

Features

Measurements

- All 3-phase AC measurements
- True RMS
- Replaces analogue meters

Intelligent

- Suitable for all 3-phase network topologies
- Replaces transducers

Communication

- Suitable for SCADA systems
- RS485 serial output
- Modbus RTU protocol

Accuracy

- U, I and F class 0.2
- Other values class 0.5

Installation

- Compact dimensions
- Simple wiring

Display

- 5 display rows
- 58 x 66 mm
- Blue backlight

Application

The MIC multi-instrument is a microprocessor-based measuring unit providing measurement of all electrical quantities on a 3-phase electric energy distribution network. The measurements are shown on the built-in display. The MIC also has an RS485 interface that supports data exchange with a control system via Modbus RTU.

The MIC product family includes two versions:

- MIC 4002 (basic)
- MIC 4224 (additional functionality)

The MIC measures true RMS values on all 3-phase network topologies with/without neutral and with both balanced and unbalanced load.

The MIC can replace a large number of standard analogue instruments in all electrical measuring applications. It can be applied both as a regular instrument and as a remote value-reading and control unit, where all measured values are transmitted to the remote control system via the serial interface. The MIC contains all necessary measuring circuits and presents all values on a display with blue backlight. The display has 4 digits resolution for all measurements with the exception of the energy counter values (9 digits). The backlight "on"-time is selectable.

The MIC is a flexible measuring unit that enables the user to easily adapt the instrument to the individual application. Counter reset and change of the instrument settings can be password protected.

Measured and calculated values

Voltage (phase-neutral)

Actual voltage of each phase and average voltage.

Voltage (phase to phase)

Actual voltage of each line and average voltage.

Current

Actual current of each phase, average current and neutral current.

Active power

Actual active power of each phase and total power.

Reactive power

Actual reactive power of each phase and total reactive power.

Apparent power

Actual apparent power of each phase and total apparent power.

Power factor

Actual power factor of each phase and system average power factor.

Frequency

Actual frequency of L1.

Power quality

Voltage/current unbalance factor, total harmonics distortion of voltage/current of each phase and total harmonics distortion of average voltage/current.

Energy counter

The MIC has 8 counters: Export/import kWh, export/import kvarh, absolute sum of export/import kWh, algebraic sum of export/import kWh, absolute sum of export/import kvarh, algebraic sum of export/import kvarh.

Statistics data

Max./min. values of voltage, current, total power, total reactive power, total apparent power, power demand, power factor and frequency.

Running hour

Meters the duration of the operation.

Real time clock

Date and time.

Connection

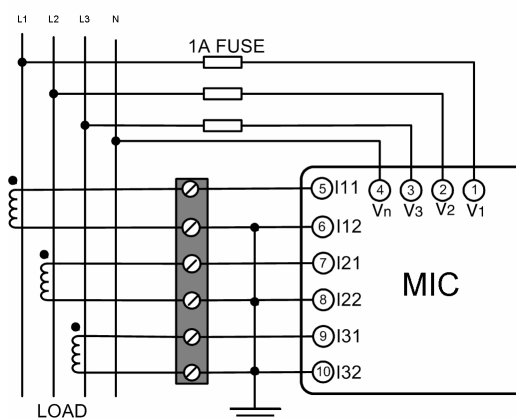
The multi-instrument MIC can be used in almost all 3-phase network topologies with/without neutral and with both balanced and unbalanced load. The voltage and current input wiring modes are set separately in the parameter setting process. The voltage wiring mode can be:

3LN	3-phase 4-line Y
2LN	3-phase 4-line Y with 2 PT
2LL	3-phase 3-line open delta

The current input wiring mode can be:

3CT	Unbalance system
2CT	Unbalance system without N
1CT	Balance system

Any voltage mode can be grouped with any of the current modes. The MIC is supplied configured in 3-phase 4-wire unbalanced mode, i.e. voltage wiring mode 3LN and current input mode 3CT (3W4).



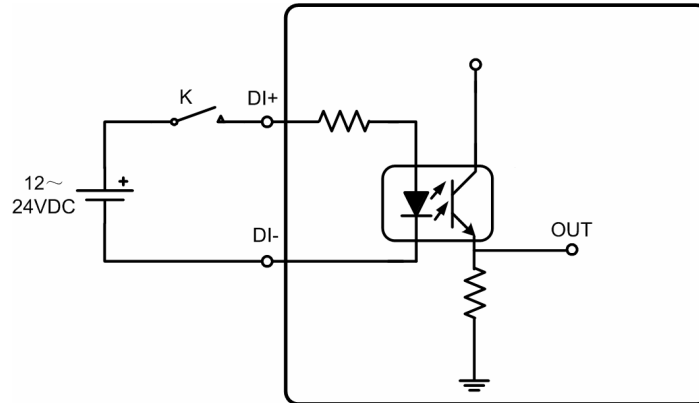
Principle diagram for 3LN, 3CT Connection (3W4)

I/O

MIC 4002

Digital input

MIC 4002 has two digital inputs that can be used to show the status of the switches in the power system:



Digital input circuit

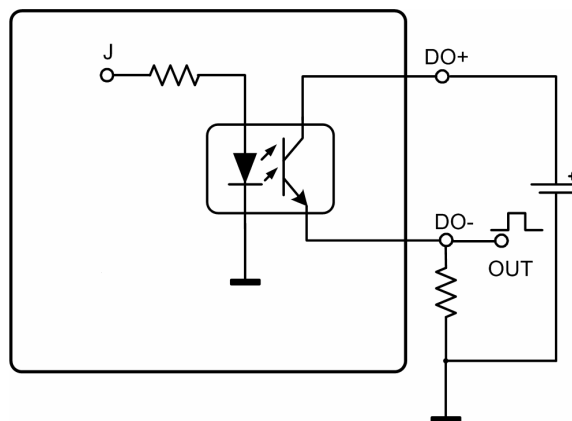
MIC 4224

Relay output

The two relay outputs are used to control electric switches in the power system via the Modbus RTU communication.

Digital output

MIC 4224 has two digital outputs that can be used either as pulse outputs for actual and reactive energy or as over/under the limit alarm signals. The digital outputs are suitable for driving tariff devices or 24V DC relays:



Digital output circuit (pulse)

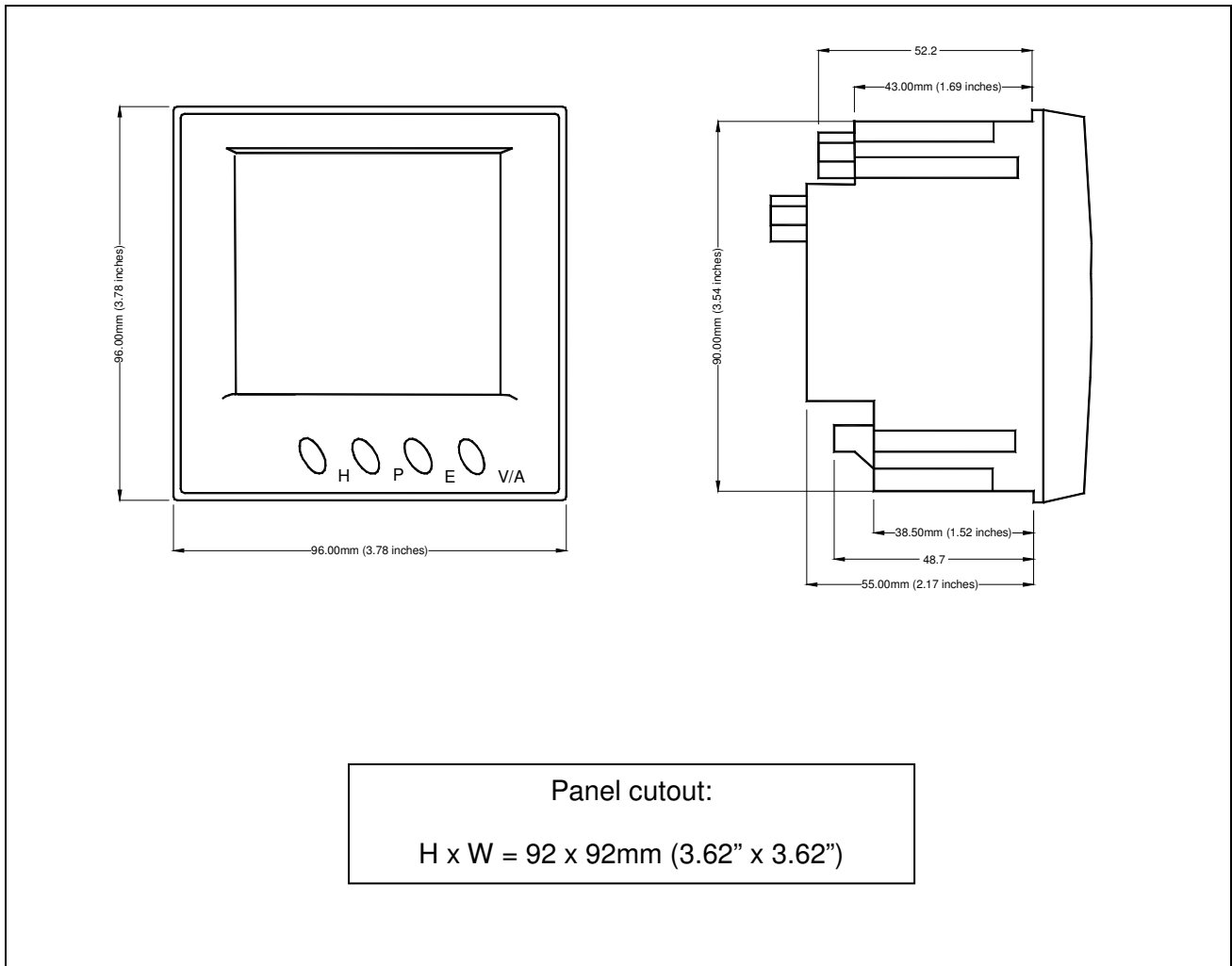
Digital input

MIC 4224 has four digital inputs that can be used for status of switches in the power system.

Technical specifications

Voltage inputs					
Nominal voltage U_N		Ph-N 230V AC Ph-Ph 400V AC			
Measuring range		10...480V AC			
Overload capacity		2 x U_N continuously 2500V for 1s			
PT primary		100V...500kV			
PT secondary		100V...400V			
Consumption		≤ 0.2VA/phase			
Fuse		1A/230V			
Current inputs					
Nominal current I_N		5A AC			
Measuring range		0 to 1.2 x I_N			
Overload capacity		10A continuously 100A for 1s			
CT primary		5A...10kA			
Max. current		9999A			
Consumption		≤ 0.5VA/phase			
Frequency					
Nominal frequency f_N		50/60Hz			
Measuring range		45Hz to 65Hz			
Measuring point		V1 phase voltage			
Accuracy					
Ph-N voltage		0.2% of range			
Ph-Ph voltage		0.2% of range			
Ph current		0.2% of range			
Frequency		0.2% of reading			
Neutral current		0.5% of range			
Active power		0.5% of range			
Reactive power		0.5% of range			
Apparent power		0.5% of range			
Power factor		0.5% of range			
Active energy		EN 61036 class 1			
Reactive energy		EN 61268 class 2			
Demand power		1.0% of range			
THD		1.0% of reading			
Response time					
Metering data		300ms			
Power quality		3s			
Auxiliary power supply					
Universal AC/DC power supply					
Supply voltage		24...48, 100...280V DC 85...264V AC 50/60Hz			
Consumption		≤ 2VA			
Fuse		1A/250V AC			
Digital input					
Optical isolation		4000V AC rms			
Input resistance		2k Ω			
Input voltage		5...30V DC			
Input current		Max. 20mA			
Digital output					
Output form		Open collector, NO			
Optical isolation		4kV AC rms			
Voltage		+40V DC to -6V DC			
Current		Max. 30mA			
Pulse rate		0.1...600kWh/pulse 0.1...600kvarh/pulse			
Pulse duration		20ms...1s			
Relay output					
Type		Normally open contact			
AC rating (resistive load)		250V-3A-750VA			
DC rating (resistive load)		30V-3A-90W			
Mechanical life		5x10 ⁶ operations			
Electrical life at rated load AC		1x10 ⁵ operations			
Electrical life at rated load DC		2x10 ⁵ operations			
Dielectric strength		750V AC for 1 min.			
Isolation contact/coil		4kV AC rms			
Communication					
Signal levels		RS485			
Connection type		Multi-drop			
Devices per link		Max. 32 units			
Cable type		Screened twisted pair			
Maximum cable length		1200m			
Transmission mode		Asynchronous			
Message format		Modbus RTU			
Data rate		1 200 to 38 400 bits/s			
Environmental conditions					
Working temperature, display		-5...55°C			
Working temperature, RS485		-25...55°C			
Storage temperature		-25...70°C			
Humidity, relative		0-95% non condensing			
Temperature drifts		100ppm/°C			
Standard		EN 60068-2-1, EN 60068-2-2, EN 60068-2-3			
Connections					
Measuring inputs		Firm terminal block			
Wire max.		5mm ² / AWG10			
Screw torque		0.5Nm / 5.5 lb-inch			
Other		Pluggable block			
Wire max.		1.5mm ² / AWG16			
Screw torque		0.25Nm / 2.5 lb-inch			
Mounting					
Panel mounted		Max. 6mm thick			
Panel cutout		92 x 92mm +0.8mm (3.62" x 3.62")			
Protection					
Front		IP40 (EN 60529)			
Rear		IP20 (EN 60529)			
Weight					
		350 g (0.8 lbs.)			
Material					
Plastic housing		According to UL94 (V0)			
EMC					
		EN 61000-6/2-4			
Safety					
		EN 61010-1 Cat. III, pollution degree 2			
Test voltage					
		2.2kV according to EN 61010-1			

Unit dimensions in mm (inches)



Order specifications

MIC 4002	MIC 4224
400V Ph-Ph, 5A, no relay output, no digital output, 2 digital inputs Aux. supply: 100-280V DC/85-264V AC DEIF no. 1211020002 EAN no. 5703727105960 Aux. supply: 24-48V DC DEIF no. 1211020005 EAN no. 5703727106868	400V Ph-Ph, 5A, 2 relay outputs, 2 digital outputs, 4 digital inputs Aux. supply: 100-280V DC/85-264V AC DEIF no. 1211020004 EAN no. 5703727105953 Aux. supply: 24-48V DC DEIF no. 1211020006 EAN no. 5703727106875

Due to our continuous development we reserve the right to supply equipment which may vary from the described.



DEIF A/S, Frisenborgvej 33
DK-7800 Skive, Denmark

Tlf.: 9614 9614, Fax: 9614 9615
E-mail: deif@deif.com, URL: www.deif.com

