

# Voltage Transducer

UMT516 / MT516



**CLASS  
0.2**

**RS<sup>232</sup>  
485**

  
**USB 2.0**

  
**ETHERNET**

- ***True RMS AC voltage measurements***
- ***Voltage auto range measurements up to 600V<sub>#</sub>***
- ***Wide frequency measurement range 16 – 400 Hz***
- ***High accuracy class 0.2 (IEC-688),  
0.1 on communication***
- ***Serial or Ethernet and USB communication***
- ***Up to two I/O modules (analogue out, alarm out,  
digital out, digital in)***
- ***Powerful analogue out; 6 voltage and current ranges,  
non-linear characteristics...***
- ***User friendly PC setting software***

**CE**



## PROPERTIES

- **Measurements of true RMS voltage, frequency THD U and MD**
- **High accuracy class 0.2 (IEC-688)**
- **Frequency range from 16 Hz to 400 Hz**
- **16 adjustable alarms**
- **RS 232/RS 485 communication up to 115,200 bit/s or USB communication or Ethernet and USB communication simultaneously**
- **MODBUS communication protocol**
- **Up to 2 inputs or outputs (analogue outputs, digital inputs, alarm outputs, digital outputs)**
- **Universal power supply (two voltage ranges)**
- **Automatic range of nominal voltage (max. 600 V<sub>L-N</sub>)**
- **Housing for DIN rail mounting**
- **User-friendly PC MiQen software**

## DESCRIPTION

(U)MT516 is intended for measuring and monitoring single-phase electrical power network. Voltage input is electrically isolated from the system by means of high resistive input chain. It measures true RMS voltage value by means of fast sampling of voltage signals, which makes instruments suitable for acquisition of transient events. A built-in microcontroller calculates measurands (voltage, frequency, THD U, MD) from the measured signals. Measurands can be then converted into load independent DC current or voltage which is proportional to the true RMS measured value for the purpose of regulation of analogue and/or digital devices.

## COMPLIANCE WITH STANDARDS:

Standard EN	Description
61 010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
60 688	Electrical measuring transducers for converting AC electrical variables into analogue and digital signals
61000-6-2	Electromagnetic compatibility (EMC) – Immunity for industrial environments
61000-6-4	Electromagnetic compatibility (EMC) – Emission standard for industrial environments
60 529	Degrees of protection provided by enclosures (IP code)
60 068-2-1/ -2/ -6/ -27/-30	Environmental testing (-1 Cold, -2 Dry heat, -30 Damp heat, -6 Vibration, -27 Shock)
UL 94	Tests for flammability of plastic materials for parts in devices and appliances

Table 1: List of applicable standards

## APPLICATION

The (U)MT516 voltage transducer is used for a permanent monitoring of a single-phase voltage and frequency values. Wide range of various I/O modules makes (U)MT516 a perfect choice for numerous applications. (U)MT516 is delivered configured to default values. Subsequent customer configuration is possible with user friendly setting software MiQen.. (U)MT516 supports a wide range of communication interfaces. Standard serial RS232/485 with speed up to 115200 baud is perfect for simple applications and serial bus interfacing. Ethernet 10/100 is ideal for a long distance monitoring and configuration of numerous transducers. USB 2.0 can be used for a fast set-up or memory acquisition.

## TECHNICAL DATA

### MEASUREMENT INPUT <sup>①</sup>

Nominal frequency range	50, 60 Hz
Measuring frequency range	16–400 Hz (max. 1000 Hz)

### Voltage measurements:

Nominal value ( $U_N$ )	57.7...500 $V_{LN}$
Max. measured value (cont.)	600 $V_{LN}$
Max. allowed value (acc. to IEC/EN 60 688)	$2 \times U_N$ ; 10 s
Consumption	$U^2 / 4.2M\Omega$
Input impedance	4.2M $\Omega$

### System:

Voltage inputs can be connected either directly to low-voltage network or via a high-voltage transformer to high-voltage network.

### BASIC ACCURACY UNDER REFERENCE CONDITIONS

#### Total accuracy (measurements and analogue output) according to IEC/EN 60 688

Accuracy is presented as percentage of reading of the measurand except when it is stated as an absolute value.

Measurand	Accuracy ( $\pm\%$ of reading)	
Voltage Rms	0.2	0.1 <sup>(1)</sup>
Frequency (f)	10 mHz	
THD(U) (0...400 %)	0.5	

<sup>(1)</sup> On communication

### COMMUNICATION

(U)MT516 has a wide variety of communication possibilities to suit specific demands. It is equipped with two standard communication ports (COM1A and COM1B). This allows different users to access data from a device simultaneously and by using ethernet communication, data can be accessed worldwide.

Different configurations are possible (to be specified with order).

Configuration	COM1A	COM1B
1	RS232/485	/
2	RS232/485	/
3	USB	/
4	USB	/
5 <sup>(1)</sup>	Ethernet	USB
6 <sup>(1)</sup>	Ethernet	USB

<sup>(1)</sup> Galvanic separation between COM1A and COM1B is 1 kV<sub>ACRMS</sub>

Table 2: List of communication configurations

Serial communication:	RS232 <sup>(1)</sup>	RS485 <sup>(1)</sup>
Connection type	Direct	Network
Connection terminals	DB9 <sup>(1)</sup>	screw terminals <sup>(1)</sup>
Function	Settings, measurements and records acquisition, firmware upgrade	
Insulation	Protection class I, 3.3 kV <sub>ACRMS</sub> 1 min	
Max. connection length	3 m	1000 m
Transfer mode	Asynchronous	
Protocol	MODBUS RTU	
Transfer rate	2.4 kBaud to 115.2 kBaud	
Number of bus stations	/	$\leq 32$

<sup>(1)</sup> Both types of comm. are available but only one at a time

### Ethernet:

Connection type	Network
Connection terminals	RJ-45
Function	Settings, measurements and records acquisition, firmware upgrade
Insulation	Protection class I, 3.3 kV <sub>ACRMS</sub> 1 min
Transfer mode	Asynchronous
Protocol	MODBUS TCP
Transfer rate	10/100Mb/s autodetect

### USB:

Connection type	Direct
Connection terminals	USB-B
Function	Settings, measurements and records acquisition, firmware upgrade
Insulation	Protection class I, 3.3 kV <sub>ACRMS</sub> 1 min
Transfer mode	Asynchronous
Protocol	MODBUS RTU
Transfer rate	USB 2.0

## INPUT / OUTPUT MODULES

(U)MT516 is equipped with two multipurpose input/output slots. The following modules are available:

Alarm (digital) output	2 outputs	any I/O
Analogue output	2 outputs	any I/O
Digital input	2 inputs	any I/O

### Analogue output

Each of up to two analogue outputs is fully programmable and can be set to any of 6 hardware ranges, 4 current and 2 voltage, without opening an instrument. They all use the same output terminals.

#### Programmable DC current output:

Output range values -100...0...100%

-1...0...1 mA	Range 1
-5...0...5 mA	Range 2
-10...0...10 mA	Range 3
-20...0...20 mA	Range 4
other ranges possible	by MiQen software

Burden voltage	10 V
External resistance	$R_{Bmax} = 10 \text{ V} / I_{outN}$

#### Programmable DC voltage output:

Output range values -100...0...100%

-1...0...1 V	Range 5
-10...0...10 V	Range 6
other ranges possible	by software

Burden current	5 mA
External resistance	$R_{Bmin} = U_{outN} / 5 \text{ mA}$

#### General:

Linearization	Linear, Quadratic
No. of break points	5
Output value limits	$\pm 120\%$ of nominal output
Response time (measurement and analogue output)	< 100 ms
Residual ripple	< 0.5 % p.p.

The outputs 1 and 2 may be either short or open-circuited. They are electrically insulated from each other (500 VAC<sub>rms</sub>) and from all other circuits (3320 VAC<sub>rms</sub>).

All output range values can be altered subsequently (zoom scale) using the setting software, but a supplementary error results (see INTRINSIC ERROR).

### Alarm (digital) output

Type	Relay switch
Rated voltage	48 V AC/DC (+40% max)
Max. switching current	200 mA
Contact resistance	$\leq 100 \text{ m}\Omega$ (100 mA, 24V)
Impulse	Max. 4000 imp/hour Min. length 100 ms
Insulation voltage	
Between coil and contact	4000 VDC
Between contacts	1000 VDC

### Digital input

Rated voltage	48 V AC/DC (+ 40% max)
Max. current	< 1.5 mA
Min. signal width	20 ms
Min. pause width	40 ms
SET voltage	40...120 % of rated voltage
RESET voltage	0...10 % of rated voltage

## UNIVERSAL POWER SUPPLY


#### Standard (high):

Nominal voltage AC	80 ... 276 V
Nominal frequency	40 ... 65 Hz
Nominal voltage DC	70 ... 300 V
Consumption	< 5VA
Power-on transient current	< 20 A ; 1 ms

#### Optional (low):

Nominal voltage AC	48 ... 77 V
Nominal frequency	40 ... 65 Hz
Nominal voltage DC	19 ... 70 V
Consumption	< 5VA
Power-on transient current	< 20 A ; 1 ms

### SAFETY:

Protection:	protection class I (protective earth terminal due to touchable metal parts (USB-B, RJ-45, DB9), current limiting fuse 1A on aux. supply) High impedance voltage inputs Double insulation for I/O ports and COM1 port
	
Pollution degree	2
Installation category	CAT III ; 600 V <sub>#</sub> meas. inputs CAT III ; 300 V <sub>#</sub> aux. supply Acc. to EN 61010-1
Test voltages	$U_{AUX\leftrightarrow I/O}$ , COM1: 2210 VAC <sub>rms</sub> $U_{AUX\leftrightarrow U}$ inputs: 3320 VAC <sub>rms</sub> U inputs $\leftrightarrow$ I/O, COM1: 3320 VAC <sub>rms</sub> U inputs $\leftrightarrow$ I inputs: 3320 VAC <sub>rms</sub>
Enclosure material	PC/ABS
Enclosure protection	Acc. to UL 94 V-0 IP 40 (IP 20 for terminals)

### MECHANICAL

Dimensions	100 × 127 × 75 mm
Mounting	Rail mounting 35 × 15 mm acc. to DIN EN 50 022
Enclosure material	PC/ABS, PC (sliding cover)
Flammability	Acc. to UL 94 V-0
Weight	375 g

### AMBIENT CONDITIONS:

Ambient temperature	usage group II 0...15...30...45 °C Acc. to IEC/EN 60 688
Operating temperature	-30 to +70 °C (2x rated class)
Storage temperature	-40 to +70 °C
Average annual humidity	$\leq 93\%$ r.h.

## INTRINSIC-ERROR (FOR ANALOGUE OUTPUTS):

For intrinsic-error for analogue outputs with bent or linear-zoom characteristic multiply accuracy class with correction factor (c). Correction factor c (the highest value applies):

Linear characteristic

$$c = \frac{1 - \frac{y_0}{y_e}}{1 - \frac{x_0}{x_e}} \quad \text{or} \quad c = 1$$

Bent characteristic

$$x_{b-1} \leq x \leq x_b$$

b – number of break point (1 to 5)

$$c = \frac{y_b - y_{b-1}}{x_b - x_{b-1}} \cdot \frac{x_e}{y_e} \quad \text{or} \quad c = 1$$

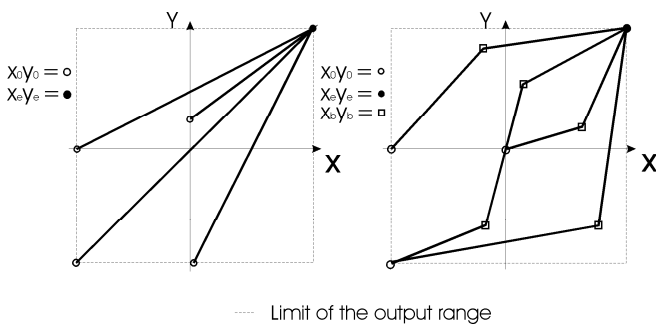


Fig 2: Examples of settings with linear and bent characteristic

## ALARMS

(U)MT516 supports recording and storing of 16 alarms in four groups. A time constant of maximal values in a thermal mode, a delay time and switch-off hysteresis are defined for each group of alarms.

## MiQen - SETTING AND ACQUISITION SOFTWARE

MiQen software is intended for supervision of (U)MT516 and many other instruments on a PC. Network and the transducer setting, display of measured and stored values and analysis of stored data in the transducer are possible via the serial, Ethernet or USB communication. The information and stored measurements can be exported in standard Windows formats. Multilingual software functions on Windows 98, 2000, NT, XP operating systems.

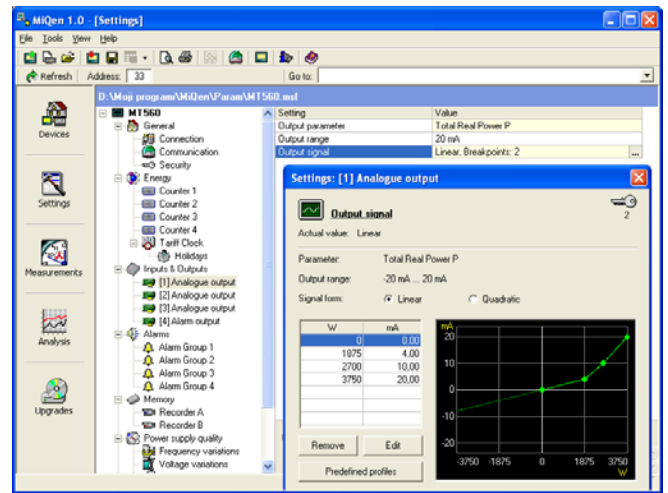
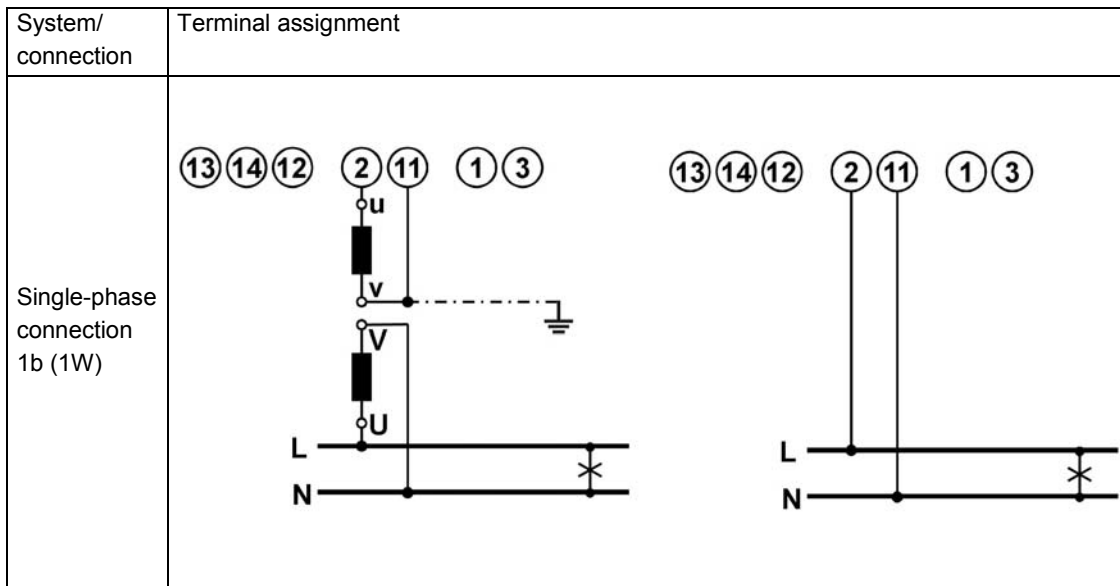


Fig 3: MiQen setting and acquisition software

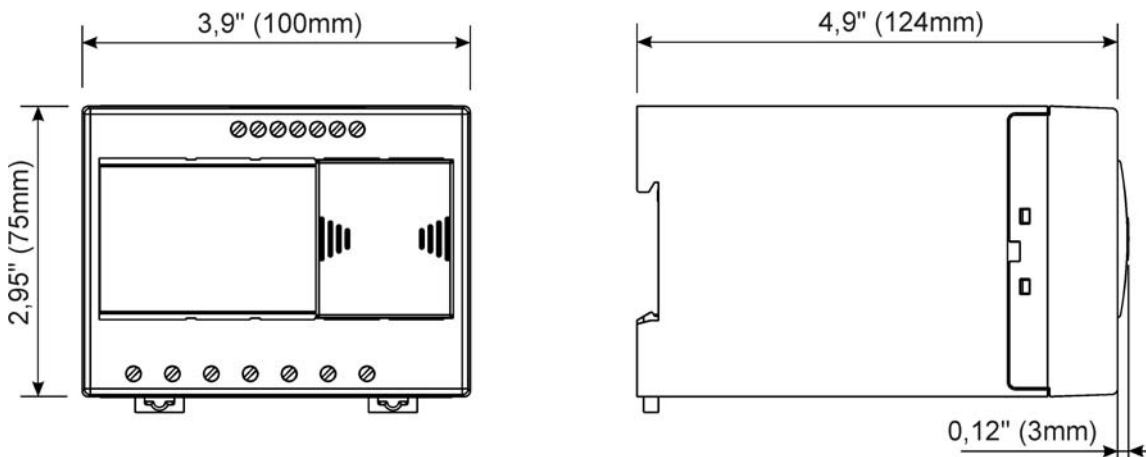
MiQen software is intended for:

- Setting all of the instruments parameters (online and offline)
- Viewing current measured readings and stored data
- Complete I/O modules configuration
- Upgrading instruments firmware
- Searching the net for devices
- Virtual interactive instrument
- Comprehensive help support

## CONNECTION



## DIMENSIONAL DRAWING



## CONNECTION TABLE

Function		Connection	
Measuring input:	AC voltage	1/3	
		UL1	2
		N	11
I/O			
Inputs / outputs:	Module 1	⊕	15
		⊖	16
	Module 2	⊕	17
		⊖	18
Auxiliary power supply:			
+ / AC (L)		13	
- / AC (N)		14	
GROUND		12	
Communication:	RS485	Rx / A	23
		NC	24
		Tx / B	25

Table 4: Connections

## DATA FOR ORDERING

### (U)MT516:

The following data shall be stated:

Type of a transducer  
Type of power supply  
Type of communication  
Type of I/O module(s)

### Supplement:

MiQen software

## ORDERING

When ordering (U)MT516, all required specifications should be stated in compliance with the ordering code. Additional information could be stated regarding functionality of analogue outputs. Default settings for analogue outputs provided that no ordering information is given will be:

Analogue output	Input quantity	Output quantity
AO1	U1 (0...500)V	0...20 mA
AO2	f (45...65)Hz	0...20 mA

If different analogue output settings are required, a proper input quantity / output quantity pair for each analogue output should be provided.

The transducers automatic range of input voltage (500 V<sub>L-N</sub>) is not stated in the code.

### EXAMPLE OF ORDERING:

UMT516 voltage transducer is connected to secondary phase voltage up to 500 V<sub>L-N</sub>. A universal HI supply is built-in the transducer. RS 232/RS 485 communication, one alarm output one analogue output are applied.

Ordering code:

UMT516 – 1 1 1 2

### Dictionary:

RMS	Root Mean Square
PF	Power factor
THD	Total harmonic distortion
Ethernet	IEEE 802.3 data layer protocol
MODBUS	Industrial protocol for data transmission
MiQen	ISKRA setting and acquisition Software
AC	Alternating quantity

## GENERAL ORDERING CODE

All specifications are obligatory except function of analogue output(s), which should be stated in a form of description.

### Transducer type

(U)MT516

#### 1. Power supply

1	universal high
2	universal low

#### 2. Communication (COM1)

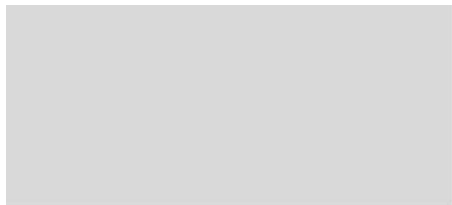
1	RS232/485
2	USB
3	Ethernet + USB

#### 3. I/O modul 1

0	Without
1	Alarm (digital) output
2	Analogue output
3	Digital input

#### 4. I/O modul 2

0	Without
1	Alarm (digital) output
2	Analogue output
3	Digital input



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