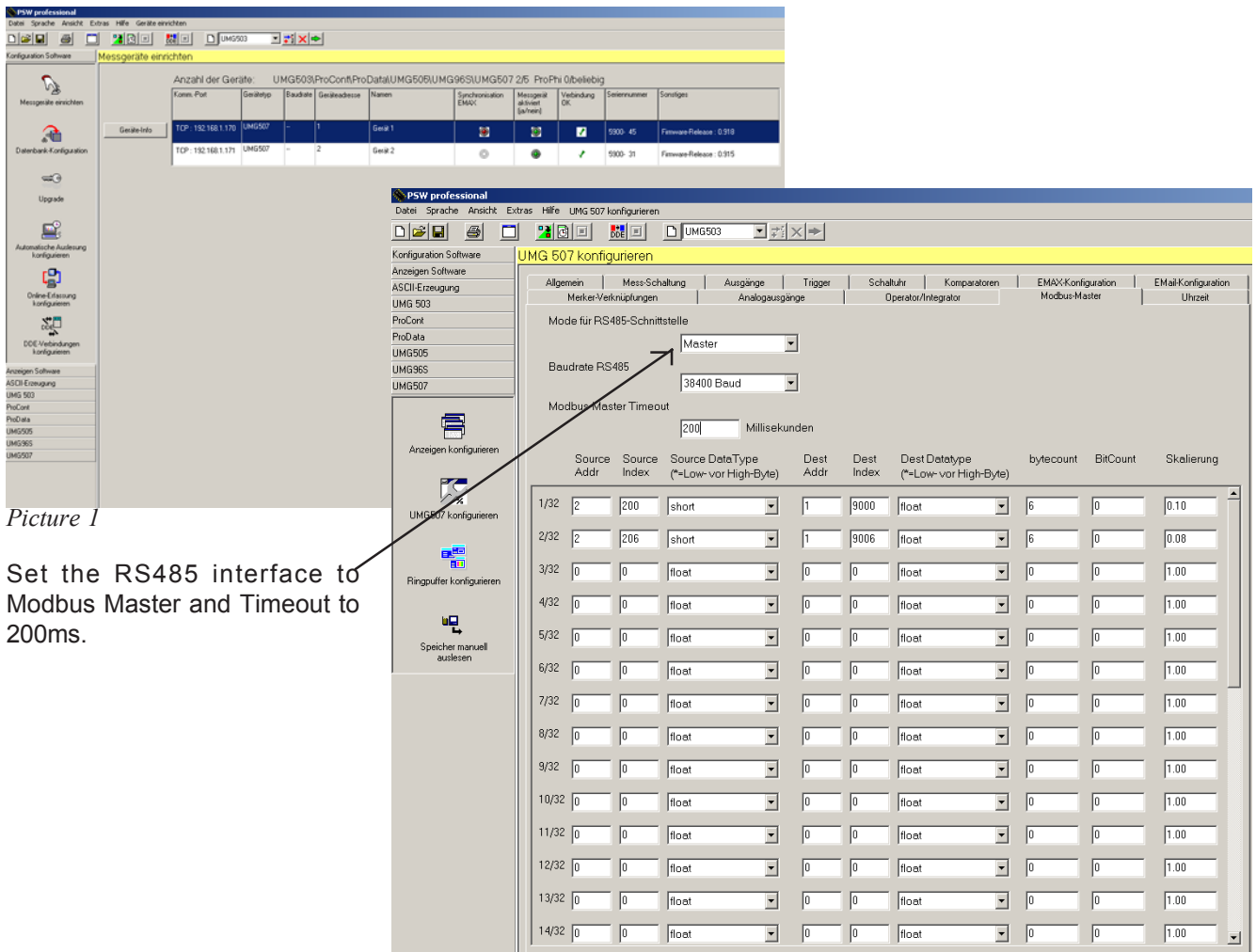
**l = inverted**

## Modbus Master setting / Connection RS485 interface UMG96S

The measured values of connected devices shall be displayed on UMG 507. In this example, the UMG507E/EP serves as remote display for several UMG96S. At first, please connect the UMG96S according to diagram 1 to the RS485 interface of the UMG507.



The following chapters imply, that the measuring device can already be called via Ethernet. Call up the PSW/basic/ professional and open the menu „Modbus Master“.



## Configuration of the Modbus Master channels

The voltages L/N of the UMG96S shall be displayed on UMG507. The UMG507 provides 32 channels in Modbus Master menu. The following inputs are required:

1. Scr. Addr	=	Device address of the slave.
2. Scr. Index	=	Register address of the slave.
3. Scr. Datatype	=	Data type (Short, Float etc.)
4. Dest. Addr	=	Target address.
5. Dest. Index	=	Target register.
6. Dest. Datatype	=	Data type of target register.
7. Bytecount	=	Number of bytes to read.
8. Bitcount	=	Anzahl der auszudekodierenden Datenbits.
6. Scaling	=	Skalierung.

The register address and the corresponding data type can be found in the manual of UMG96S. In this example, the target address is the internal data range of the UMG507E/EP. The data range begins at register address 9000 and ends at register address 9126 (see address list on CD-ROM). These are data arrays of the type Float. The step is always 2 (9000, 9002 etc.). The following parameters must be set in menu Modbus Master:

1. Scr. Addr =	2	-->	Device address of UMG96S.
2. Scr. Index =	200	-->	Register address according to manual UMG96S.
3. Scr. Datatype=	short	-->	Data type is integer. In case of UMG96S, the range is -32768 to 32767. This corresponds to the range short in UMG507E/EP (see data types).
4. Dest Addr =	1	-->	Device address of UMG507E/EP.
5. Dest Index=	9000	-->	The free data range starts with register address 9000.
6. Dest Datatype=	float	-->	The target register is of the type Float.
7. Bytecount =	6	-->	Read all three voltage values.
8. Bitcount =	0	-->	No data bits shall be decoded.
9. Scaling =	*0,1	-->	The transmission value must be divided by 10.

**Important: Set the timeout of UMG96S to 200ms.**

### Description Bytecount / Bitcount :

The UMG96S contains the voltage values on the following register addresses (see manual):

Voltage L1/N =	Register address: 200	Unit V /solution 0.1V /	Byte = 2
Voltage L2/N =	Register address: 201	Unit V /solution 0.1V /	Byte = 2
Voltage L3/N =	Register address: 202	Unit V /solution 0.1V /	Byte = 2

— Bytecount = 6

As the voltage values are deposited on subsequent register addresses, it is not necessary to open a new Modbus Master channel for each phase. It is sufficient to set the number of the bytes to read. As each register address needs two bytes, the byte count must be set to 6. The measured values can be found from address 9000.

9000 = Voltage Phase L1 ; 9002 = Voltage Phase L2 ; 9004 = Voltage Phase L3.

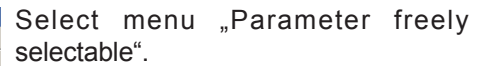
Via the Bitcount, the number of decoded Bits is set. While setting zero, no Bits are decoded.

With the parameter „Scaling“, the measured value can be scaled. The UMG96S delivers for example the transmission value 2330V as integer format with a solution of 0.1V. To achieve the corresponding measured value, the transmission value must be multiplied by the factor 0.1V.

The UMG96S provides the current in integer format with the unit „mA“. The solution is 1 mA. The transmission value must be scaled with the current transformer ratio and divided by 1000.

**Example:** The current transformer is set to 400/5A at UMG96S, the ratio therefore is 80. The scaling must be set to „0.08“ (80/1000), so the current will be indicated correctly at UMG507.

The 200 displays of the UMG507 can be configured individually. Move to menu „Display configuration“ in PSWbasic/professional and assign the register addresses 9000 to 9010 to the displays. The measured values of the UMG96S are displayed on UMG507E/EP afterwards.



Set register address, unit and phase, which shall be indicated on display. Picture 5 shows the finished configuration. Please send the display setting to the UMG507E/EP finally.



The single displays can be reached by the key 2 and 3:

