



Measuring centers MC7x0 series

Network Analyser - MC760

Network Recorder - MC750

- Evaluation of the electricity supply quality in compliance with EN 50160 (only MC760)
- 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.)
- Harmonic analysis of phase, phase-to-phase voltages and currents up to the 63rd harmonic
- Recording up to 64 measurands and 32 alarms in the internal memory (8 MB flash)
- 32 adjustable alarms
- RS 232/RS 485 communication up to 115,200 bit/s or Ethernet/USB communication
- Up to 4 inputs or outputs (analogue, pulse, relay and watchdog outputs, digital, tariff, pulse and analogue inputs)

PROPERTIES

- Evaluation of the electricity supply quality in compliance with EN 50160 (only MC760)
- 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)
- Active energy Class 1 (optional Class 0.5S)
- Harmonic analysis of phase, phase-to-phase voltages and currents up to the 63rd harmonic
- Recording up to 64 measurands and 32 alarms in the internal memory (8 MB flash)
- 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/USB communication
- MODBUS and DNP3 communication protocol
- Memory card (MMC or SD) for data transmission, setting and upgrading
- Up to 4 inputs or outputs (analogue, pulse, relay and watchdog outputs, digital, tariff, pulse and analogue inputs)
- Additional communication port (COM2)
- Universal or AC 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
- Extension unit with analogue outputs – EX104 (up to 4 modules with 4 analogue outputs)

DESCRIPTION

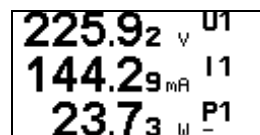
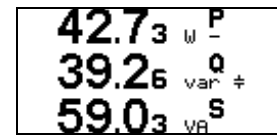
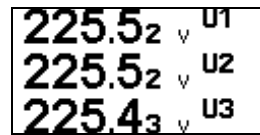
The meter is intended for measuring, analysing and monitoring single-phase or three-phase electrical power network. The meter measures RMS value according to the principle of fast sampling of voltage and current signals. A built-in microprocessor calculates measurands (voltage, current, frequency, energy,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

USE

Both **MC760** and **MC750** are intended for monitoring, measuring and recording of electrical quantities of a three-phase electric-energy distribution system. The meter is provided with 32 adjustable alarms, 8MB flash recorder (up to 64 measurands and 32 alarms), up to four input or output modules and communication. With the RS 232/RS 485 or Ethernet/USB communication the meter can be set, measurements checked and stored data downloaded. The meter functions also as an electricity meter, with the additional function of cost management by tariffs. A tariff input or a tariff clock can be set. At tariff

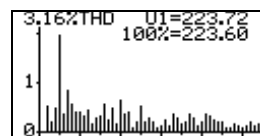
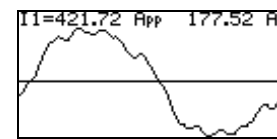
clock setting, four periods and four work groups as well as electric energy price for each period and a work group (16 different price periods) are available. Additionally, 20 places are available for setting holidays or days when special tariff rules are valid.

As an electricity meter it records energy in all four quadrants in four tariffs.



E1	332.55	EUR
E2	54.74	EUR
E3	2.79	EUR
E4	21.58	EUR
Σ	411.66	EUR

Actual period	
THD	: ✓
Harmonics	: ✓
Short flickers	: ✓
Long flickers	: ✓
Rapid V. chg.	: ✓
Report:	48/2006



Info	
🔒 Locked	
⚠ Wrong connection	
🔋 Low battery	
🔌 Low supply	
🏠 Main menu	

The **MC760** network analyser is used for permanent analysis of electricity supply quality in compliance with EN 50160 standard. Records are stored in the internal memory for the period of the last three years. Moreover, more than 170,000 deviations of the measurands from the standard values are stored, which enables finding eventual reasons for the problems in network. Optional limits and required quality in a monitored period can be defined for each monitored characteristic. The following characteristics are measured and recorded:

- Frequency deviations
- Voltage deviations
- Voltage unbalances
- Rapid voltage changes
- Flicker intensity
- Voltage dips and swells
- Voltage interruptions
- THD & harmonics

COMPLIANCE WITH STANDARDS

Standard EN	Description
61010-1	<i>Safety requirements for electrical equipment for measurement, control and laboratory use</i>
60529	<i>Degrees of protection provided by enclosure (IP code)</i>
62052-11*	<i>Electricity metering equipment – General requirements, tests and test conditions</i>
62053-21*	<i>Electricity metering equipment (a.c.) Particular requirements</i>
62053-22*	<i>Electricity metering equipment (a.c.) Particular requirements</i>
62053-23*	<i>Electricity metering equipment (a.c.) Particular requirements</i>
62053-31	<i>Electricity metering equipment (a.c.) Particular requirements</i>

* – Partial compliance

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
- Flicker intensity measuring (MC760 only)

RECORDER

A built-in recorder (8Mb) enables storing of up to 64 measurements and detected alarms (up to 32).

The recorder is additionally used for measurements related to the inspection of voltage quality (MC760 only).

ALARMS

Up to 32 alarms divided in four groups can be set. A time constant of maximal values in a thermal mode, a delay time and switch-off hysteresis are defined for each group of alarms. Alarms can be recorded and can trigger relay output and beeper.

COMMUNICATION

The meter is equipped with RS232 and RS485 (DB9 or terminal connection), Ethernet (RJ-45 terminal) and USB (USB-B type) or USB (USB-A type) communication. Communication enables transfer of instantaneous measurements, records from the memory, settings and updating. Communication supports MODBUS and DNP3 protocols.

MEMORY CARD

The meter is provided with a slot for a full size MMC or SD* (128MB to 2GB) memory card formatted to FAT16. It is used for transfer of measurements from the internal memory, meter setting and software updating.

* - MMC and MMC compatible SD memory cards are supported. Order at Iskra, d.d. to assure functionality.

INPUT / OUTPUT MODULES

The modules are available with double inputs/outputs. Each module has three terminals.

The meter is available without, with one or with two modules. The following modules are available:

- Relay output 2 outputs
- Analogue output 2 x 20 mA outputs
- Pulse output 2 outputs
- Bistable alarm output 1 output
- Analogue input 2 inputs
- Pulse input 2 inputs
- Digital input 2 inputs
- Tariff input 2 inputs
- Additional communication port (COM2) 1 port
- Communication port for analogue extender EX104 1 port

ANALOGUE EXTENDER EX104 (ACCESSORY)

If there is a demand for additional analogue outputs analogue extender EX104 can be used.

It is a standalone unit, connected to meter via module 2 (module needs to be – Communication port for analogue extender EX104). Up to 4 units with 4 analogue outputs can be used on one meter. More information can be found on Analogue extender EX104 datasheet.

SUPPLY

Power supply connection of the meters is adaptive. A universal power supply enables connection of the meter to DC (20–300 V) or AC voltage (48–276 V 40 ... 70 Hz).

AC power supply enables connection of the meter to AC voltage.

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, stored values and analysis of data from the meter are possible via serial or Ethernet communication. The information and stored measurements can be exported in standard Windows formats. Multilingual software functions on Windows 8, 7, XP, NT, 2000 operating systems. MiQen can be downloaded from Iskra d.d. webpage www.iskra.eu.

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 memory card, communication and alarm are of additional help.

TECHNICAL DATA

EU DIRECTIVES

Directive **2006/95/EC** on low voltage.

Directive **2004/108EC** on electromagnetic compatibility.

Directive on RoHS 2011/65/EU.

SAFETY

Protection: protection class II
600 V rms, installation category II
300 V rms, installation category III
 pollution degree 2
 in compliance with **EN 61010-1**

Enclosure material: PC/ABS
 incombustibility or self-extinguishability
 in compliance with **UL 94 V-0**

Enclosure protection: IP 52 (IP 20 for terminals)
 in compliance with **EN 60529**

Cutting for installation: $92^{+0,8}$ mm

Converter mass: approx. 600 g

AMBIENT CONDITIONS

Climatic class: 3
 in compliance with **EN 62052-11**
 in compliance with **EN 62052-21**

Temperature range of operation: -10 to +65°C

Storage temperature range: -40 to +70°C

Average annual humidity: ≤ 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

ACCURACY

Accuracy is presented as percentage from range except when it is stated as an absolute value.

Measurand	Range	Accuracy
Rms current (I1, I2, I3, Iavg, In)	1-5 A	0.5 (optional 0.2)
Rms phase voltage (U1, U2, U3, Uavg)	75-500 V	0.5 (optional 0.2)
Phase-to-phase voltage (U12, U23, U31, Uavg)	120-800 V	0.5 (optional 0.2)
Frequency (f)		10 mHz
Power factor (PF)	-1...0...+1 U = 50...120 % Un I = 2...200 % In	0.5
Phase and phase-to-phase angle (φ, φ12, φ23, φ31)		0.5°
THD	0...400 %	0.5
Active power	75-500 (In = 1 A)	0.5 (optional 0.2)
Reactive and apparent power	375-2500 (In = 5 A) [W/var/VA]	0.5
Maximal values (MD)		1.0
Measurand	Standard	Accuracy
Active energy	EN 62053-21	Class 1
	EN 62053-22	(optional 0.5S)
Reactive energy	EN 62053-23	Class 2
Pulse output	EN 62053-31	Class A & B

POWER SUPPLY

Power supply	Universal	AC
Nominal voltage AC	48-276 V	57.7 / 63.5 / 100 / 110 / 230 / 400 / 500... V
Nominal frequency	40-70 Hz	40-65 Hz
Nominal voltage DC	20-300 V	-
Consumption	< 12 VA	< 8 VA

REAL TIME CLOCK (RTC)

RTC accuracy: 1 min/month (30 ppm)

To enable clock operation backup battery or supercap is built-in.

Supercap life span: approx. 2 days

Battery life span: approx. 6 years (at 23°C)

REFERENCE CONDITIONS

Ambient temperature: -10 ... 23 ... 65°C

Input: 0...100 % Un
 (connected to a measuring transformer) 0...100 % In

Active/reactive power, factor: $\cos\varphi = 1 / \sin\varphi = 1$

Waveform: Sinus

COMMUNICATION TYPES

	Ethernet	RS485	RS232	USB
Type of connection	Network		Direct	
Max. conn. length	-	1000 m	3 m	5 m
Terminals	RJ-45	DB9 female connector or screw terminals		USB-B type
Insulation	3.7 kV rms., 1 minute between terminals and other circuits			
Transfer mode	Asynchronous			
Protocol	MODBUS RTU / DNP3			
Transfer rate	10/100 Mb/s autodetect	1.200 to 115.200 bit/s	Full speed USB 2.0	

TERMINALS DIMENSIONS

Connection	Max. conductor cross-sections
Voltage inputs (4)	≤ 2.5 mm ² ; one conductor
Current inputs (3)	≤ Ø 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

CONNECTION TERMINALS AND MARKINGS

Inputs / Quantities		Terminals	
Measuring inputs:	AC current	IL1	CT1
		IL2	CT2
		IL3	CT3
	AC voltage	UL1	2
		UL2	5
		UL3	8
Auxiliary power supply:	N	11	
	+ / AC	13	
	- / AC	14	
Input / Output modules	Module 1	I/O-1	15
		C-1/2	16
		I/O-2	17
		I/O-3	18
	Module 2	C-3/4	19
		I/O-4	21

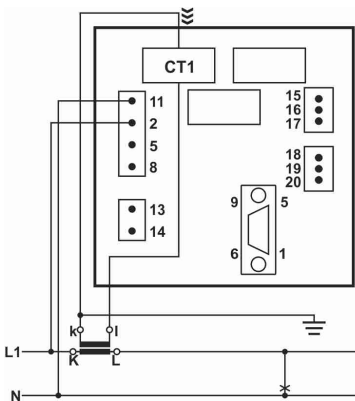
COMMUNICATION TERMINALS

Communication		Terminals	
RS232	DB9 female or screw terminals	Rx	3
		⏏	5
		Tx	2
RS485		B	7
		A	8
Ethernet	RJ-45	TD+	1
		TD-	2
		RD+	3
		RD-	6
USB	USB-B type	-	-
RS232 (module 2)	Screw terminals	Rx	18
		⏏	19
Tx		20	
RS485 (module 2)		A	18
RS485 for EX104 (module 2)		B	20
		A	18
	B	20	

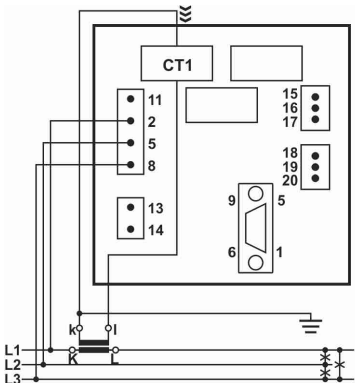
CONNECTION

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

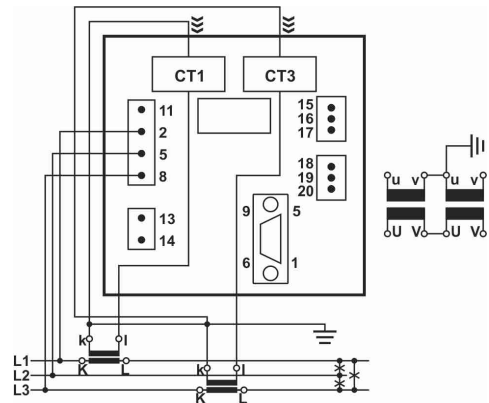
Current inputs shall be connected to network via a corresponding current transformer.



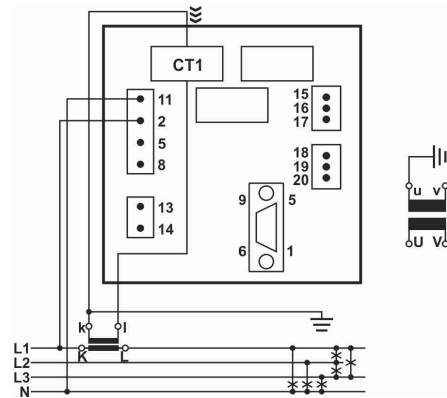
1b (1W1b) – single phase connection



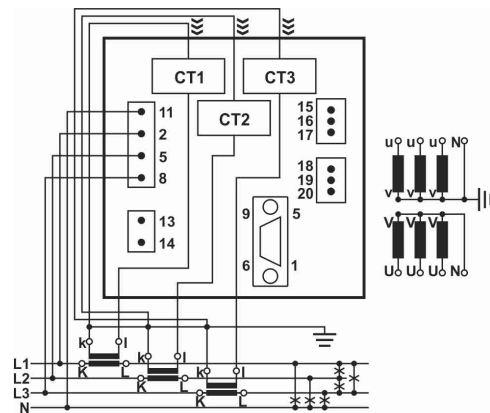
3b (1W3b) – Three phase, three wire connection with balanced load



3u (2W3u) – Three phase, three wire connection with unbalanced load

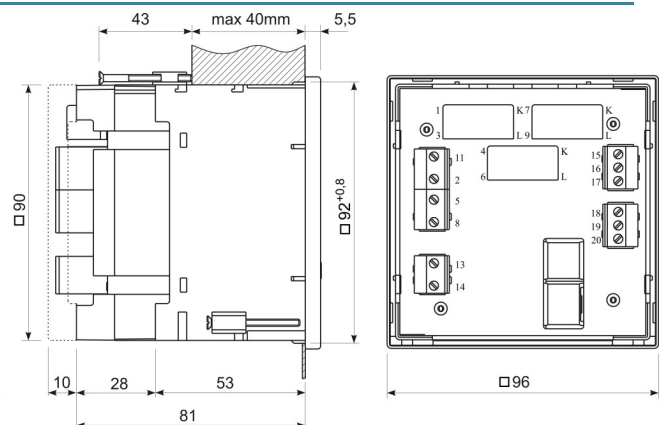


4b (1W4b) – Three phase, four wire connection with balanced load



4u (1W4u) – Three phase, four wire connection with unbalanced load

DIMENSIONAL DRAWING



DATA FOR ORDERING

When ordering MC750 or MC760 Measuring centre, all required specifications shall be stated in compliance with the ordering code. Additional information could be stated. Most typical options are shown as example. For complete range of options please visit <http://konfigurator.iskra.eu>.

General ordering code

The following specifications shall be stated:

Device type	Accuracy class	Nominal frequency	Aux. power	Com. Type (COM1)	I/O module 1	I/O module 2	RTC back. supply	Comment
MC7X0	x	x	x	x	x	x	x	
							C	Supercap
							B	Battery *
					A			2× Analogue output
					S			2× Pulse output
					M			2× Relay (alarm) output
					B			1× Bistable Relay (alarm) output
					I			2× Analogue input (mADC)
					U			2× Analogue input (VDC)
					R			2× Analogue input (R/Temp.)
					D			2× Digital input (230VAC/DC)
					E			2× Digital input (75...110VAC/DC)
					F			2× Digital input (5...48VAC/DC)
					P			2× Pulse input (5...48VDC)
					T			2× Tariff input (230VAC/DC)
					Z			2× Tariff input (75...110VAC/DC)
					Y			2× Tariff input (5...48VAC/DC)
					W			1× Status (Watchdog) + 1× Relay (alarm) output
					G			COM2 – RS232
					C			COM2 – RS485
					X			Comm. port for analogue extender EX104
					N			Without *
				R	RS232/485 (DB9 connector) *			
				T	RS232/485 (Screw terminals)			
				E	Ethernet & USB			
				U	USB			
			U	Universal *				
			A	57.7 V AC				
			B	63.5 V AC				
			C	100 V AC				
			D	110 V AC				
			E	230 V AC				
			F	400 V AC				
			G	500 V AC				
		S	50, 60 Hz *					
		A	400 Hz					
		B	16 2/3 Hz					
	S	Class 0.5 *						
	H	Class 0.2						
MC750	Network recorder							
MC760	Network analyser							

* - Default value

Nominal frequency is valid only for measuring inputs and not for power supply

ACCESSORIES

MMC or SD memory card

Analogue extender EX104 *

* - Only in combination with module 2 - Communication port for analogue extender EX104

EXAMPLE OF ORDERING

MC760 Network analyser Class 0,5, with a universal power supply is connected to a secondary phase voltage up to 500 VL-N and 5 A secondary current on 50Hz network. It is equipped with ethernet & USB communication, watchdog output (plus one relay output) as I/O1&2 module 1, 2x digital input 230V as I/O3&4 module 2. RTC backup is supercap.

ORDERING CODE:

MC760 S S U E W D C

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	type of Multi Media memory Card
SD	type of Multi Media memory Card
MiQen	Software for MC meters
AC	Alternating current
DC	Direct current
PA	Power angle (angle between current and voltage)
PF	Power factor
THD	Total harmonic distortion
MD	Maximum demand measurement in time interval
Harmonic voltage	Harmonic sine voltage with frequency equal to integer multiple of basic frequency
Flicker	Voltage fluctuation causes changes of luminous intensity of lamps, which causes the so-called flicker
RTC	Real Time Clock

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