

# Power Quality Analyser Plus MI 2292

Top of range,  
3-phase power  
quality analyser,  
with included  
EN 50160 and Flicker  
measurements



**Power Quality Analyser Plus is a top of range, 3-phase, portable power analyser for use in industry, utilities and suits the most demanding power quality diagnostics.**

- Three current and three voltage inputs combined with an internal memory modules allow recording up to 4 weeks
- 64 parameters can be monitored or recorded simultaneously
- Instrument can be programmed either directly or via PC
- MS Windows compatible PC SW PowerLink serves for downloading, management of recorded data and preparation of test reports
- Extensive selection of accessories makes the instrument suitable for a variety of different applications

#### Target applications

- General power quality assessment in distribution and industrial low and middle voltage electric systems
- Power quality analysis according to EN 50160
- Capturing and recording of power supply events (shut-down's, interruptions, sags, dips)
- Flicker measurement
- Power factor correction equipment measurements
- Harmonics measurements and filter selection
- Transients recording and over-voltage protection devices (MO varistors) performance testing
- Assessment of UPS performance
- Consumption profile recording
- Motor's inrush currents monitoring and recording

#### Main features

- High accuracy measurement and recording of power quality parameters (U, I, f, cos  $\phi$ , PF, P, Q, S, current and voltage harmonics up to 63<sup>rd</sup> order, etc.)
- Power quality assessment according to EN 50160 including Flicker measurement and standardised printout report in graph and table form
- Transients measurements down to 20  $\mu$ s with adjustable level triggers
- Waveform measurements with harmonics direction detection. Adjustable level and slope triggers on voltage and current
- Instrument or a group of them can be remotely controlled and programmed via GSM modem
- Windows compatible PowerLink PC Software supports downloading, programming, communication with the instrument and transfer of recorded data to other MS programmes (Excel, Word, etc.)

#### Standards:

**Instrument is developed and manufactured in accordance with following standards:**

**Safety:** IEC/EN 61010-1

**EMC:** IEC/EN 61326-1

**Measurements:** EN 50160 and EN 61000-4-30, Class B

#### General technical specifications

##### Display

Graphic Liquid Crystal Display with LED backlight, 160 x 116 dots resolution

##### Non - volatile memory

2048 Kbytes SRAM, battery backed

##### Digital hardware specification

A/D con., 14 bit with 128 samples per channel per period (43  $\div$  68 Hz)

##### Outputs

Communication type: RS232 serial interface

Baud rate: 2400  $\div$  57600 bps

Connector: 9 pin, D-type

Communication cable: Standard type

##### Power supply

Operating range:

230 VAC  $\pm$  10 %  $\div$  20 %, 45  $\div$  65 Hz, 8 VA

Optional: 115 VAC  $\pm$  10 %  $\div$  20 %, 45  $\div$  65 Hz, 8 VA

DC power supply: Internal 4 x 1.2 V NiMH batteries

Charger: Internal battery charger

Working temperature range: -20  $^{\circ}$ C  $\div$  + 60  $^{\circ}$ C

Max. humidity: 85 % RH (0  $\div$  40  $^{\circ}$ C)

Pollution degree: 2

Protection classification: II, double insulation

Voltage inputs: CAT III/600 V; optional CAT IV/600 V

Overvoltage category: AC power supply CAT III/300 V

Protection degree: IP 64

Dimensions: 265 x 110 x 185 mm

Weight: 2 kg

##### Recorder

Adjustable integration period: 1 s  $\div$  900 s

Selected signals: max. 64

Statistics values:

Each period divided in 200 parts (0.1 ms)

Voltage anomalies:

Based on half period, start, duration and

extremes of measured voltage

EN 50160 Analysis mode:

Voltage dips, swells, sags and breaks

Resolution 10 ms, no gaps

Unsymmetry

Voltage RMS

Frequency

Harmonics: up to 43<sup>rd</sup>

Flickers: Pst, Plt

# Technical specification

## AC Voltages

Three-phase AC voltage input (3 differential inputs, L1 - N, L2 - N, L3 - N)

Input voltage range:  $10 \div 550 V_{RMS\ L-N}$ ,  $900 V_{RMS\ L-L}$   
 $600 V_{RMS\ L-N}$  (overload 10 s)

Optional on request:  $10 \div 750 V_{RMS\ L-N}$ ,  $1000 V_{RMS\ L-L}$   
 $800 V_{RMS\ L-N}$  (overload 10 s)

Resolution: 0.1 V

Accuracy:  $\pm 0.5\%$  of reading  $\pm 2$  digits

Crest factor max.:  $1 \div 1.4 @ 550 V_{RMS\ L-N}$

Frequency range:  $43 \div 68$  Hz mains voltage

## AC Currents

Three-phase AC input for connection to current transducers with voltage output

Input current (voltage output):  $0.02 \div 1 V_{RMS}$  (from  $0.02 \times I_n \div I_n$ )

Resolution: 0.3 mV (0.3 A with 1000 A / 1 V)

Accuracy: ( $\pm 0.5\%$  of reading  $\pm 6$  dig.) + current transformer accuracy

Crest factor:  $1 \div 2.5 @ 1 V_{RMS}$

Maximum permissible overload: 150 %  $I_n$  (sinusoidal current)

Maximum input voltage:  $1 V_{RMS}$

## Phase angle

Consider phase angle data of used current transformer.

## Scope

Display options: Waveform of pairs (L1: U1 and I1, L2: U2 and I2,  
L3: U3 and I3), U<sub>1, 2, 3</sub>, and I<sub>1, 2, 3</sub>

Ranging: Auto / manual

## METER – Power measurement

Phase values for selected measuring parameters:

Measured: voltage (U), current (I),  $\cos \phi$

Calculated: active power (P), apparent power (S), reactive power (Q),  
power factor (PF) with its characteristics (C, L, none), interphase voltage

3-phase values:

Calculated: active power (Pt), apparent power (St), reactive power (Qt),  
power factor (PFt), neutral current (In);

Basic accuracy for P, Q, S,:  $\pm 1\%$  of reading

Resolution for P, Q, S,: 0.01 of displayed value

## SPECTRUM – Harmonics measurement

The instrument computes harmonics on signals sampled with an A/D converter.

Recording interval: 160 ms (8 cycles)

Spectrum calculation range: DC – 63<sup>rd</sup>

Spectrum display range: DC – 25<sup>th</sup>

Displayed items for selected harmonic: Order, relative and absolute value

## Energy

### Displayed results:

- cumulative values (TOTAL)

- partial cumulative value (SUBTOTAL)

- values for last integration period (LAST IP)

**Quantities** Active energy (EP), capacitive energy (EQC), inductive energy (EQI)

Basic accuracy:  $\pm 1\%$  of reading

Resolution: 0.1 of displayed value

## Flicker measurement

The instrument computes flickers according to IEC 61000-4-15

## Waveforms

Sampling rate: 128 scans / period

Trigger: level, manual, timer

Buffer: min. 10 periods of pre / post size, up to 7812 periods can be recorded

Channels: Single or multi channel mode

Harmonics / direction: magnitudes generated by load, generated by utility

## Fast logging

Sampling rate: 128 scans / period, (min, max, avg recorded each half period)

Trigger: level, manual, timer

Buffer: pre / post size, up to 166 minutes of recording

Channels: 3 x U, 3 x I, Single or multi channel mode

## Transients

Capturing:  $>20 \mu s$  transient detectability

Trigger: Level, slope, manual

Buffer: min. 10 periods of pre / post size, up to 1000 periods can be recorded

Channels: 3 x U, 3 x I, single or multi channel mode

## Ordering information:

Standard set

Part No. MI 2292



- Instrument Power Quality Analyser Plus
- Current clamp 1000 A/1 V, 3 pcs
- Test tips, 3 pcs
- Alligator clips, 4 pcs
- Voltage measurement cables, 4 pcs
- Mains cable
- PowerLink PC SW package with RS232 cable
- Power supply adapter
- Rechargeable batteries, 4 pcs
- Soft carrying bag
- Small soft carrying bag for current clamps
- User manual
- Handbook "Modern Power Quality Measurement Techniques" on CD
- Product verification data

Standard set

Part No. MI 2292F



Similar content as MI 2292:

Current clamp 1000 A/1 V, 3 pcs replaced by  
3-phase flexible current clamps 3000/300/30 A, 1 pcs

## Optional accessories:

Photo	Order No.	Acc. description
	A 1033	Current clamp 1000 A/1 V
	A 1037	Current transformer 5 A/1 V
	A 1039	Clamp adapter (for A 1069 and A 1122)
	A 1069	Mini clamp 100 A/1 V to be used with (A 1039)
	A 1122	Mini clamp 5 A/1 V to be used with (A 1039)
	A 1100	Modem ST
	A 1101	Modem GSM
	A 1171	USB/RS232 converter with 1 m fixed cable
	A 1179	3-phase flexible current clamps 2000/200/20 A
	A 1257	3-phase flexible current clamps 3000/300/30 A
	A 1287	1-phase flexible current clamps 3000/300/30 A
	S 2014	Safety fuse adapter
	S 2015	Safety flat clamps



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