Power Transducer

UMT510 / MT510

Power Transducer & Recorder

UMT511 / MT511

Iskra MIS

CLASS 0.2

RS 232 485

USB 2.0

ETHERNET

FLASH 8 MB

- ***All single phase AC network measurements (U, I, P, Q, S, f, cosφ, energy, THD, MD)***
- ***Voltage and current auto range measurements up to 600$V_{\#}$, 12.5A***
- ***Wide frequency measurement range 16 – 400 Hz***
- ***Power accuracy class 0.2 (IEC-688)***
- ***Serial or Ethernet and USB communication***
- ***8MB flash internal memory; (U)MT511 only***
- ***Up to two I/O modules (analogue out, alarm out, pulse out, digital in, digital out)***
- ***Powerful analogue out; 6 voltage and current ranges, non-linear characteristics…***
- ***User friendly PC setting software***

CE

PROPERTIES

- **Measurements of instantaneous values of all single phase values; U, I, P, Q, S, f, φ, energy, THD U, THD I, MD**
- **Power accuracy class 0.2**
- **Recording of up to 8 measurands and 16 alarms in the internal memory (8 MB flash); (U)MT511 only**
- **16 adjustable alarms**
- **Frequency range from 16 Hz to 400 Hz**
- **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 (digital) outputs, pulse outputs)**
- **Universal power supply (two voltage ranges)**
- **Automatic range of nominal current and voltage (max. 12.5 A and 600 V_{L-N})**
- **Housing for DIN rail mounting**
- **User-friendly PC MiQen software**

DESCRIPTION

(U)MT510/511 are intended for measuring and monitoring single-phase electrical power network. Input voltage and input current are electrically isolated from the system by means of high resistive input chain and current transformer respectively. It measures true RMS values by means of fast sampling of voltage and current signals, which makes instruments suitable for acquisition of transient events. A built-in microcontroller calculates measurands (voltage, current, frequency, energy, power, power factor, power angles, THD U, THD I, MD) from the measured signals.

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
62 053−21,22, 23	Electricity metering equipment – Particular requirements
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)MT510/511 power transducer and recorder is used for a permanent monitoring of most of the single-phase AC-network values. Records are stored in the internal memory for the period of the last three years. Wide range of various I/O modules makes (U)MT510/511 a perfect choice for numerous applications. (U)MT510/511 is delivered configured to default values. Subsequent customer configuration is possible with user friendly setting software MiQen. (U)MT510/511 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 ω

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

Current measurements:

Nominal value (I_N)	0.31…5 A
Max. measured value	12.5 A sinusoidal
Max. allowed value (thermal)	15 A cont.
(acc. to IEC/EN 60 688)	20 × I_N ; 5 × 1s
Consumption	I^2 × 0.01Ω

Voltage measurements:

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

System:

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

Current inputs can be connected either directly to low-voltage network or shall be connected to network via a corresponding current transformer (with standard 1 A or 5 A outputs).

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 (±% of reading)	
Current Rms	0.2	0.1[3]
Voltage Rms	0.2	0.1[3]
Power (P, Q, S)	0.2	0.15[3]
Power factor (PF)	0.1°	
Frequency (f)	10 mHz	
angle (φ)	0.1°	
THD(U), THD(I) (0…400 %)	0.5	
Active energy	Class 1	0.5S[1]
Reactive energy	Class 2	0.5[1]
Real time clock (RTC)[2]	1 min/month	

[1] Optional
[2] (U)MT511 only
[3] On communication

COMMUNICATION

(U)MT510/511 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[1]	Ethernet	USB
6[1]	Ethernet	USB

[1] Galvanic separation between COM1A and COM1B is 1 kV_{ACRMS}

Table 2: List of communication configurations

Serial communication:	RS232[1]	RS485[1]
Connection type	Direct	Network
Connection terminals	DB9[1]	screw terminals[1]
Function	Settings, measurements and records acquisition, firmware upgrade	
Insulation	Protection class I, 3.3 kV_{ACRMS} 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	/	≤ 32

[1] 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_{ACRMS} 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_{ACRMS} 1 min
Transfer mode	Asynchronous
Protocol	MODBUS RTU
Transfer rate	USB 2.0

INPUT / OUTPUT MODULES

(U)MT510/511 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
Pulse 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 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 mA

General:

Linearization	Linear, Quadratic
No. of break points	5
Output value limits	± 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 VACrms) and from all other circuits (3320 VACrms).

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	≤ 100 mΩ (100 mA, 24V)
Impulse	Max. 4000 imp/hour Min. length 100 ms
Insulation voltage	
Between coil and contact	4000 VDC
Between contacts	1000 VDC

Pulse output

Type	Solid state
Max. voltage	40 V AC/DC
Max. current	30 mA (R_{ONmax} = 8Ω)
Pulse length	programmable 2…1000 ms

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: τ ⏚	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 $V_{\#}$ meas. inputs CAT III ; 300 $V_{\#}$ aux. supply Acc. to EN 61010-1
Test voltages	U_{AUX}↔I/O, COM1: 2210 VAC_{rms} U_{AUX}↔U, I inputs: 3320 VAC_{rms} U, I inputs↔I/O, COM1: 3320 VAC_{rms} U inputs↔I inputs: 3320 VAC_{rms}
Enclosure material	PC/ABS Acc. to UL 94 V-0
Enclosure protection	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	≤ 93% r.h.

AUXILIARY BATTERY; (U)MT511 ONLY

A built-in auxiliary battery enables the clock operation and recording the measurements in the memory with the time flag. The battery shall be replaced by the authorised service.

Type	CR2032 Li-battery
Nominal voltage	3 V
Life span	approx. 6 years (typical 23°C)

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

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

Bent characteristic

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

b – number of break point (1 to 5)

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

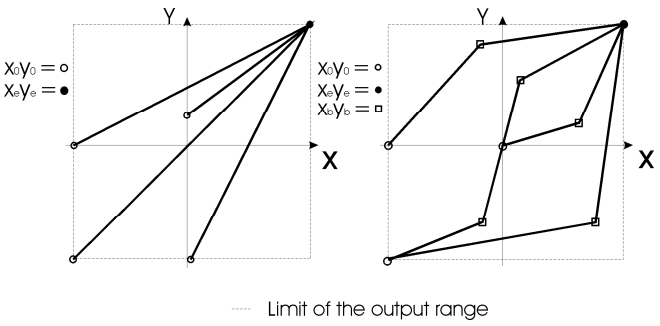


Fig 2: Examples of settings with linear and bent characteristic

RECORDER

A built-in recorder (8Mb) enables storing measurements and detected alarms; (U)MT511 only.

ALARMS

(U)MT510/511 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)MT510/511 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.

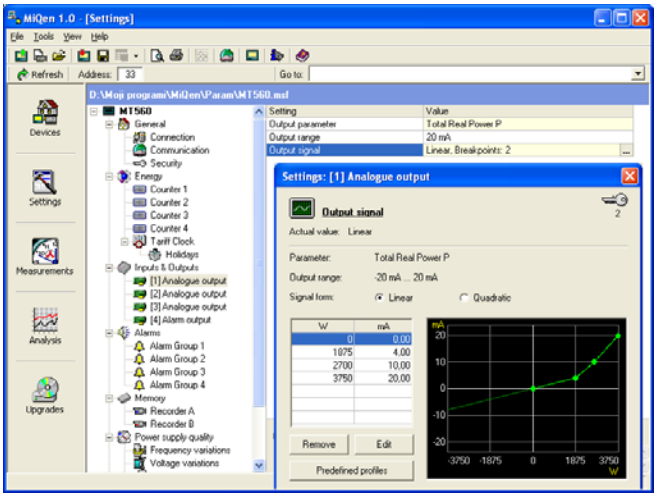
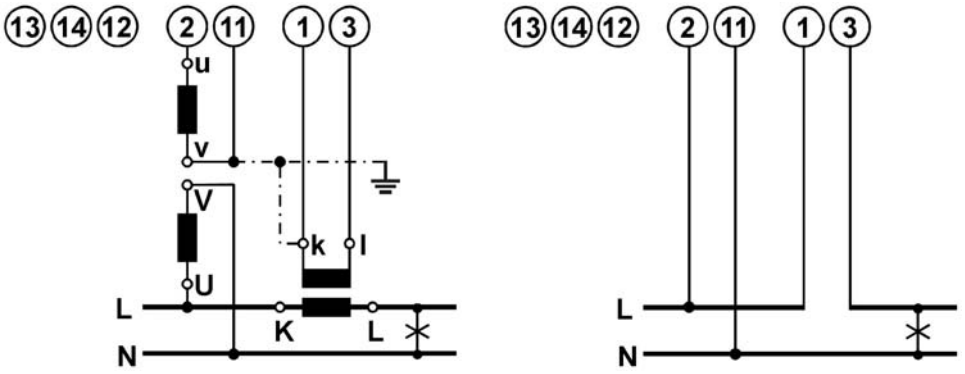


Fig 3: MiQen setting and acquisition software

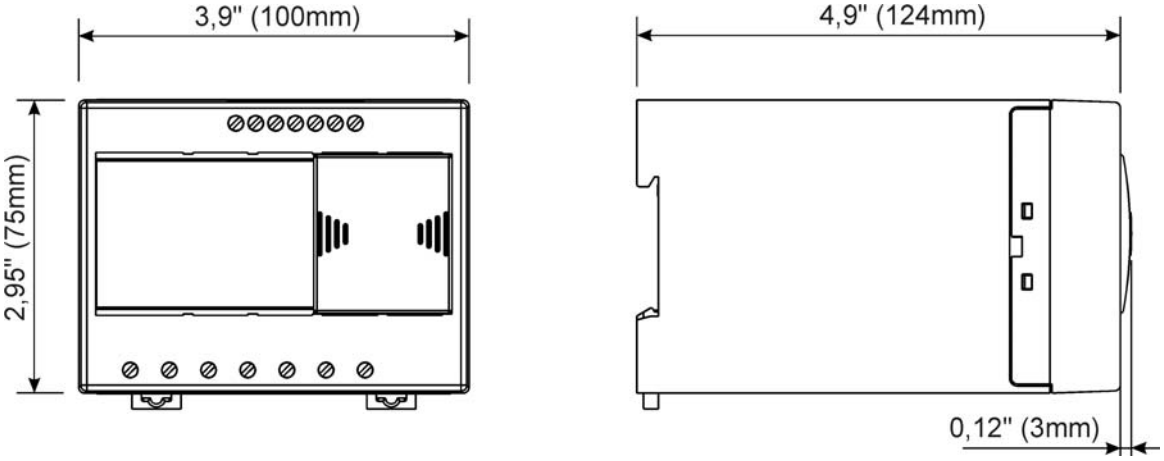
MiQen software is intended for:

- Setting all of the instruments parameters (online and offline)
- Viewing current measured readings and stored data
- Setting and resetting energy counters; (U)MT511 only
- Complete I/O modules configuration
- Upgrading instruments firmware
- Searching the net for devices
- Virtual interactive instrument
- Comprehensive help support

CONNECTION

System/ connection	Terminal assignment
Single-phase connection 1b (1W)	

DIMENSIONAL DRAWING



CONNECTION TABLE

Function			Connection
Measuring input:	AC current	IL1	1/3
	AC voltage	UL1	2
		N	11
		I/O	
Inputs / outputs:	Module 1	ϖ+	15
		ϖϑ	16
	Module 2	ϖ+	17
		ϖϑ	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)MT510/511:

The following data shall be stated:
Type of a transducer
Type of power supply
Type of communication
Type of I/O module(s)
Required energy accuracy

Supplement:

MiQen software

ORDERING

When ordering (U)MT510/511, 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	P1 (-2500...0...2500)W	-20...0...20 mA
AO2	Q1 (-2500...0...2500)var	-20...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 current (5 A) and voltage (500 V_{L-N}) is not stated in the code.

EXAMPLE OF ORDERING:

UMT511 power transducer and recorder is connected to secondary phase voltage up to 500 V_{L-N} and 5 A secondary current. A universal HI supply is built-in the transducer. RS 232/RS 485 communication, one alarm output and one analogue output are applied.

Ordering code:
UMT511 − 1 1 1 2

Dictionary:

RMS	*Root Mean Square*
PA	*Power angle (between current and voltage)*
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*
RTC	*Real Time Clock*

GENERAL ORDERING CODE

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

Transducer type

UMT510
UMT511

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	Pulse output
4	Digital input

4. I/O modul 2

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

TÜV SÜD Management Service

CE

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