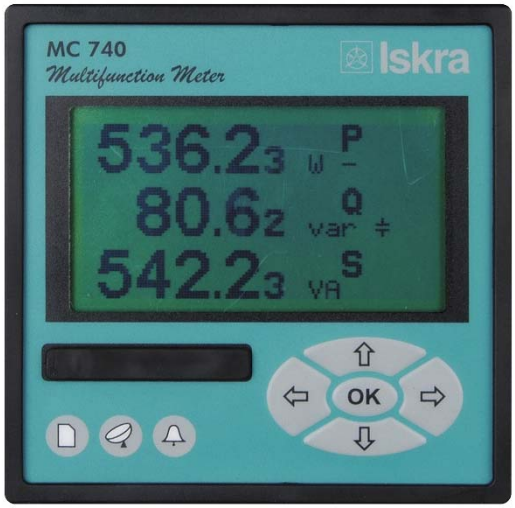
Energy sector



Measuring centers MC7x0 series

Multifunction Meter – MC740

- Measurements of instantaneous values of more than 130 quantities (U, I, P, Q, S, PF, PA, f, ϕ, THD, MD, energy, energy cost by tariffs, etc.)
- Active energy Class 1 (optional Class 0.5S)
- Harmonic analysis of phase, phase-to-phase voltages and currents up to the 63rd harmonic
- 32 adjustable alarms
- Up to 4 inputs or outputs (analogue, pulse, relay and watchdog outputs, digital, tariff, pulse and analogue inputs)
- User-friendly PC MiQen software

Iskra®

PROPERTIRS

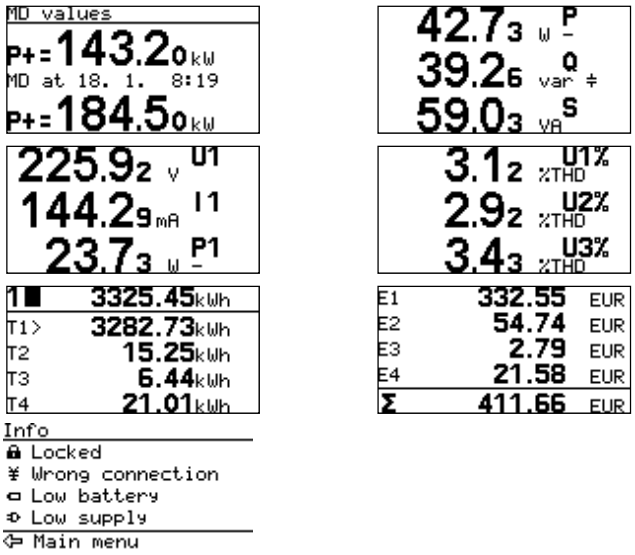
- Measurements of instantaneous values of more than 130 quantities (U, I, P, Q, S, PF, PA, f, ϕ, THD, MD, energy, energy cost by tariffs, etc.)
- Accuracy class 0.5 (optional 0.2)
- Active energy Class 1 (optional Class 0.5S)
- Harmonic analysis of phase, phase-to-phase voltages and currents up to the 63rd harmonic
- 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 meter 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
- User-adjustable display of measurements
- 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 records TRMS 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, phase angles, etc.) from the measured signals.

USE

The **MC740** multifunction meter is intended for monitoring and measuring of electrical quantities of a three-phase electric-energy distribution system. The meter is provided with 32 adjustable 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 and measurements can be checked. 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.



COMPLIANCE WITH STANDARDS

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

* – Partial compliance

DESCRIPTION OF PROPERTIES

MEASURANDS

- TRMS 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

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 trigger relay output and beeper.

COMMUNICATION

The meter is equipped with RS232 and RS485 communication (DB9 or terminal connection) or Ethernet communication via the RJ-45 terminal and standard USB port. Communication enables transfer of instantaneous measurements, 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) formatted to FAT16. It is used for the 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, and display of measured values are possible via the serial or Ethernet communication. 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 **2014/35/EU** on low voltage.
Directive **2014/30/EU** on electromagnetic compatibility.
Directive on RoHS **2011/65/EU**.

SAFETY

- Protection: protection class **II**
  600 V TRMS, installation category **II**
  300 V TRMS, 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
TRMS current (I1, I2, I3, Iavg, In)	1-5 A	0.5 (optional 0.2)
TRMS 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) 375-2500 (In = 5 A) [W/var/VA]	0.5 (optional 0.2)
Reactive and apparent power		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: cosφ =1 / sinφ =1
- Waveform: Sinus

COMMUNICATION TYPES

	Ethernet	RS 232	RS 485
Type of connection	Direct		Network
Max. connection length	-	3 m	1000 m
Terminals	RJ-45	DB9 female connector or screw terminals	
Insulation	3.7 kV TRMS., 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	

TERMINALS DIMENSIONS

Connection	Max. conductor cross-sections
Voltage inputs (4)	≤ 2.5 mm²; one conductor
Current inputs (3)	≤ Ø 6 mm; one conductor with insulation
Power supply (2)	≤ 2.5 mm²; one conductor
Modules (2 x 3)	≤ 2.5 mm²; one conductor

CONNECTION TERMINALS AND MARKINGS

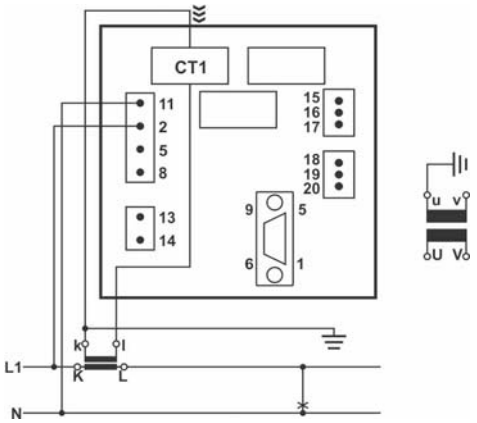
Inputs / Quantities		Terminals	
Measuring inputs:	AC current	IL1	1, 3
		IL2	4, 6
		IL3	7, 9
	AC voltage	UL1	2
		UL2	5
		UL3	8
		N	11
Auxiliary power supply:		+ / AC	13
		– / AC	14
Input / Output modules	Module 1	I/O–1	15
		C–1/2	16
		I/O–2	17
	Module 2	I/O–3	18
		C–3/4	19
		I/O–4	21

COMMUNICATION TERMINALS

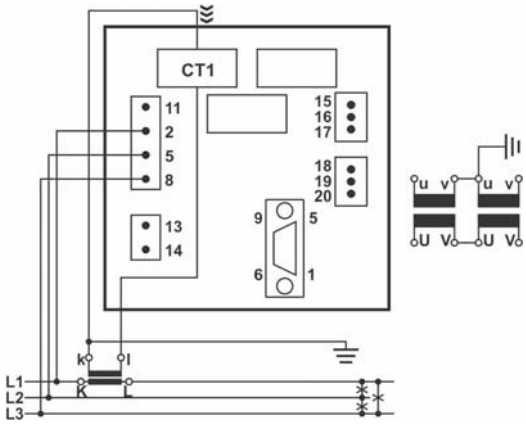
Communication		Terminals	
RS232	DB9 female or screw terminals	Rx	3
		⏚	5
		Tx	2
RS485		B	7
		A	8
Ethernet	RJ-45	TD+	1
		TD–	2
		RD+	3
		RD–	6
USB	USB-B type	-	-
RS232 (module 2)	Screw terminals	Rx	18
		⏚	19
		Tx	20
RS485 (module 2)		A	18
		B	20
RS485 for EX104 (module 2)		A	18
		B	20

CONNECTION

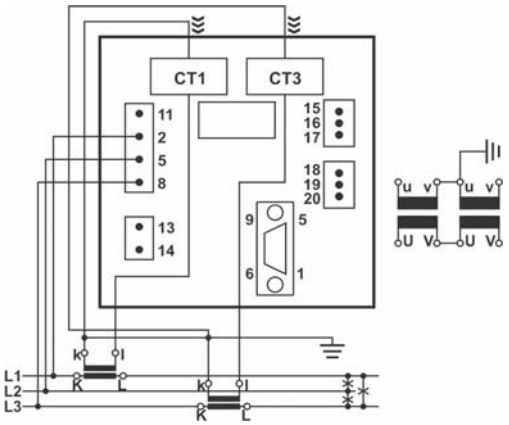
Converter voltage inputs can be connected either directly to low-voltage network or via a high-voltage transformer to high-voltage network.
Current inputs shall be connected to network via a corresponding current transformer.



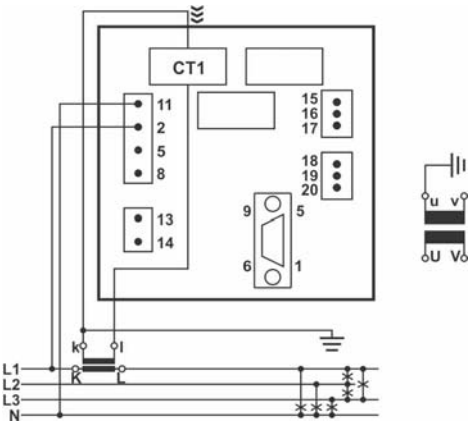
1b (1W1b) – single phase connection



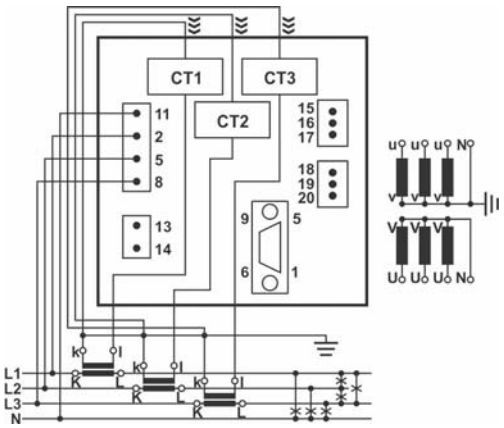
3b (1W3b) – Three phase, three wire connection with balanced load



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

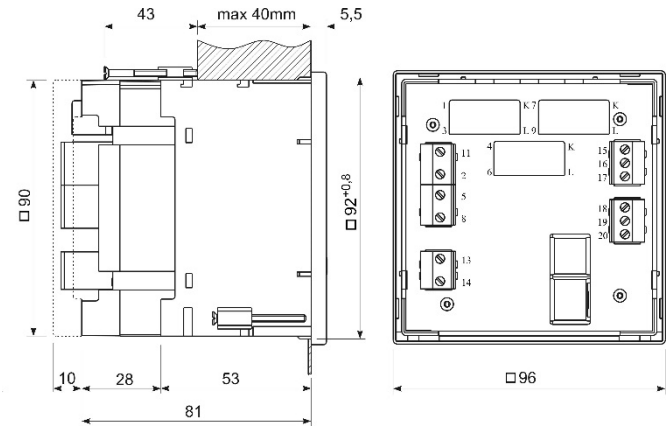


4b (1W4b) – Three phase, four wire connection with balanced load



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

DIMENSIONAL DRAWING



DATA FOR ORDERING

When ordering MC740 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 supply	Com. Type (COM1)	I/O 1&2 module 1	I/O 3&4 module 2	RTC back. supply		*Comment*
MC740	**X**	**X**	**X**	**X**	**X**	**X**	**X**		
							C	Supercap	
							B	Battery *	
					A			2× Analogue output	*Not available for Nominal freq. 16 2/3 Hz*
					S			2× Pulse output	
					M			2× Relay (alarm) output	
					B			1× Bistable Relay (alarm) output	
					I			2× Analogue input (mA_{DC})	
					U			2× Analogue input (V_{DC})	
					R			2× Analogue input (R/Temp.)	
					D			2× Digital input (230 $V_{AC/DC}$)	
					E			2× Digital input (75 ... 110 $V_{AC/DC}$)	
					F			2× Digital input (5 … 48 $V_{AC/DC}$)	
					P			2× Pulse input (5 ... 48 V_{DC})	
					T			2× Tariff input (230 $V_{AC/DC}$)	*I/O1&2 module 1 only*
					Z			2× Tariff input (75 ... 110 $V_{AC/DC}$)	*I/O1&2 module 1 only*
					Y			2× Tariff input (5 … 48 $V_{AC/DC}$).	*I/O1&2 module 1 only*
					W			1× Status (Watchdog) + 1× Relay (alarm) output	
					G			COM2 – RS232	*I/O3&4 module 2 only*
					C			COM2 – RS485	*I/O3&4 module 2 only*
					X			Comm. port for analogue extender EX104	*I/O3&4 module 2 only*
					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							
MC740	Network recorder								

* - 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

MC740 Multi meter Class 0.5, with a universal power supply is connected to a secondary phase voltage up to 500 V_{L-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 230 V as I/O3&4 module 2. RTC backup is supercap.

ORDERING CODE:
MC740 S S U E W D C

DICTIONARY

TRMS	*True Root Mean Square*
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*
RTC	*Real Time Clock*

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