MULTIFUNCTION METER iMC740

- MEASUREMENTS OF INSTANTANEOUS VALUES OF MORE THAN **140 QUANTITIES**.
- **CLASS S** MEASURING ACCURACY ACCORDING TO EN 61000-4-30.
- VOLTAGE AND CURRENT AUTO RANGE MEASUREMENTS UP TO 1000 V_{TRMS}, 12.5 A.
- **WIDE FREQUENCY** MEASUREMENT **RANGE** 16 HZ – 400 HZ.
- UP TO **THREE INDEPENDENT COMMUNICATION PORTS**.
- SUPPORT FOR **NTP REAL TIME SYNCHRONISATION**.
- UP TO **4 INPUTS/OUTPUTS**.

Iskra

FEATURES

o Measurements of instantaneous values of more than 140 quantities including harmonics, unbalance, etc..

o Class S (0.2%) accuracy in compliance with EN 61557-12.

o Four quadrant energy measurement with class 0.5 S or 0.2 S for active energy (8 programmable energy counters, up to four tariffs, tariff clock, etc.).

o Automatic range selection of 3 current and 4 voltage channels (max. 12.5 A and 1000 V_{TRMS}) with 32 kHz sampling rate.

o Measurements of 40 minimal and maximal values in different time intervals (from 1 period to 256 periods).

o Frequency range from 16 Hz to 400 Hz.

o Up to three independent communication ports (RS232 or RS485 up to 115,200 bit/s, Ethernet and USB 2.0).

o MODBUS and DNP3 communication protocols.

o Support for NTP real time synchronisation.

o Up to 4 inputs and outputs (analogue inputs/outputs, digital inputs/outputs, alarm/watchdog outputs, pulse input/outputs, tariff inputs).

o Multilingual support.

o Universal power supply.

o 96 mm square panel mounting.

o User-friendly setting and evaluation software, MiQen.

o Extension unit with four configurable analogue outputs – EX104 (0.4 mA_{DC} … 20 mA_{DC}, 0 V_{DC} … 10 V_{DC}).

DESCRIPTION

The iMC740 Multifunction Meter is an important device for permanent monitoring measuring and analysing single-phase or three-phase electrical power network.

The meter measures 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, THD phase angles, etc.) from the measured signals.

The iMC740 Multifunction Meter performs measurements in compliance with regulatory requested standard EN 61557-12.

With the RS232/RS485 or Ethernet/USB communication, the meter can be set, and measurements checked.

APPLICATION AND BENEFITS

The iMC740 Multifunction Meter is intended for monitoring and measuring of electrical quantities of a three-phase electric-energy distribution system.

Identifying relevant fixed measuring points is the most important task prior to complete system installation. This system itself will not prevent disturbances in network but will help diagnose their origin and effects. This is possible only with a system approach by using time synchronized meters with wide range of measuring parameters.

COMPLIANCE WITH STANDARDS

The iMC740 Multifunction Meter follows required procedures and meets the precision requirements for class S measuring device as described in standard IEC EN 61557-12.

Standard EN	Description
61010-1	*Safety requirements for electrical equipment for measurement, control and laboratory use.*
61557-12	*Electrical safety in LV distribution systems up to 1 kV a.c. and 1.5 kV d.c. – Combined performance measuring and monitoring devices for electrical parameters.*
61000-4-7:2002 + A1	*Electromagnetic compatibility (EMC) – General guide on harmonics and inter-harmonics measurements.*
50160	*Voltage characteristics of electricity supplied by public distribution networks.*
62053-22	*Electricity metering equipment - Static meters for active energy (classes 0.2 S and 0.5 S).*
62053-24	*Electricity metering equipment – Static meters for reactive energy at fundamental frequency (classes 0,5 S, 1 S and 1).*
62053-23	*Electricity metering equipment -Static meters for reactive energy (classes 2 and 3).*
61326-1	*EMC requirements for electrical equipment for measurement, control and laboratory use.*
60529:1997/A1	*Degrees of protection provided by enclosures (IP code).*
60068-2-1/ -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***

MEASUREMENTS

ONLINE MEASUREMENTS

Online measurements are available on display or can be monitored with setting and monitoring software **MiQen**.

Readings on display are performed continuously with refresh time dependent on set average interval whereas rate of readings monitored with **MiQen** is fixed and refreshed approx. each second.

For better overview over numerous readings, they are divided into several groups, which contain basic measurements, min. and max. values, harmonics and alarms.

Each group can represent data in visually favored graphical form or detailed tabular form. Latter allows freezing readings and/or copying data into various report generation software tools.

INTERACTIVE INSTRUMENT

Additional communication feature of a device allows interactive handling with a dislocated device as if it would be operational in front of user.

This feature is useful for presentations or product training.
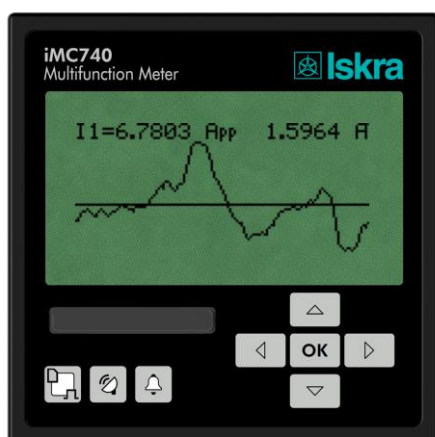
SELECTION OF AVAILABLE QUANTITIES

Available online measuring quantities and their appearance can vary according to set type of power network and other settings such as

average interval, max. demand mode, reactive power calculation method …

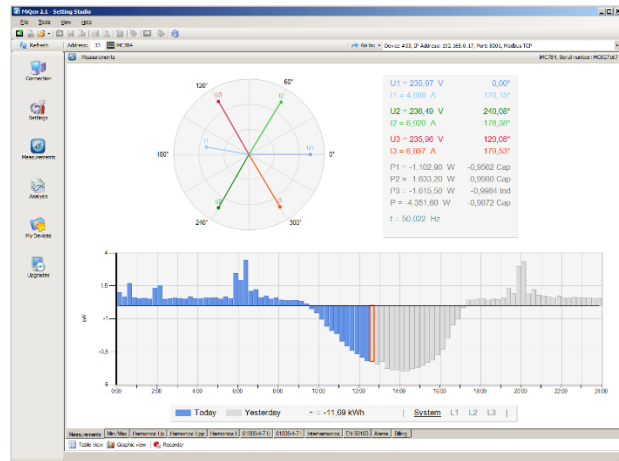Complete selection of available online measuring quantities is shown in a table on the next page.

Figure 1: **The sample of online measurements in graphical form – phase diagram and daily total active power consumption histogram**
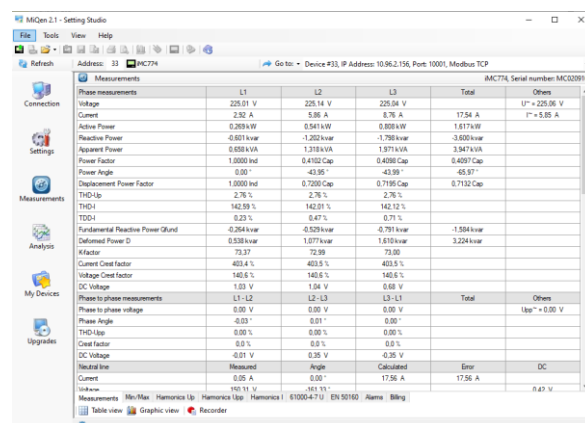

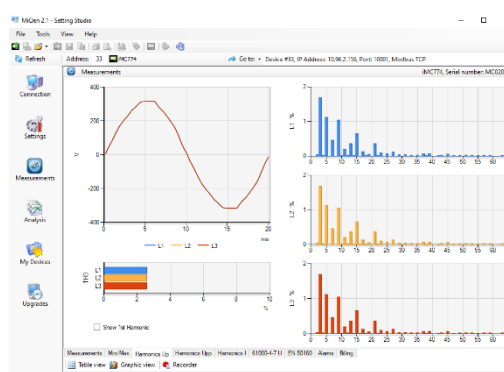*Figure 2:* **The sample of online measurements in tabular form**

Figure 3: **The sample of online harmonic measurements in graphical form**

Meas. type	Measurement	3-phase 4-wire	3-phase 3-wire	1-phase	comments
Phase measurements	*Voltage*				
	$U_{1\text{-}3\_TRMS}$	☑		☑1ph	
	U_{AVG_TRMS}	☑		☑	
	$U_{1\text{-}3\_DC}$	☑		☑1ph	*DC component of phase voltages*
	Current				
	$I_{1\text{-}3\_TRMS}$	☑	☑	☑1ph	
	I_{TOT_TRMS}	☑	☑	☑	
	I_{AVG_TRMS}	☑	☑	☑	
	$I_{NEUTRAL\_calc}$	☑	☑	☑	*Calculated neutral current*
	Power				
	$P_{1\text{-}3\_TRMS}$	☑		☑1ph	
	P_{TOT_TRMS}	☑	☑	☑	
	$Q_{1\text{-}3\_TRMS}$	☑📖		☑1ph📖	*Reactive power can be calculated as a squared difference between S and P or as delayed sample*
	Q_{TOT_TRMS}	☑	☑	☑	
	$S_{1\text{-}3\_TRMS}$	☑		☑1ph	
	S_{TOT_TRMS}	☑	☑	☑	
	$Q_{fund1\text{-}3\_TRMS}$	☑📖		☑1ph📖	*Fundamental reactive power of first harmonics*
	$Q_{fundTOT\_TRMS}$	☑	☑	☑	
	$PF_{1\text{-}3}$	☑		☑1ph	
	PF_{TOT}	☑	☑	☑	
	$\varphi_{1\text{-}3}$	☑		☑1ph	*PA – Power angle*
	Harmonic analysis				
	THD-$U_{1\text{-}3}$	☑		☑1ph	
	THD-$I_{1\text{-}3}$	☑	☑	☑1ph	
	TDD-$I_{1\text{-}3}$	☑	☑	☑1ph	
	$U_{1\text{-}3\_harmonic\_1\text{-}63\_\%}$	☑📖		☑1ph📖	*% of TRMS or % of base*
	$U_{1\text{-}3\_harmonic\_1\text{-}63\_ABS}$	☑		☑1ph	
	$U_{1\text{-}3\_harmonic\_1\text{-}63\_\varphi}$	☑		☑1ph	
	$U_{1\text{-}3\_signaling\_ABS}$	☑		☑1ph	
	$I_{1\text{-}3\_harmonic\_1\text{-}63\_\%}$	☑📖	☑📖	☑1ph📖	*% of TRMS or % of base*
	$I_{1\text{-}3\_harmonic\_1\text{-}63\_ABS}$	☑	☑	☑1ph	
	$I_{1\text{-}3\_harmonic\_1\text{-}63\_\varphi}$	☑	☑	☑1ph	
Phase to phase measurements	*Voltage*				
	$Upp_{1\text{-}3\_TRMS}$	☑	☑		
	Upp_{AVG_TRMS}	☑	☑		
	$\varphi_{x\text{-}y}$	☑	☑		*Phase-to-phase angle*
	Harmonic analysis				
	THD-$Upp_{1\text{-}3}$	☑	☑		
	$Upp_{1\text{-}3\_harmonic\_1\text{-}63\_\%}$	☑📖	☑📖		*% of TRMS or % of base*
	$Upp_{1\text{-}3\_harmonic\_1\text{-}63\_ABS}$	☑	☑		
	$Upp_{1\text{-}3\_harmonic\_1\text{-}63\_\varphi}$	☑	☑		

Meas. type	Measurement	3-phase 4-wire	3-phase 3-wire	1-phase	comments
Metering	*Energy*				
	Counter E_{1-8}	☑	☑	☑	*Each counter can be dedicated to any of four quadrants (P-Q, import-export, L-C). Total energy is a sum of one counter for all tariffs. Tariffs can be fixed, date/time dependent or tariff input dependent*
	$E_{\_TOT\_1-8}$	☑	☑	☑	
	Active tariff	☑	☑	☑	
	Cost_by_meters$_{1-4}$	☑	☑	☑	*Calculated costs depend on specified price per hour and currency*
	Cost$_{1-4\_TOT}$	☑	☑	☑	
	Billing	☑	☑	☑	
Maximum demand measurements	*Maximum demand*				
	MD_I_{1-3}	☑	☑	☑1ph	
	MD_P_{import}	☑	☑	☑	
	MD_P_{export}	☑	☑	☑	
	MD_Q_{ind}	☑	☑	☑	
	MD_Q_{cap}	☑	☑	☑	
	MD_S	☑	☑	☑	
Min and max measurements	*Min and max*				
	$U_{1-3\_TRMS\_MIN}$	☑		☑1ph	
	$U_{1-3\_TRMS\_MAX}$	☑		☑1ph	
	$Upp_{1-3\_TRMS\_MIN}$	☑	☑	☑	
	$Upp_{1-3\_TRMS\_MAX}$	☑	☑	☑	
	$I_{1-3\_TRMS\_MIN}$	☑	☑	☑1ph	
	$I_{1-3\_TRMS\_MAX}$	☑	☑	☑1ph	
	$P_{1-3\_TRMS\_MIN}$	☑		☑1ph	
	$P_{1-3\_TRMS\_MAX}$	☑		☑1ph	
	$P_{TOT\_TRMS\_MIN}$	☑	☑	☑1ph	
	$P_{TOT\_TRMS\_MAX}$	☑	☑	☑1ph	
	$S_{1-3\_TRMS\_MIN}$	☑		☑1ph	
	$S_{1-3\_TRMS\_MAX}$	☑		☑1ph	
	$S_{TOT\_TRMS\_MIN}$	☑	☑	☑1ph	
	$S_{TOT\_TRMS\_MAX}$	☑	☑	☑1ph	
	$freq_{MIN}$	☑	☑	☑	
	$freq_{MAX}$	☑	☑	☑	
Other measurements	*Miscellaneous*				
	$freq_{MEAN}$	☑	☑	☑	
	Internal temp.	☑	☑	☑	
	Date, Time	☑	☑	☑	
	Last Sync. time	☑📖	☑📖	☑📖	*UTC*

📖 For more information see ***iMC7×0 Power Monitoring Device*** User's manual

*Table 3: **Selection of available measurement quantities***

DESCRIPTION OF PROPERTIES

Memory card

The iMC740 Multifunction Meter is equipped with a front panel slot for full sized SD memory card that supports capacity up to 2 GB. It is intended for setting file and performing firmware upgrade.

Alarms

Alarms are powerful tool for **the iMC740 Multifunction Meter** control and supervision features. Devices' performance can with this features reach beyond measuring and analyzing power network.
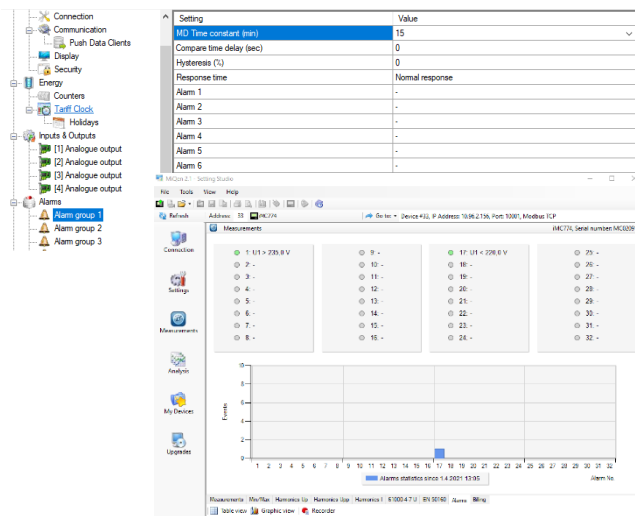

*Figure 4: **The sample of setting and viewing alarms***

REAL TIME SYNCHRONISATION

For this purpose, instruments normally support highly accurate internal RTC. Still this is not enough, since temperature is location dependant and it influences its precision. For that reason, it is required to implement periodical RTC synchronization.

The iMC740 Multifunction Meter supports Network time protocol synchronization (NTP).

Network time protocol (NTP):

Synchronization via Ethernet requires access to an NTP server.

> **PLEASE NOTE:** NTP can usually maintain time to within tens of milliseconds over the public Internet, but the accuracy depends on infrastructure properties - asymmetry in outgoing and incoming communication delay affects systematic bias. It is recommended that dedicated network rather than public network is used for synchronisation purposes.

COMMUNICATION

The iMC740 Multifunction Meter has a wide variety of communication possibilities to suit specific demands. It is equipped with standard communication port COM1 and auxiliary communication port COM2. This allows two different users to access data from a device simultaneously and by using TCP/IP communication, data can be accessed worldwide.

COM2 port is optional and can be ordered as one of I/O modules.

Different configurations are possible (to be specified with an order).

Configuration	COM1	COM2
1	RS232/485	/
2	RS232/485	RS232 or RS485
3[(1)]	Ethernet & USB	/
4[(1)]	Ethernet & USB	RS232 or RS485

[(1)] *Galvanic separation between Eth. and USB is 1 kVACTRMS*

*Table 4: **List of communication configurations***

The iMC740 Multifunction Meter supports standard communication protocols MODBUS RTU, TCP and DNP3 L1.

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 for communication with EX104 needs to be specified at order). Up to 4 analogue outputs can be used with one extender. Up to 4 extender EX104 can be used with one iMC740 meter. More information can be found in Analogue extender EX104 data sheet (E P22.495.400).

TECHNICAL DATA

Measurement inputs

Nominal frequency range	*50 Hz, 60 Hz*
Measuring frequency range	*16 Hz–400 Hz*

Voltage measurements:

Number of channels	*4 [1]*
Sampling rate	*32 kHz*
Min. voltage for sync.	*1 V_{TRMS}*
Nominal value (U_N)	*500 V_{LN} , 866 V_{LL}*
Max. measured value (cont.)	*600 V_{LN} ; 1000 V_{LL}*
Max. allowed value	*1.2 × U_N permanently*
	2 × U_N ; 10 s
Consumption	*< U^2 / 4.2MΩ per phase*
Input impedance	*4.2MΩ per phase*

[1] 4th channel is used for measuring U EARTH-NEUTRAL

Current measurements:

Number of channels	*3*
Sampling rate	*32 kHz*
Nominal value (I_{NOM})	*1 A, 5 A*
Max. measured value (I_1-I_3 only)	*12.5 A sin.*
Max. allowed value (thermal)	*15 A cont.*
	≤ 300 A; 1s
Consumption	*< I^2 × 0.01Ω per phase*

Basic accuracy under reference conditions

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

Measurand	Accuracy class	According to
Voltage L-N, L-L	0.2	EN 61557-12
Current	0.2	EN 61557-12
Active power (I_N = 5 A)	0.2	EN 61557-12
Active power (I_N = 1 A)	0.5	EN 61557-12
Active energy	0.5S	EN 62053-22
Reactive energy	1	EN 62053-24
Frequency (f)	0.02 Class A	EN 61557-12
Power factor (PF)	0.5	EN 61557-12
THD (U)	0.3 Class A / I	EN 61557-12
THD (I)	0.3	EN 61557-12
Real time clock (RTC)	< ± 1 s/day	IEC 61000-4-30

For complete overview of accuracy for all measured parameters and measuring ranges see Users' manual.

INPUT/OUTPUT modules

The iMC740 Multifunction Meter is equipped with two main I/O slots. According to order, each slots' function can be as presented in a table below.

Module type	Number of I/O per module
Relay output (RO)	2
Analogue output (AO)	2 x 20 mA
Analogue input (AI)	2
Pulse output (PO)	2
Pulse input (PI)	2
Bistable Digital output (BO)	1
Digital output (DO)	2
Digital input (DI)	2
Tariff input (TI)	2
Additional communication port (COM2)	1
Status output (WO)	1 + 1xRO
Communication port for analogue extender EX104	1

*Table 5: **List of available I/O modules***

Analogue input:

Three types of analogue inputs are suitable for acquisition of low voltage DC signals from different sensors. According to application requirements it is possible to choose current, voltage or resistance (temperature) analogue input. They all use the same output terminals.

MiQen software allows setting an appropriate calculation factor, exponent and required unit for representation of primary measured value (temperature, pressure, wind speed …).

DC current input:

Nominal input range	*−20 mA…0…20 mA (±20%)*
Input resistance	*20 Ω*
Accuracy	*0.5 % of range*
Temperature drift	*0.01% / °C*
Conversion resolution	*16 bit (sigma-delta) internally referenced*
Analogue input mode	*Single-ended*

DC voltage input:

Nominal input range	–10 V...0...10 V (±20%)
Input resistance	100 kΩ
Accuracy	0.5 % of range
Temperature drift	0.01% / °C
Conversion resolution	16 bit (sigma-delta) internally referenced
Analogue input mode	Single-ended

Resistance (temperature) input:

Nominal input range (low)*	0 Ω - 200 Ω (max. 400 Ω) PT100 (-200°C–850°C)
Nominal input range (high)*	0 kΩ – 2 kΩ (max. 4 kΩ) PT1000 (-200°C–850°C)
Connection	2-wire
Accuracy	0.5 % of range
Conversion resolution	16 bit (sigma-delta) internally referenced
Analogue input mode	Single-ended

* Low or high input range and primary input value (resistance or temperature) are set by the MiQen setting software

Analogue output:

Output range	0 mA...20 mA
Accuracy	0.5% of range
Max. burden	150 Ω
Linearization	Linear, Quadratic
No. of break points	5
Output value limits	$\pm$120% of nominal output
Response time (measurement and analogue output)	depends on set general average interval (0.1 s – 5 s)
Residual ripple	< 1 % p.p.

Outputs may be either short or open-circuited. They are electrically insulated from each other and from all other circuits.

Output range values can be altered subsequently (zoom scale) using the setting software, but a supplementary error results.

Digital input:

Purpose	Tariff input, Pulse input, General purpose digital input

Tariff input

No. of inputs per module	2
Rated voltage	5 V...48 $V_{AC/DC}$* 110 ± 20 % $V_{AC/DC}$* 230 ± 20 %$V_{AC/DC}$* *Depends on a build in hardware
Frequency range	45 Hz...65 Hz

Pulse input

No. of inputs per module	2
Rated voltage	5 V- 48 V_{DC} (±20 %)
Max. current	8 mA (at 48 V_{DC} + 20 %)
Min. pulse width	0.5 ms
Min. pulse period	2 ms
SET voltage	(40...120) % of rated voltage
RESET voltage	(0...10) % of rated voltage

General purpose digital input

No. of inputs per module	2
Voltage	5 V...48 $V_{AC/DC}$* 110 ± 20 % $V_{AC/DC}$* 230 ± 20 %$V_{AC/DC}$* *Depends on a build in hardware

Digital output:

Type	Relay switch
No. of outputs per module	2
Purpose	Alarm output, General purpose Digital output, Pulse output, Status output (watchdog)
Rated voltage	230 $V_{AC/DC}$ ± 20% max
Max. switching current	1000 mA
Contact resistance	≤ 100 mΩ (100 mA, 24 V)
Impulse	Max. 4000 imp/hour Min. length 100 ms

Type	Bistable Relay switch
No. of outputs per module	1
Purpose	Alarm output, General purpose digital output
Max. switching power	40 VA
Rated voltage	230 $V_{AC/DC}$ ± 20% max
Max. switching current	1000 mA
Contact resistance	≤ 100 mΩ (100 mA, 24 V)

Type	Optocoupler open collector switch
No. of outputs per module	2
Purpose	Pulse output
Rated voltage	40 $V_{AC/DC}$
Max.switching	30 mA (R_{ONmax} = 8 Ω)
Pulse length	programmable (2 ms... 999 ms)

Type		**Mechanical**	
No. of outputs	*1 x watchdog + 1 x relay output*	Dimensions	*96 mm × 96 mm × 96.5 mm*
Normal operation	*Relay in ON position*	Mounting	*Panel mounting*
Failure detection delay	*≈ 1.5 s*		*96 mm × 96 mm*
		Required mounting hole	*92 mm × 92 mm*
Rated voltage	*230 V$_{AC/DC}$ ±20 % max*	Enclosure material	*PC/ABS*
Max. switching current	*1000 mA*	Flammability	*Acc. to UL 94 V-0*
		Weight	*550 g*
Contact resistance	*≤ 100 mΩ (100 mA, 24 V)*	Enclosure material	*PC/ABS*
			Acc. to UL 94 V-0

Power Supply

Standard:	*CAT III 300V*
Nominal voltage AC	*48 V… 276 V*
Nominal frequency	*40 Hz… 65 Hz*
Nominal voltage DC	*20 V… 300 V*
Consumption (max. all I/O)	*< 8 VA*
Power-on transient current	*< 20 A; 1 ms*
AC power supply	*CAT III 300 V*
Nominal voltage AC	*110 V, 230 V or 400 V*
Nominal frequency	*40 Hz… 65 Hz*
Consumption (max. all I/O)	*< 8 VA*

Ambient conditions

Ambient temperature	*K55 temperature class*
	Acc. to EN 61557-12
	-10 °C …55 °C
Storage temperature	*-40 °C to +70 °C*
Ambient humidity	*≤ 75% r.h. (no condensation)*
Max. storage and transport humidity	*≤ 90% r.h. (no condensation)*
Voltage and current max. temperature influence limit	*± 20 ppm / K*
	(10 V-600 V; 0.05 A-10 A)
	(T$_{amb}$: -30°C to +70°C)

Safety

Safety:	*protection class **II***
	functional earth terminal must be connected to earth potential!
⚠ ▣	*Voltage inputs via high impedance Double insulation for I/O ports and COM ports*
Pollution degree:	*2*
Test voltages:	*U$_{AUX}$ against SELV circuits – 3.51 kV RMS*
	Other circuits to functional earth – 2.21 kV RMS
EMC:	*Directive on electromagnetic compatibility 2004/108/EC*
	In compliance with EN 61326-1:2013 for industrial environment
Protection:	*In compliance with EN 60529: 1997/A1:2000*
	Front side (with protection cover for memory slot: IP40
	Rear side (with protection cover): IP20

Real time clock

A built-in real time clock is also without external synchronization very stable when device is connected to auxiliary power supply. For handling shorter power interruptions without influence on RTC, device uses high capacity capacitor battery. It ensures auxiliary supply (for internal RTC only) for more than two days of operation (6 years with battery).

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

Supercap life span	*approx. 2 days*
Type	*Low power embedded RTC*
RTC stability	*< 1 sec / day*
Battery life span	*approx. 6 years (at 23 °C)*

Connection cables

The iMC740 Multifunction Meter is equipped with European style pluggable terminals for measuring voltages, auxiliary supply, communication and I/O modules.

Measuring current cables can be connected in two ways. They shall be attached as through-hole connection without screwing or as detachable screw terminals.

> **PLEASE NOTE:** Stranded wire must be used with insulated end sleeve to assure firm connection.

Voltage inputs (4)	*≤2.5 mm² , AWG 24-12 single wire*
Current inputs (3)	*≤Ø 6 mm one conductor with insulation*
Supply (3)	*≤2.5 mm² , AWG 24-12 single wire*
Com (5), I/O (6)	*≤2.5 mm² , AWG 24-12 single wire*

MiQen - setting and acquisition Software

MiQen software is intended for supervision of the **iMC740** and many other instruments on a PC. Network and the device setting, display of measured and stored values and analysis of stored data in the device 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 XP operating system or higher.
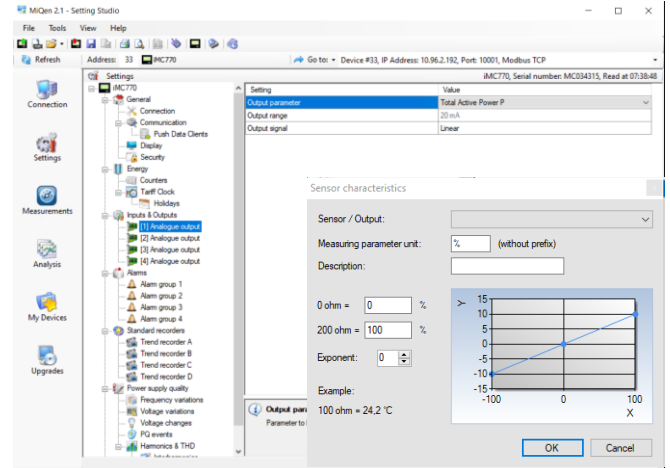
*Figure 5: **MiQen setting and acquisition software***
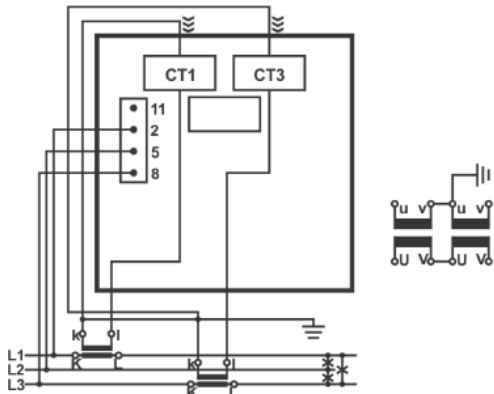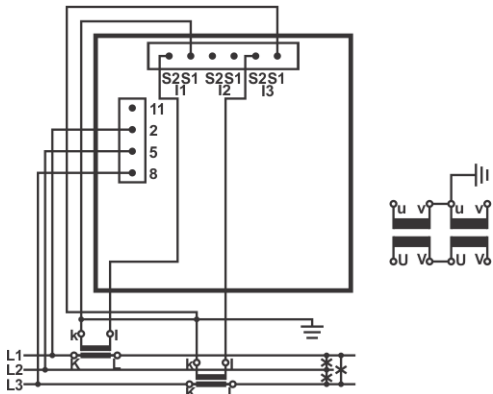
MiQen software is intended for:
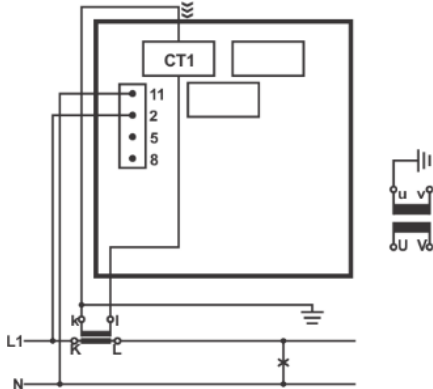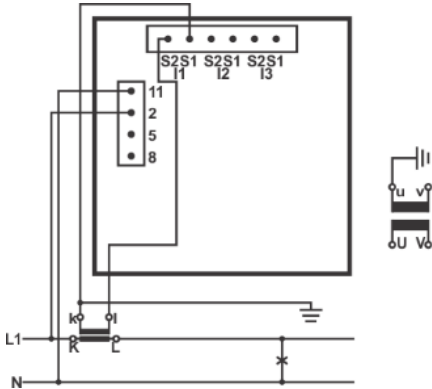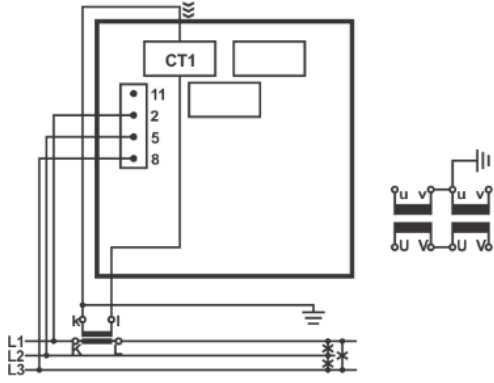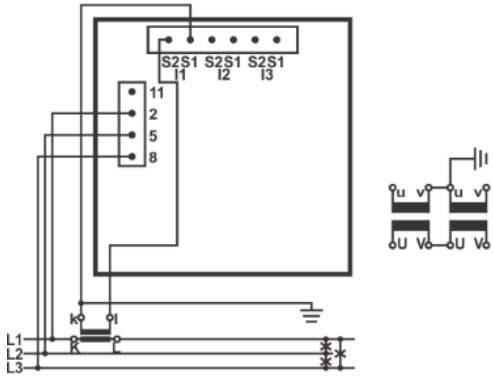
- Setting all of the instruments parameters (online and offline).
- Viewing current measured readings.
- Setting and resetting energy counters.
- Complete I/O modules configuration.
- Upgrading instruments firmware.
- Searching the net for devices.
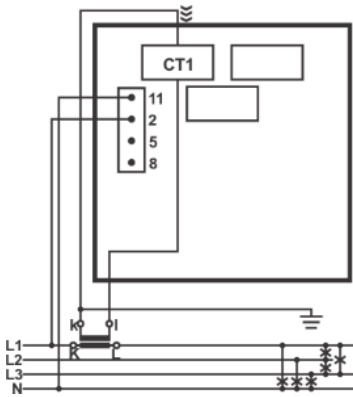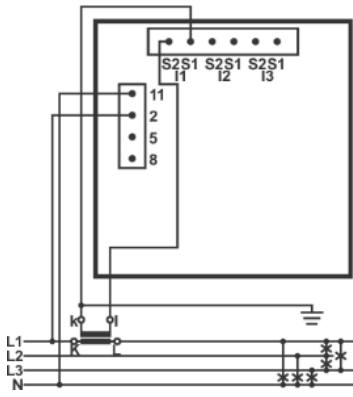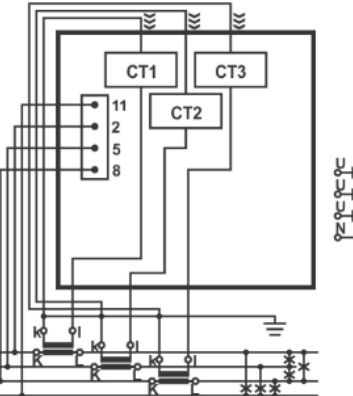- Virtual interactive instrument.
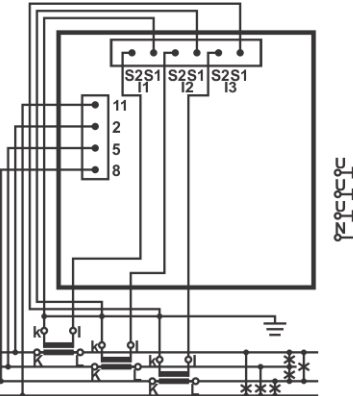- Comprehensive help support.

> **PLEASE NOTE!**
>
> MiQen software functions depend on the type of connected device.
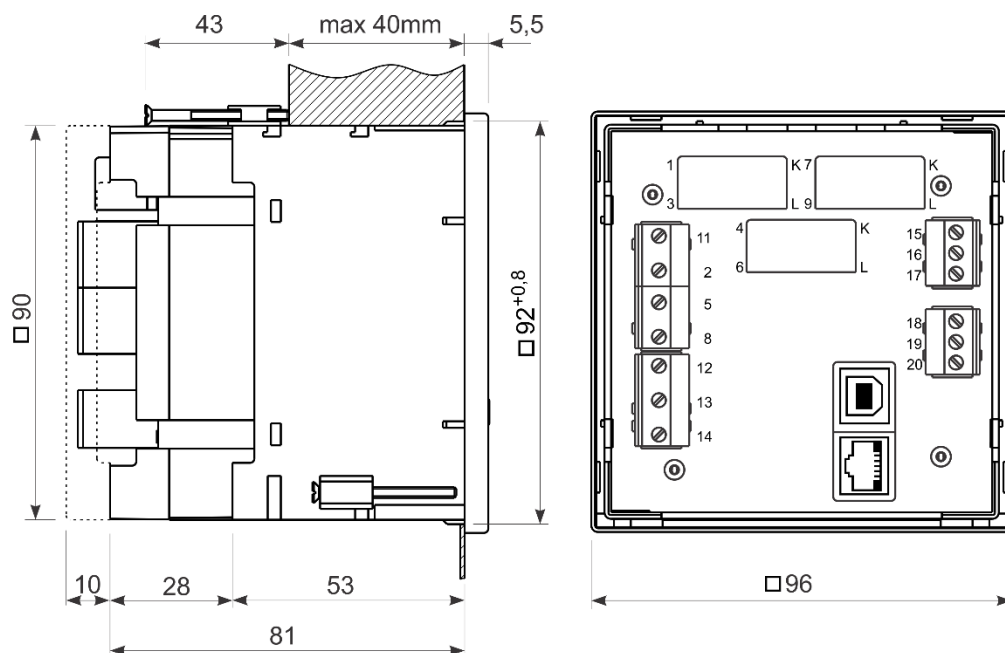
CONNECTION

Two possible connections of current are available, through-hole connection and terminal connection (see pictures below).

| System/connection	Through-hole connection assignment	Terminal connection assignment
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.		

System/connection	Through-hole connection assignment	Terminal connection assignment
4b (1W4b) Three-phase, four wire connection with balanced load.		
4u (3W4) Three-phase, four wire connection with unbalanced load.		

DIMENSIONAL DRAWING

Dimensions for iMC740 (through-hole connection assignment):

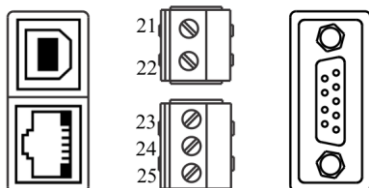Dimensions for iMC740 (terminal connection assignment):
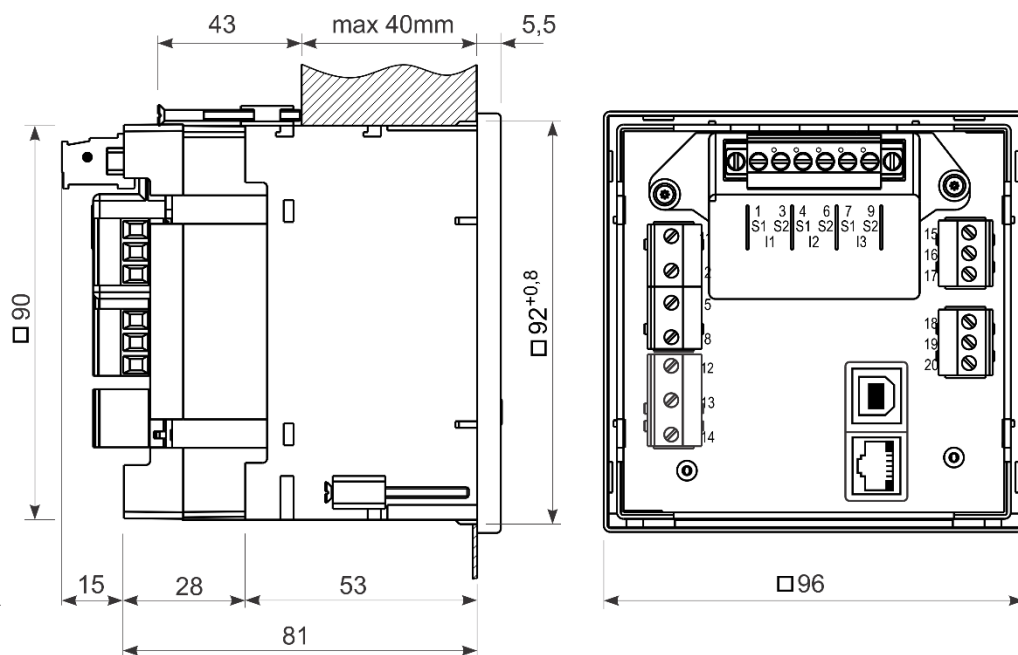
PLEASE NOTE: Terminals for communication could be chosen (see picture below).

Terminals options

Connection table

| Function			Terminals	Comment
Measuring input:	AC current	IL1	1/3	⚠ CAT II 600V CAT III 300V
		IL2	4/6	
		IL3	7/9	
	AC voltage	UL1	2	⚠ CAT II 600V CAT III 300V
		UL2	5	
		UL3	8	
		UN	11	
Inputs/outputs:	Module 1/2	�⟍ +	15	
		�⟍ − (common)	16	
		�⟍ +	17	
	Module 3/4	�⟍ +	18	
		�⟍ − (common)	19	
		�⟍ +	20	
Auxiliary power supply:		+ / AC (L)	13	⚠ CAT III 300V
		− / AC (N)	14	
		GROUND	12	⚡ GROUND terminal must be always connected !!
Communication:	RS485	A	21	RS232 and RS485 are both supported, but only one at the time can be used!
		B	22	
	RS232	RX	23	In case of Ethernet / USB communication, terminals from 21 to 25 are replaced with RJ45 and USB-B
		GND	24	
		TX	25	
Communication: DB9 female	RS232	Rx	3	RS232 and RS485 are both supported, but only one at the time can be used!
		⏚	5	
		Tx	2	
	RS485	B	7	
		A	8	

Table 6: **Connections**

DATA FOR ORDERING

When ordering **The iMC740 Multifunction Meter**, all required specifications shall be stated in compliance with the ordering code. Additional information could be stated. PLEASE NOTE that fixed or programmable specifications are not part of ordering code.

General ordering code

The following specifications shall be stated:

Device Type	Nominal freq.	Aux. power supply	Comm. COM1	I/O module 1/2	I/O module 3/4	RTC backup supply	Current connection
iMC740	X	X	X	X	X	X	X

Current connection
- **T** Through Hole Transformer *
- **C** Screw Terminal Connector *****

RTC backup supply
- **C** Supercap *
- **B** Battery

I/O module 1/2 / I/O module 3/4
- **N** Without *
- **A** 2× Analogue output ****
- **S** 2× Pulse output
- **M** 2× Relay (alarm) output
- **B** 1× Bistable relay (alarm) output
- **W** 1× Status + 1× Relay output
- **I** 2× Analogue input - mA $_{DC}$
- **U** 2× Analogue input - V $_{DC}$
- **R** 2× Analogue input - R/Temp.
- **P** 2× Pulse input 5 - 48 V $_{DC}$
- **D** 2× Digital input 230 V $_{AC/DC}$
- **E** 2× Digital input 110 V $_{AC/DC}$
- **F** 2× Digital input 5 - 48 V $_{AC/DC}$
- **T** 2× Tariff input 230 V $_{AC/DC}$ ***
- **Z** 2× Tariff input 110 V $_{AC/DC}$ ***
- **Y** 2× Tariff input 5 - 48 V $_{AC/DC}$ ***
- **G** RS232 Communication - COM2 **
- **C** RS485 Communication - COM2 **
- **X** Output Extender - COM2 **

Comm. COM1
- **T** RS232 & RS485 Terminal *
- **R** RS232 & 485 DB9
- **E** Ethernet & USB

Aux. power supply
- **U** 20 ... 300 V $_{DC}$, 48 ... 276 V $_{AC}$ *
- **D** 110 V $_{AC}$
- **E** 230 V $_{AC}$
- **F** 400 V $_{AC}$

Nominal freq.
- **S** 50, 60 Hz *
- **A** 400 Hz
- **B** 16 2/3 Hz

*	-	**standard**
**	-	**I/O module 3/4 only**
***	-	**I/O module 1/2 only**
****	-	**not available for Nominal freq. 16 2/3 Hz**
*****	-	**without protection back cover**

Example of ordering:

iMC740 with a universal supply is connected to 230 V voltage and 5 A secondary current on 50 Hz network. Ethernet & USB communication, watchdog output (plus one relay output) as I/O 1/2 and two pulse outputs as I/O 3/4. RTC with supercap supply. Through-hole type current transformers.

Voltage and current nominal value are due to auto-range fixed to max. nominal value and are therefore omitted from ordering code.

Connection type is user programmable and is therefore omitted from ordering code. Default is 4u connection.

Example ordering code:

iMC740	**S**	**U**	**E**	**W**	**S**	**C**	**T**
	|	|	|	|	|	|	|
	|	|	|	|	|	|	Through Hole Transformer
	|	|	|	|	|	Supercap	
	|	|	|	|	2× Pulse output		
	|	|	|	1× Status (Watchdog) + 1× Relay output			
	|	|	Ethernet & USB				
	|	Universal (20 V DC… 300 V DC, 48 V AC… 276 V AC)					
	50 Hz, 60 Hz						

DICTIONARY:

PQ	*Power Quality alias Voltage Quality*
RMS	*Root Mean Square*
TRMS	*True Root Mean Square*
PA	*Power angle (between current and voltage)*
PF	*Power factor*
VT	*Voltage measuring transformer*
CT	*Current measuring transformer*
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*
IRIG	*Inter-range instrumentation group time codes*
NTP	*Network Time Protocol*