Energy sector

Measuring centre

Network Recorder – MC350 TH

- Measurements of instantaneous values for more than 60 quantities (U, I, P, Q, S, PF, PA, f, ϕ, THD, MD, …)
- Active energy accuracy class 0.5S
- Up to four I/O modules (analogue output, pulse output, alarm output, tariff input)
- 4 Energy counters with tariff clock or tariff input
- RS 232/RS 485 communication up to 115,200 bit/s or USB 2.0
- Internal recorder 8MB

Iskra®

PROPERTIES

- Measurements of instantaneous values of more than 140 quantities (U, I, P, Q, S, PF, PA, f, ϕ, THD, MD, energy, etc.)
- Active energy class 0.5S
- 4 Energy counters
- Recording up to 32 measurands and 16 alarms in the internal memory (8 MB flash)
- 16 adjustable alarms
- Frequency range from 16 Hz to 400 Hz
- RS232 / RS485 communication up to 115,200 bit/s or USB 2.0 communication
- MODBUS and DNP3 communication protocol
- Up to 2 tariff inputs (option)
- Up to 2 pulse or alarm outputs (option)
- AC or Universal (option) power supply
- Graphical LCD; 128 x 64 dots with illumination
- Automatic range of nominal current and voltage (max. 12.5 A and 600 V)
- User-adjustable display of measurements
- Multilingual support
- User-friendly PC MiQen software MiQen software for setting via communication (option)

DESCRIPTION

The meter is intended for measuring, analysing and monitoring of single-phase or three-phase electrical power distribution system. 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, phase angles, etc.) from the measured signals.

USE

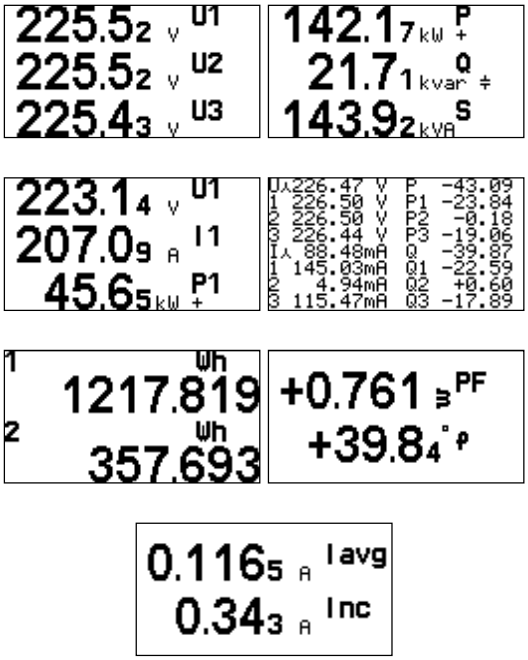
The meter is intended for monitoring and measuring electrical quantities of single and three-phase electrical power distribution system. It records energy like the electricity meter in all four quadrants in up to four tariffs and since it also measures active and reactive power in all directions it can provide data about power direction(like ANSI code 32).

By using input/output modules it is possible to use meter for process control. Meter supports 2 optional I/O slots ready for use with double input or output modules. Available options are analogue output, digital output (open collector (SO) or mechanical relay) or tariff input. Digital output can be used as pulse or alarm output.

Alarms are useful tool for fast detection of exceeded parameters, monitoring proper magnitude level and notification in combination with alarm (relay) outputs. Thus function can be used for secondary over/under voltage/frequency protection, overload protection switch...

Internal memory (8MB) is used for recording of real time measurements and alarms, all equipped with a time stamp.

Various types of communication modules are available. Serial RS485 can be used for connecting device in to the network, standard USB and serial RS232 for connection of device to computer or controller.



PROGRAMING

Complete programming of a meter and downloading and analysing of stored data can be done via communication with user friendly MiQen software (free download from *Iskra, d.d.* web page).

Setting of basic functions and navigation through illuminated LCD can easily be done via 5 buttons placed on the meter front panel.

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 enclosure (IP code)*
62052-11*	*Electricity metering equipment – General requirements, tests and test conditions*
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

- RMS values of currents and voltages
- Measurements of active, reactive, apparent power and power factor
- Measurements of energy in all 4 quadrants
- Average values of measurands per interval
- Measurement of THD values of current and voltage

RECORDER

A built-in recorder (8Mb) enables storing of up to 32 measurements (two partitions) and detected alarms all equipped with a time stamp.
Sampling time of measurements recorder can be set from 1 to 60 min. Minimum, maximum, average or actual value of selected quantity can be stored.

ALARMS

The meter supports setting of up to 16 alarms that are divided in to two alarm groups. Alarms can be set for any of measured parameters by setting condition and a limit value. A time constant of maximum demand values in a thermal mode, a delay time and switch-off hysteresis are defined for each group of alarms. To each of two alarm groups an alarm output (solid-state or electromechanical relay) can be dedicated.

COMMUNICATION

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

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:

○ Pulse (digital) output (S0)	2 outputs
○ Relay output	2 outputs
○ Analogue output	2 outputs
○ Tariff input	2 inputs
○ Digital input	2 inputs

Pulse (digital) output module is available as:
Pulse output according EN 62053-31 (27 V, 27 mA)

AUX POWER SUPPLY

Standard AC power supply enables connection of the meter to a specific AC voltage (57.7 / 63.5 ... V).
There are also two options with a universal power supply:

- Full range - DC (20–300 V) or AC (48–276 V / 40-65 Hz) voltage
- High range - DC (100–265 V) or AC (85–265 V / 40-65 Hz) voltage

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 10, 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). An indication symbols on the front side are optical LED for energy flow and active alarm.

TECHNICAL DATA

EU DIRECTIVES

Directive **2014/35/EU** on low voltage.
Directive **2014/30/EU** on electromagnetic compatibility.
Directive on RoHS **2011/65/EU**.

VOLTAGE MEASUREMENTS:

Measuring range	10…600 V_{LN}
Nominal voltage(U_N)	50…500 V_{LN}
Max. measured value (cont.)	600 V_{LN} ; 1000 V_{LL}
Overload	1.2 × U_N
Consumption	< 0.1 VA
Input impedance	3.3 MΩ per phase

CURRENT MEASUREMENTS:

Measuring range	0.01…10 A
Nominal current (I_N)	1 / 5 A
Max. measured value	12.5 A sinusoidal
Max. allowed value (thermal)	15 A cont.
Overload	50 × I_N ; 1s

FREQUENCY MEASUREMENT

Frequency measuring range	16 … 400 Hz (on comm.)
(Only for frequency meas.)	f_N ± 30 Hz (on analogue out)
Nominal frequency (f_N)	50/60 Hz
Optional nominal frequencies	16.6, 200, 400 Hz

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 x 92 mm + 0.8
Converter mass:	max. 500 g

ACCURACY

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

Measurand		Accuracy
Rms current (I1, I2, I3, Iavg, In)		0.5
Rms phase voltage (U1, U2, U3, Uavg)		0.5
Phase-to-phase voltage (U12, U23, U31, Uavg)		0.5
Frequency (f)		0.02
Power factor (PF)		1
Phase and phase-to-phase angle (ϕ, ϕ12, ϕ23, ϕ31)		0.5°
THD		0.5
Active power		0.5
Reactive power		1
Apparent power		0.5
Measurand	**Standard**	**Accuracy**
Active energy	EN 62053-22	Class 0.5S
Reactive energy	EN 62053-23	Class 2
Pulse output	EN 62053-31	Class A & B

COMMUNICATION TYPES

	RS485	RS232	USB
Type of connection	Network	Direct	
Max. conn. length	1000 m	3 m	5 m
Terminals	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	2.400 to 115.200 bit/s		Full speed USB 2.0

COMMUNICATION TERMINALS

Communication		Terminals	
RS232	Screw terminals	Rx	21
		⏚	22
		Tx	23
RS485	Screw terminals	A	21
		Do not connect!	22
		B	23
USB	USB-b type	-	-

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

POWER SUPPLY

UNIVERSAL SUPPLY – FULL RANGE

Nominal voltage AC range	48 … 276 V
Nominal frequency range	40 … 65 Hz
Nominal voltage DC range	20 … 300 V
Consumption	< 3.5 VA

UNIVERSAL SUPPLY – HIGH RANGE

Nominal voltage AC range	85 … 265 V
Nominal frequency range	40 … 65 Hz
Nominal voltage DC range	100 … 265 V
Consumption	< 3.5 VA
Power-on transient current	< 20 A; 3 ms

AC POWER SUPPLY

Nominal voltage AC	57.7 / 63.5 / 100 /110 / 230 / 240 / 400 / 440 / 500 V
Nominal frequency range	40 … 65 Hz
Consumption	< 3.5 VA

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_L	13	
		– / AC_N	14	
Input / Output modules	Output	Out – 1	15	
		C – 1/2	16	
		Out – 2	17	
	Tariff input	T 1/2	18	
		C	19	
		T 3/4	21	

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
Voltage input:	+/- 20 % U_n
Voltage input with voltage auto range:	50 … 500 V
Current input:	0…100 % I_n
Active/reactive power, factor:	cosφ = 1 / sinφ = 1
Waveform:	Sinus
Frequency:	f_N = 50 or 60 Hz

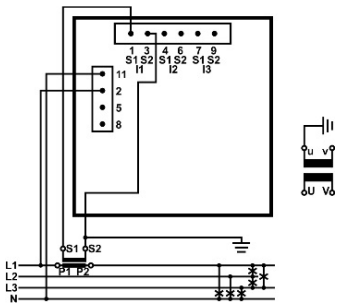
AMBIENT CONDITIONS

Temperature range of operation:	-10 to +60 °C
Storage temperature range:	-40 to +70 °C
Average annual humidity:	≤ 75% r.h.

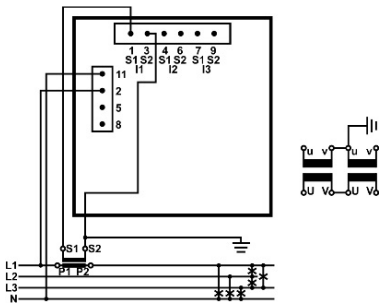
CONNECTION

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

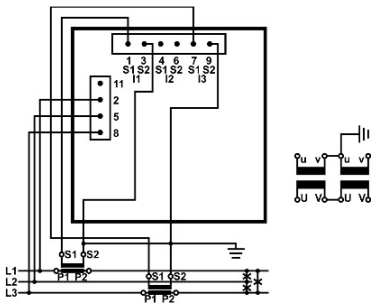
Current inputs shall be connected to network via a corresponding current transformer.



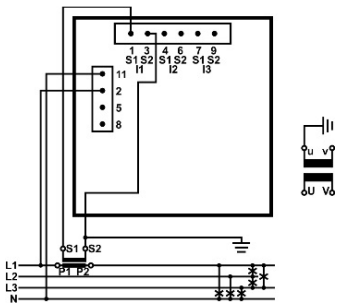
1b (1W1b) – single phase connection



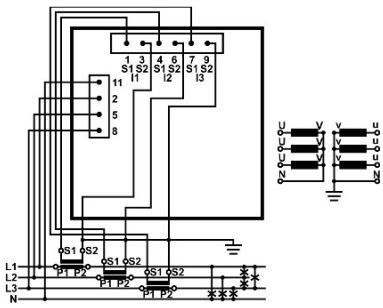
3b (1W3b) – Three phase, three wire connection with balanced load



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

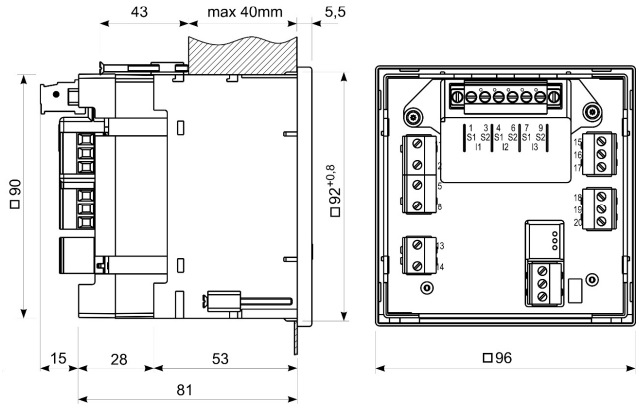


4b (1W4b) – Three phase, four wire connection with balanced load



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

DIMENSIONAL DRAWING



DATA FOR ORDERING

When ordering the meter, all required specifications shall be stated in compliance with the ordering code. Also additional information could be stated if needed. Most typical options are shown as an example.

EXAMPLE OF ORDERING

The MC350 TH meter is connected to secondary phase voltage up to 500 V_{L-N} and 5 A secondary current. Energy accuracy - Active class 1 / Reactive class 2. A universal supply and two modules are built-in the meter. The first module is a relay output and the second one is a tariff input (230 V AC). Meter has USB communication, it is calibrated to frequency 50, 60 Hz, finish is standard.
Ordering code example:

MC350 TH	**S**	**ARNG**	**S**	**U**	**U**	**M**	**D**	**A**	**C**

DATA FOR ORDERING

The following specifications shall be stated:

Device type	Energy Accuracy Class	Voltage Input	Nominal frequency	Aux. power supply	Communication (COM1)	Input /Output1 &2	Input /Output 3&4	Finish	Current Connector		Comment
MC350 TH	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		
									T	Current Transformer *	
									C	Terminal Connector	
								A		Standard *	
								P		IP54	
								H		HVE (Tropical Seal)	
								G		HVE + IP54	
							A			2x Digital input 230 V	
							E			2x Digital input 75 ... 110 V	
							F			2x Digital input 24 V DC	
							T			2x Tariff input 230 V	
							Z			2x Tariff input 75 ... 110 V	
							N			Without *	
							A			2x Analogue output	Only for **H**-Aux. power supply
						S				2x Pulse output	
						M				2x Relay output	
						N				Without *	
					S					RS232	
					D					RS485	
					U					USB	
				U						20 ... 300 V DC, 48 ... 276 V AC *	
				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	
				I						240 V AC	
				J						440 V AC	
				H						100 … 265 V DC, 85 ... 265 V AC	
			S							50, 60 Hz *	
			A							400 Hz	
			B							16,6 Hz	
			C							200 Hz	
		ARNG								50 ... 500 V *	
	S									Active cl.1 / Reactive cl.2 *	
	H									Active cl.0.5S / Reactive cl.2	

* - Default value

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