Multifunction Meter
MC744

Network Recorder
MC754

Network Analyser
MC764

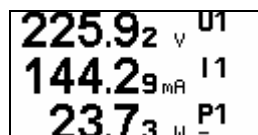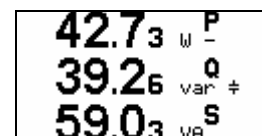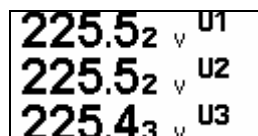**⊗ Iskra®**

Iskra MIS

PROPERTIES

- **Evaluation of the electricity supply quality in compliance with SIST EN 50160 (only MC764)**
- **Measurements of instantaneous values of more than 140 quantities (U, I, P, Q, S, PF, PA, f, φ, THD, MD, energy, energy cost by tariffs, etc.)**
- **Accuracy class 0.5 (optional 0.2)**
- **Harmonic analysis of phase, phase-to-phase voltages and currents up to the 63rd harmonic (only MC764)**
- **Recording up to 32 measurands and 32 alarms in the internal memory (only MC754/764)**
- **Measurements of 40 minimal and maximal values in different time periods**
- **32 adjustable alarms**
- **Frequency range from 16 Hz to 400 Hz**
- **RS 232/RS 485 communication up to 115,200 bit/s or Ethernet communication**
- **MODBUS and DNP3 communication protocol**
- **MMC/SD card for data transmission, setting and upgrading**
- **Up to 4 inputs or outputs (analogue outputs, pulse outputs, alarm outputs, tariff inputs)**
- **Additional I/O modules with up to 16 digital inputs or outputs, or up to 8 analogue inputs or outputs**
- **Additional communication port (COM2)**
- **Universal power supply**
- **Graphical LCD; 128 x 64 dots with illumination**
- **Automatic range of nominal current and voltage (max. 12.5 A and 750 V)**
- **Adjustable tariff clock, display of electric energy consumption in optional currency**
- **Multilingual support**
- **User-friendly PC MiQen software**

DESCRIPTION

The meter is intended for measuring, analysing and monitoring single-phase or three-phase electrical power network. The meter measures RMS value according to the principle of fast sampling of voltage and current signals. A built-in microprocessor calculates measurands (voltage, current, frequency, energy, power, power factor, THD phase angles, etc.) from the measured signals.
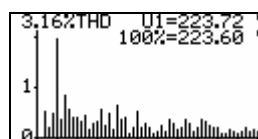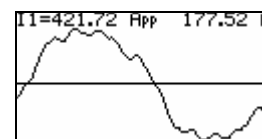
USE

Meters from MC7x4 series are designed for environments where beside measurement of three-phase electrical power network additional analogue or digital measurements/controls must be made without additional hardware (PLC, OPLC, ...). Meters are housed in enclosure 144mm x 144mm.

COMPLIANCE WITH STANDARDS:

Standard SIST EN	Description
61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
60529	Degrees of protection provided by enclosures (IP code)
50160**	Voltage characteristics of electricity supplied by public distribution systems
62052−11 62052−21	Electricity metering equipment – General requirements, tests and test conditions

* − Partial compliance
** - only MC764

DESCRIPTION OF PROPERTIES

MEASURANDS

RMS values of currents and voltages

Measurements of energy, power and power factors in all 4 quadrants

Minimal / maximal values

Average values of measurands per interval

Measurement of THD values of current and voltage (from 0 to 400 %)

Harmonic analysis of phase, phase-to-phase voltages and currents up to the 63rd harmonic

RECORDER (ONLY MC754/764)

A built-in recorder (8Mb) enables storing measurements and detected alarms. The recorder is additionally used for measurements related to the inspection of voltage quality.

ALARMS

The meter supports recording and storing of 32 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.

COMMUNICATION

The meter is equipped with RS232 and RS485 communication via the DB9 terminal or Ethernet and USB communication. Communication enables transfer of instantaneous measurements, records in the memory, settings and updating. Communication supports MODBUS and DNP3 protocols.

MMC/SD CARD

The meter is provided with a slot for a full size MMC/SD card. It is used for transfer of measurements from the internal memory, the meter setting and software updating. SDHC type of cards is not supported.

INPUT / OUTPUT MODULES

Instrument can be equiped with:
- 2 double I/O modules (Module 1 and 2)
- 2 octuple I/O modules (Module 3 and 4)

Double I/O modules have three terminals. The following modules are available:

Alarm output	2 outputs
Analogue output	2 x 20 mA outputs
Pulse output	2 outputs
Tariff input	2 inputs
Bistable alarm output	1 output
Additional communication port (COM2)	
Analogue input	2 inputs
Pulse input	2 inputs
Digital input	2 inputs

Octuple I/O modules have 9 terminals. The following modules are available:

Alarm output	8 outputs
Digital output	8 outputs
Digital input	8 inputs
Analogue output	4 x 20 mA outputs
Analogue input (not yet available)	4 inputs

The meter is available without, with one, two, 3 or 4 modules.

SUPPLY

Universal auxiliary power supply allows connection of DC voltage in range between 20 … 300 V and AC voltage in range between 48 … 230 V.

HANDLING THE COSTS

A special meter function is cost evaluation of energy (active, reactive and total) per tariffs. The meter itself enables tracing the costs in optional currency and calculates consumption by means of the adjustable tariff clock and electric energy price.

MIQEN

MiQen software is intended for supervision of the meter on PC. Network and the meter setting, display of measured and stored values and analysis of stored data in the meter are possible via the serial or Ethernet communication. The information and stored measurements can be exported in standard Windows formats. Multilingual software functions on Windows 98, 2000, NT, XP, Vista, W7 operating systems.

DATA DISPLAY

Data are displayed on 128 x 64 dot graphic LCD with illumination (37 x 69 mm). Indication symbols on the front side that are illuminated at the access to SD, communication and alarm are of additional help.

TECHNICAL DATA

EU DIRECTIVES:

Decree on electrical equipment designed for use within certain voltage limits **URLRS 53/00** (Directive **2006/95/EC** on low voltage).

Safety requirements for electrical equipment for measurement, control and laboratory use, part 1: General requirements

Decree on electromagnetic compatibility (EMC) **URLRS 61/00** (Directive **2004/108/EC** on electromagnetic compatibility).

SAFETY:

Protection:	protection class **II**
	600 V rms, installation category **II**
	300 V rms, installation category **III**
	pollution degree 2
	in compliance with **SIST EN 61010-1**: 2002
Enclosure material:	PC/ABS
	incombustibility–self-extinguishability,
	complying with **UL 94 V-0**
Enclosure protection:	IP 52 (IP 00 for terminals)
	in compliance with **SIST EN 60529**: 1997
Cutting for installation:	$144^{+0,8}$ mm
Converter mass:	approx. 600 g

AMBIENT CONDITIONS:

Temperature range of operation:	-10 to +65°C
Storage temperature range:	-40 to +70°C
Average annual humidity:	$\leq$ 75% r.h.

INPUTS

Input signals	Current	Voltage
Nominal frequency range	50, 60 Hz	
Measuring frequency range	16−400 Hz	
Nominal value (In, Un)	5 A	500 V $_{L-N}$
Maximal value	12.5 A	750 V $_{L-N}$
Consumption	< 0.1 VA	< 0.1 VA

POWER SUPPLY

Power supply	Universal
Nominal voltage AC	48−230 V
Nominal frequency	40−65 Hz
Nominal voltage DC	20−300 V
Consumption	< 10 VA

CLOCK RETENTION

A built-in super-capacitor enables the clock operation and recording the measurements in the memory with the time flag. Clock must be set at first start-up and if supply is lost for more than 2 days.

REFERENCE CONDITIONS

Ambient temperature:	−5 … +55°C
Voltage input:	50 … 500V
Current input:	0 … 100 % In
Active/reactive power, factor:	$\cos\varphi = 1 / \sin\varphi = 1$
Sine form:	Sinus

ACCURACY

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

Measurand		Accuracy
Rms current (I1, I2, I3, Iavg, In)		0.5 (optional 0.2)
Rms phase voltage (U1, U2, U3, Uavg)	62.5 − 750 V	<0.5 (optional 0.2)
	10 − 500 V	0.5 (optional 0.2)
Phase-to-phase voltage (U12, U23, U31, Uavg)		0.5
Frequency (f)		10 mHz
Power factor (PF)		0.5
Phase and phase-to-phase angle (φ, $\varphi12$, $\varphi23$, $\varphi31$)		0.5
THD	0 … 400 %	0.5

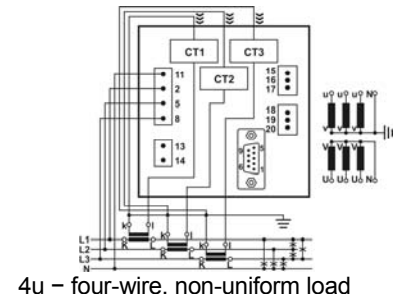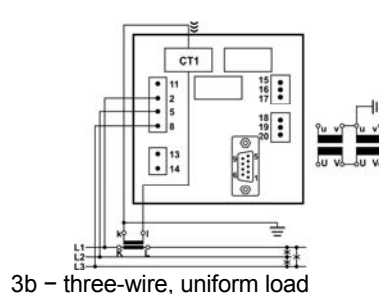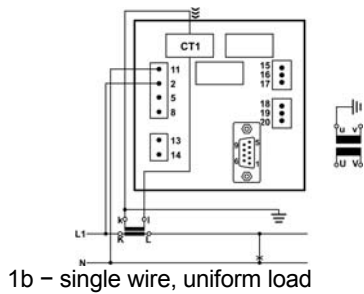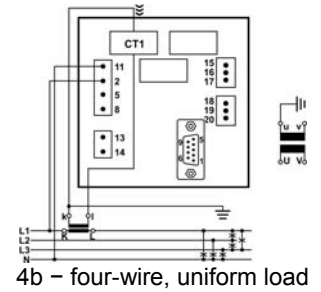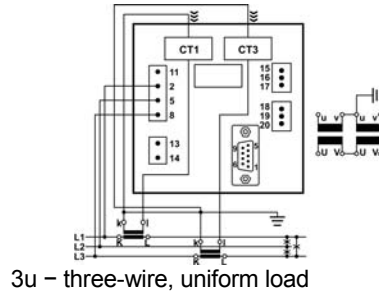| Measurand		Accuracy
Active, reactive and apparent power		0.5 (optional 0.2)
Active energy	SIST EN 62053-21	Class 1
Reactive energy	SIST EN 62052-23	Class 2

REAL TIME CLOCK (RTC):
RTC accuracy   1 min/month (30 ppm)

CONNECTION

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


3u − three-wire, uniform load

4b − four-wire, uniform load

1b − single wire, uniform load

3b − three-wire, uniform load

4u − four-wire, non-uniform load

Inputs / Quantities		Terminals	
Measuring inputs:	AC current	IL1	CT1
		IL2	CT2
		IL3	CT3
	AC voltage	UL1	2
		UL2	5
		UL3	8
		N	11
Auxiliary power supply:		+ / AC	13
		− / AC	14
Input / Output modules	Module 1	I/O−1	15
		COMMON	16
		I/O−2	17
	Module 2	I/O−3	18
		COMMON	19
		I/O−4	20
	Module 3	I/O-1	48
		I/O-2	47
		I/O-3	46
		I/O-4	45
		I/O-5	44
		I/O-6	43
		I/O-7	42
		I/O-8	41
		COMMON	40
	Module 4	I/O-1	38
		I/O-2	37
		I/O-3	36
		I/O-4	35
		I/O-5	34
		I/O-6	33
		I/O-7	32
		I/O-8	31
		COMMON	30

TYPE OF COMMUNICATION

Communication		Terminals	
DB9 female	RS 232	Rx	3
		⏚	5
		Tx	2
	RS 485	B	7
		A	8
Screw terminals (COM2)	RS 232	Rx	18
		⏚	19
		Tx	20
	RS 485	B	20
		A	18

Ethernet and USB communication uses standard type of connection; RJ45 for Ethernet and type B connector for USB.

DIMENSIONAL DRAWING
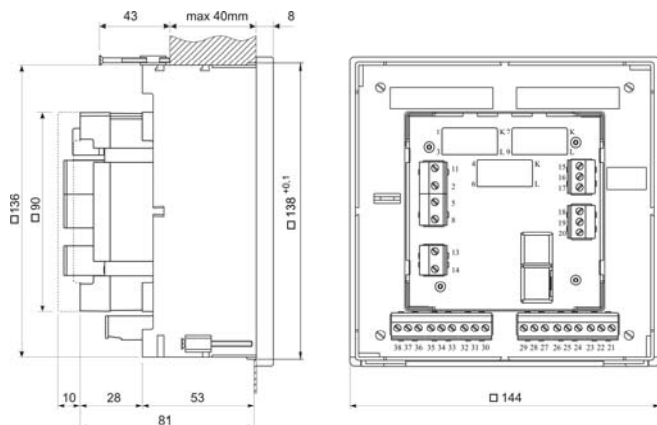
TERMINALS

Connection	Max. conductor cross-sections
Voltage inputs (4)	≤ 5 mm^2; one conductor
Current inputs (3)	$\leq \emptyset$ 6 mm; one conductor with insulation
Power supply (2)	≤ 2.5 mm^2; one conductor
Modules (2 x 3)	≤ 2.5 mm^2; one conductor
Modules (2 x 9)	≤ 2.5 mm^2; one conductor

COMMUNICATION CONNECTION

	Ethernet	USB	RS 232	RS 485
Type of connection	Direct			Network
Max. connection length	100 m	3 m	3 m	1000 m
Terminals	RJ-45	USB-B	DB9 female	
Insulation	3.5 kV rms., according to EN 61010-1			
Transfer mode	Asynchronous			
Protocol	MODBUS TCP / DNP3	MODBUS RTU / DNP3		
Transfer rate	10/100Mb/s autodetect	USB 2.0	1.200 do 115.200 bit/s	

DATA FOR ORDERING

Measuring centre:

The following data shall be stated:
Type of a meter
Type of communication
Type of a module(s)

Supplement:

MiQen software
SD card
Communication cables

ORDERING

When ordering the meter, all required specifications shall be stated in compliance with the ordering code.

The meters automatic range of input current (up to 5 A), voltage (up to 500 V_{L-N}) and power supply is not stated in the code.

EXAMPLE OF ORDERING:

The MC760 network analyser is connected to secondary phase voltage up to 500 V_{L-N} and 5 A secondary current. A universal supply is built-in the meter. RS 232 / RS 485 communication and all 4 modules are applied. The first module is an alarm output; the second one is analogue output; third is digital input and fourth is resistance analogue input.

Ordering code:
MC764−RS−2AL 2AN−8DI4AIR

GENERAL ORDERING CODE
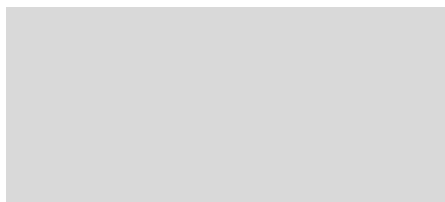
All specifications are obligatory.
An example of a completely filled-in ordering code:

MC764 −RS−2AL 2PO−8AL8DI

Meter type

MC764	
MC754	
MC744	

Communication (COM1)

RS	RS 232 / RS 485
E	Ethernet

Module 1 / Module 2

WO	Without
2AL	2 X Relay output
2AN	2 X Analogue output
2AIR	2 X Analogue input – resistance (Pt100 – Pt1000)
2AIU	2 X Analogue input – voltage (0 – 10V)
2AII	2 X Analogue input – current (20mA)
2PO	2 X Pulse output
2TI	2 X Tariff input – only module 1
1BAL	1 X Bistable alarm output
2DI	2 X Digital input
2PI	2 X Pulse input
RS2	1 X RS 232 (COM2) – only module 2
RS4	1 X RS 485 (COM2) – only module 2

Module 3 / Module 4

WO	Without
8AL	8 X Relay output
8DO	8 X Digital output
8DI	8 X Digital input
4AN	4 X Analogue output

Dictionary:

RMS	*Root Mean Square*
Flash	*Type of a memory module that keep its content in case of power supply failure*
Ethernet	*IEEE 802.3 data layer protocol*
MODBUS / DNP3	*Industrial protocol for data transmission*
MMC CARD	*Multi Media Card*
SD CARD	*Secure Digital Card*
MiQen	*Software for MC meters*
AC	*Alternating current*
PA	*Power angle (angle between current and voltage)*
PF	*Power factor*
THD	*Total harmonic distortion*
MD	*Measurement of average values in time interval*
Harmonic voltage – harmonic	*Sine voltage with frequency equal to integer multiple of basic frequency*
Hand-over place	*Connection spot of consumer installation in public network*
Flicker	*Voltage fluctuation causes changes of luminous intensity of lamps, which causes the so-called flicker*
RTC	*Real Time Clock*