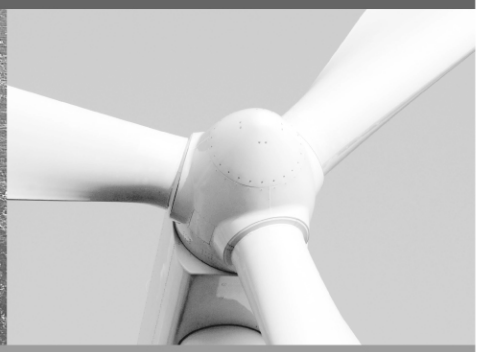
MIC-2 MKII, Multi-instrument
DATA SHEET





Measurements

- All 3-phase AC measurements
- True RMS
- 4-Quadrant energy
- Power Quality Analysis
- Replaces analogue meters

Communication

- RS-485 Modbus RTU protocol
- TCP/IP Modbus (optional)
- Profibus DP (optional)

I/O modules optional

- Analogue Input/Output
- Digital Input/Output
- Relay

Accuracy Multi-instrument *only*

- U, I and f class 0.2
- Harmonic Class 5
- Other values class 0.5
- Harmonic accuracy 1 % when MIC-2 MKII FCT and MIC-2 MKII FCT DIN is including flexible current transformer

Variants

- MIC-2 MKII front-mounted
- MIC-2 MKII DIN-mounted
- MIC-2 MKII FCT, flexible current transformer input, front-mounted
- MIC-2 MKII FCT DIN, flexible current transformer input, DIN-mounted

Intelligent

- Suitable for 2 and 3-phase network topologies

Installation

- Compact dimensions
- Simple wiring

Utility software

- Data logging
- Remote reading
- Easy setting up

Alarms

- Up to 16 configurable alarms

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Data sheet

Application

The MIC-2 MKII multi-instrument is a microprocessor-based measuring unit providing measurement of most electrical quantities on a 2- or 3-phase electric energy distribution network. The measurements are shown on the built-in display.*1

MIC-2 MKII can be used as a data logging device for an intelligent Power Distribution System or Plant Automation System. All measurements are monitored and data is available via the RS-485 Modbus port. Other communication types as Ethernet (Web page, TCP/IP Modbus and emails transfer) and Profibus DP are available options.

True RMS values are measured with/without neutral and with both balanced and unbalanced load.

A large number of standard analogue instruments can be replaced by the MIC-2 MKII in all electrical measuring applications. The MIC-2 MKII contains all necessary measuring circuits and presents all values on a display with white backlight. The display has 4-digits resolution for all measurements. The backlight duration is selectable. *1

Operating the MIC-2 MKII is very easy. It is a flexible and logical measuring unit that enables the user to easily adapt the instrument to individual applications. Password protection of KWh counter reset and change of settings is possible.

Measured and calculated values

Voltage
True RMS – each phase, line-to-line voltage and average.

Current
Each phase, average and neutral.

Active power (P)
Each phase, total power.

Reactive power (Q)
Each phase, total power.

Apparent power (S)
Each phase total power.

Power factor
Each phase and total power factor.

Frequency

Actual frequency

Load nature
Inductive/Capacitive/Resistive.

THD (up to 63rd harmonics)
Voltage THD of each phase, current THD of each phase.

Maximum Demand
Demand of Active (P), Reactive (Q) and Apparent (S) power.

*1 Only MIC-2 MKII and MIC-2 MKII FCT

Energy counter
Import and export of energy, inductive and capacitive of reactive energy. Apparent energy.

Energy pulse output (optional)
Two ports of pulse output (assign to any energy (P, Q and S) counter.

Statistics
Max/min of voltage, current, Power (P, Q, S) total, PF total, Frequency, Unbalance factor and THD values with time stamps.

Running hour indication.

Unbalance factor
Voltage and current.
Based on the positive and the negative sequence

Connection

The MIC-2 MKII can be used in 2- and 3-phase network topologies with/without neutral and with both balanced and unbalanced load, including the US split phase system. The voltage and current input wiring modes are set separately in the parameter setting process. Please refer to the wiring diagram section in the MIC-2 MKII Installation Instructions for more details.

Options

Communication

- Ethernet - TCP/IP Modbus
- Profibus DP/VO

Input/Output

- Analogue input (AI)
- Analogue output (AO)
- Digital input/output (DI/DO)
- Relay output (RO)

I/O Module	DI	DO	RO	AI	AO
AXM-IO1	6		2		
AXM-IO2	4	2			2
AXM-IO3	4		2	2	

AXM-IO1 has a 24 V DC power supply for DI.
A maximum of 1 communication and 2 input/output modules can be used for each MIC-2 MKII.

Communication via RS-485 com port and AXM-NET module.
Normal refresh time Modbus 1 sec.
Refresh time harmonic values 4 sec.
The 100 ms. refresh time Modbus parameter address list is only supported by the RS-485 communication port. Please see the Installations Instructions.

Technical specifications, MIC-2 MKII and MIC-2 MKII DIN

Voltage inputs

Nominal voltage U_N	L- L 480 V AC (cat III) L-L 690 V AC (cat II)
Measuring range	0 to 1.2 x U_N
Overload capacity	1500 V continuous 3250 V for 1min
VT primary	220 V to 500 kV
VT secondary	100 V to 400 V
Fuse	1 A slow blow

Current inputs

Nominal current I_N	5 A AC
Measuring range	0 to 10 A
Overload capacity	20 A continuous 100 A for 1 s
CT primary	5 A to 50 kA
CT secondary	5 A
Load	0.5 VA

Frequency

Nominal frequency f_N	50/60 Hz
Measuring range	45 Hz to 65 Hz
Measuring point	V1 phase voltage

Accuracy Multi-instrument only

Voltage	0.2 %
Current	0.2 %
Power	0.5 %
Power factor	0.5 %
Frequency	0.2 %
Energy	0.5 %
Harmonic	5.0 %

Standard IEC 60051

Auxiliary power supply

Universal AC/DC power supply

Supply voltage	100 to 240 L-N / +/-10 % 100 to 415 L-L V AC +/-10 % 50/60 Hz 100…300 V DC
Consumption	≤ 5 VA
Fuse	1 A slow blow

Communication

RS-485 Modbus RTU

Number of devices	Max. 32 units
Cable type	Belden 3105 A or equivalent (twisted pair and shielded)
Maximum cable length	up to 1000 m
Data rate bits/s	1200 (9600) to 38400

Environmental conditions

Operation temperature	-25 to 70°C
Storage temperature	-40 to 85°C
Standard	IEC 60068-2-2 IEC 60068-2-1
Humidity, relative	5-97 % RH condensing
Standard	IEC 60068-2-6 Db

Connections

Measuring inputs	Current input fixed block, wire max. 5 mm²
Screw torque	0.5 Nm/5.5 lb-inch
Other	Pluggable block
Wire max.	1.5 mm²
Screw torque	0.25 Nm/2.5 lb-inch

Mounting

Panel mounted	Max. 6 mm thick
Panel cutout	92 x 92 mm +0.8 mm (3.62” x 3.62”) or 4” round

Protection

Front	IP52 (EN 60529)
Rear	IP30 (EN 60529)

Safety IEC/EN 61010-1,
UL 61010-1
300 V installation cat. III, pollution degree 2
600 V installation cat. II, pollution degree 2

Weight

MIC-2 MKII	320 g (0.8 lbs.)
MIC-2 MKII DIN	280 g (0.7 lbs.)

EMC IEC/EN 61000-6-2
IEC/EN 61000-6-4

Vibration 3 to 13.2 Hz: 2 mmpp
13.2 to 100 Hz: 0.7 g
To IEC 60068-2-6
To IACS UR E10

Technical specifications, MIC-2 MKII FCT and MIC-2 MKII FCT DIN

Voltage inputs

Nominal voltage U_N	L- L 480 V AC (cat III) L-L 690 V AC (cat II)
Measuring range	0 to 1.2 x U_N
Overload capacity	1500 V continuous 3250 V for 1min
VT primary	220 V to 500 kV
VT secondary	100 V to 400 V
Fuse	1 A slow blow

FCT, Flexible Current Transformer input 100 mV

Only to be used with DEIF accessory flexible current transformer.

See Technical Specification, Flexible Current Transformer

Frequency

Nominal frequency f_N	50/60 Hz
Measuring range	45 Hz to 65 Hz
Measuring point	V1 phase voltage

Accuracy Multi-instrument only

Voltage	0.2 %
Current	0.2 %
Power	0.5 %
Power factor	0.5 %
Frequency	0.2 %
Energy	0.5 %
Harmonic	1.0 % *3

*3 Harmonic accuracy 1 % when MIC-2 MKII FCT and MIC-2 MKII FCT DIN is including flexible current transformer.

Standard IEC 60051

Auxiliary power supply

Universal AC/DC power supply

Supply voltage	100 to 240 L-N / +/-10 % 100 to 415 L-L V AC +/-10 % 50/60 Hz 100 to 300 V DC
Consumption	≤ 5 VA
Fuse	1 A slow blow

Communication

RS-485 Modbus RTU

Number of devices	Max. 32 units
Cable type	Belden 3105 A or equivalent (twisted pair and shielded)
Maximum cable length	up to 1000 m
Baud rate	1200 (9600) to 38400 bps

Environmental conditions

Operation temperature	-25 to 70°C
Storage temperature	-40 to 85°C
Standard	IEC 60068-2-2 IEC 60068-2-1
Humidity, relative	5-95 % RH condensing
Standard	IEC 60068-2-30 Db

Connections

Measuring inputs	Current input fixed block, wire max. 5 mm²
Screw torque	0.5 Nm/5.5 lb-inch
Other	Pluggable block
Wire max.	1.5 mm²
Screw torque	0.25 Nm/2.5 lb-inch

Mounting

Panel mounted	Max. 6 mm thick
Panel cut out	92 x 92 mm +0.8 mm (3.62” x 3.62”) or 4” round

Protection

Front	IP52 (EN 60529)
Rear	IP30 (EN 60529)

Safety IEC/EN 61010-1, UL 61010-1
300 V installation cat. III, pollution degree 2
600 V installation cat. II, pollution degree 2

Weight

MIC-2 MKII FCT	320 g (0.8 lbs.)
MIC-2 MKII FCT DIN	280 g (0.7 lbs.)

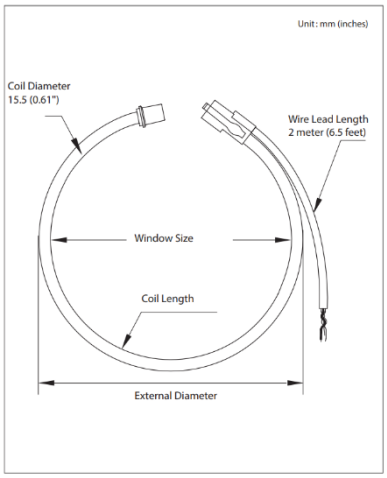
EMC IEC/EN 61000-6-2
IEC/EN 61000-6-4

Vibration 3 to 13.2 Hz: 2 mmpp
13.2 to 100 Hz: 0.7 g
To IEC 60068-2-6
To IACS UR E10

Technical specifications, FCT - Flexible Current Transformer

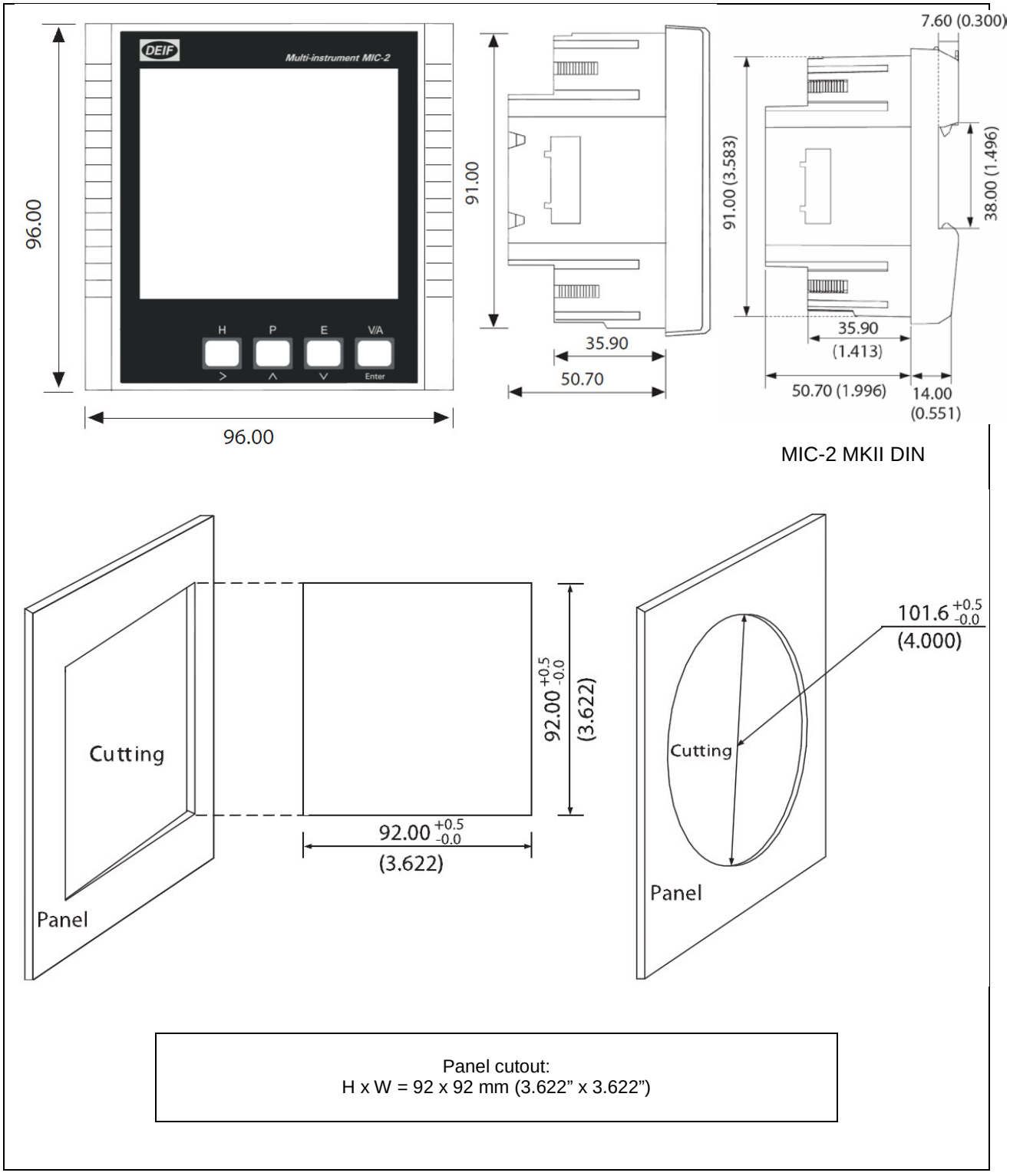
Flexible Current Transformer

Variant	**FCT1200**	**FCT3000**	**FCT6000**
Measuring range	5 A – 1200 A	12.5 A – 3000 A	25 A – 6000 A
Window size	106 mm	178 mm	271 mm
Coil length	400 mm	600 mm	900 mm
External diameter	143 mm	207 mm	302 mm



Frequency Range	20 Hz – 5 kHz (Coil only)
Maximum measurements error	≤ 1 % (of final range value). MIC-2 MKII FCT and MIC-2 MKII FCT DIN including Flexible Current Transformer.
Conductor Position sensitivity	+/- 2 % max
Influence of external fields	+/- 2 % max
Lead	White-positive, brown-negative, bare-shield must be connected to functional earth; 24AWG
Mounting	Coil to be fastened to the busbar or cable with tie wrap. Wire lead must also be fastened securely.
Insulation category	CAT III 1000 V/CAT IV 600 V
Polarity	Arrow towards load (current flow direction).
Measuring principle	Rogowski 100 mV
Operating temperatures Storage temperature Temperature drift	-20°C - 70°C -40°C - 70°C +/- 0.07 % within operating temperature range
Material	Orange thermoplastic rubber, flame retardant UL 94 V-0 rated
Testing voltage	7400 V AC @ 50/60 Hz for 1 minute
Coil diameter	15.5 mm
Wire lead length	2 meters. Extension of wire lead is not approved

Unit dimensions in mm (inches)



Communication modules

Ethernet TCP/IP module – AXM-NET
10 M/100 M self-adaptable,
RJ45 Jack
TCP/IP Modbus protocol,
HTTP Web page browse
E-mail sending on time interval or on event.

Profibus module – AXM-PROFI
Profibus-DP/V0
Input Byte (typical): 32 bytes
Output Byte (typical): 32 bytes
EN50170 vol.2 compliance
Profibus slave mode, baud rate self-adaptable up to 12M

I/O modules

AXM-IO1	6 digital inputs (DI), 2 relay output (RO), 24 V DC isolated voltage output
AXM-IO2	4 digital inputs (DI), 2 digital outputs (DO), 2 analogue output (AO)
AXM-IO3	4 digital inputs (DI), 2 relay output (RO), 2 analogue input (AI)

Digital Input (DI)
Input voltage range 20~160 V AC/DC
Input current (max) 2 mA
"1" voltage level 15 V
"0" voltage level 5 V
Switch response time <1 ms
Pulse frequency (max) 100 Hz, 50 % duty ratio (5 ms ON and 5 ms OFF)
Power supply for digital input (DI)
Output voltage 24 V DC
Output current 42 mA
Load (max) 21 DI

Digital Output (DO) (Photo-MOS)
Voltage range 0~250 V AC/DC
Load current 100 mA (Max)
Output frequency 25 Hz, 50 % Duty Ratio (20 ms ON, 20 ms OFF)
Isolation voltage 2500 V

Relay Output (RO)
Switching voltage (max) 250 V AC, 30 V DC
Load current 3 A
Set time 10 ms (Max)
Contact resistance 100 mΩ (Max)
Isolation voltage 2500 V
Mechanical life 1.5 x 10^7

Analogue Input (AI)
Input range, 0~20 mA/4~20 mA
Accuracy 0.2 %
Temperature drift 50 ppm/°C typical
Isolation voltage 500 V
Impedance: 100 Ω

Analogue Output (AO)
Output range, 0~20 mA/4~20 mA
Accuracy 0.5 %
Response time 300 ms
The max load resistance is 500 Ω
Temperature drift 50 ppm/°C typical
Isolation voltage 500 V

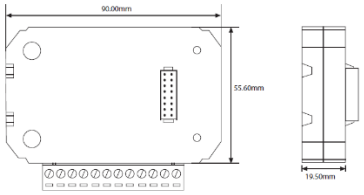
Note: Predefined output, see "Option I-O module 4189320032 UK", for more information.

Consumption

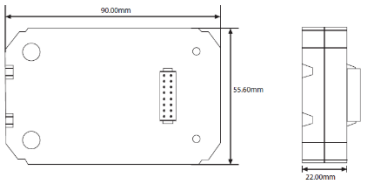
	AXM-NET: 1 W AXM-PROFI: 1 W AXM-IO1: 1 W AXM-IO2: 1.3 W AXM-IO3: 0.8 W

Environmental conditions

Operation temperature	-25 to 70°C
Storage temperature	-40 to85°C
Standard	IEC 60068-2-2 IEC 60068-2-1
Humidity, relative	5-97 % RH condensing
Standard	IEC 60068-2-6 Db
Safety	IEC/EN 61010-1, UL 61010-1 300 V installation cat. III, pollution degree 2 600 V installation cat. II, pollution degree 2
Weight	AXM-NET: 65 g AXM-PROFI: 65 g AXM-IO1: 90 g AXM-IO2: 80 g AXM-IO3: 85 g
EMC	IEC/EN 61000-6-2 IEC/EN 61000-6-4



IO Module dimensions



Communication Module dimensions

Available accessories

Type	Description	Item no.
Accessory for MIC-2 MKII	Bracket for DIN rail mounting	2232700011
Accessory for MIC-2 MKII FCT & DIN	FCT1200 Flexible current transformer	1211029016
Accessory for MIC-2 MKII FCT & DIN	FCT3000 Flexible current transformer	1211029017
Accessory for MIC-2 MKII FCT & DIN	FCT6000 Flexible current transformer	1211029018

Order specifications

Optional modules:

Multi - instrument	Communi-cation module	I/O module 1	I/O module 2
MIC-2 MKII DEIF no. 1211020021 EAN no. 5703727116133	***AXM-NET*** ***TCP/IP Modbus com.*** DEIF no. 1211020016 EAN no. 5703727109746	***AXM-IO1*** DEIF no. 1211020013 EAN no. 5703727109760	***AXM-IO1 (2)*** DEIF no. 1211020018 EAN no. 5703727110001
MIC-2 MKII FCT DEIF no. 1211020023 EAN no. 5703727113019		***AXM-IO2*** DEIF no. 1211020014 EAN no. 5703727109777	***AXM-IO2 (2)*** DEIF no. 1211020019 EAN no. 5703727110018
MIC-2 MKII DIN DEIF no. 1211020022 EAN no. 5703727116140	***AXM-PROFI*** ***PROFI-BUS DP/VO*** DEIF no. 1211020017 EAN no. 5703727109753	***AXM-IO3*** DEIF no. 1211020015 EAN no. 5703727109784	***AXM-IO3 (2)*** DEIF no. 1211020020 EAN no. 5703727110025
MIC-2 MKII FCT DIN DEIF no. 1211020024 EAN no. 5703727113026			

A maximum of 1 communication and 2 input/output modules can be used for each MIC-2 MKII.

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

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