MIRO PQ41 Power Quality Logger and Analyser

CHK Power Quality – Australia's first manufacturer of a Class A Power Quality Analyser

The ***MIRO*** PQ41 is the perfect tool to act as the first line of defence against power quality issues. With its IP66 rating and fixed voltage leads, the simple design of the PQ41 allows for quick and easy installation in all weather conditions. The in-built WiFi lets users view real time measurements, change configurations, download data files and upgrade firmware directly from their phone or tablet. The ease of use of the PQ41 makes it the perfect instrument for a variety of professions including electricians, linesmen and technicians.

The PQ41 comes with four voltage channels (3 phase + Ground + Neutral) and four current channels. Similar to the PQ45, the PQ41 meets the CAT IV 600V safety category, the highest of all portable PQA's. It's compact profile and lightweight design (1.05kG) makes it easy to transport around and store in tight spaces such as switchboards and control panels.

Figure 1: MIRO PQ41 - Three phase power quality logger and analyser

Key hardware features

- Compact design to meet applications for the modern marketplace and where space and accessibility are restrictive.
- AC voltage and current measurements.
- All weather conditions: rugged, shock resistant, portable and weatherproof (IP66).
- All local (WiFi) is integrated within the enclosure - no additional peripherals required
- Safety
  - Voltage transients: Minimum CAT IV 600V
  - > 10kV isolation to ground
  - Detachable current leads
  - Reinforced insulation / double insulated
- Graphical colour display
  - Voltage and current waveforms.
  - Phasor diagrams.
  - Measurements.
  - User defined screen.
- Internal backup battery: 5 minutes back up time as standard, with option to extend upon request.
- Fixed voltage leads
- Starts logging on power up.
- Gapless logging: User can download data, clear log memory and configure the device with no interruption to logging.
- User configurable log intervals
- Logged memory: 8GB.

Address: Unit 1, 3 Tollis Place, Seven Hills, NSW 2147, Sydney, Australia
Telephone: +61 2 8283 6945; **Fax:** +61 2 8212 8105
Website: www.chkpowerquality.com.au; **Enquiries:** sales@chkpowerquality.com.au

Key software (CITRUS) features

- The CITRUS platform is a powerful, easy-to-use and intuitive application software that supports all CHK PQ products. It provides tools for: device management; online monitoring; data analysis; and reporting.

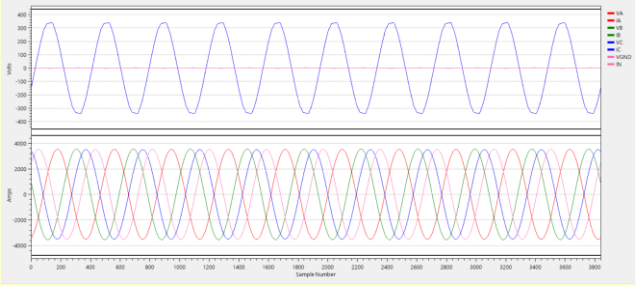

Figure 2: CITRUS – Online Monitor

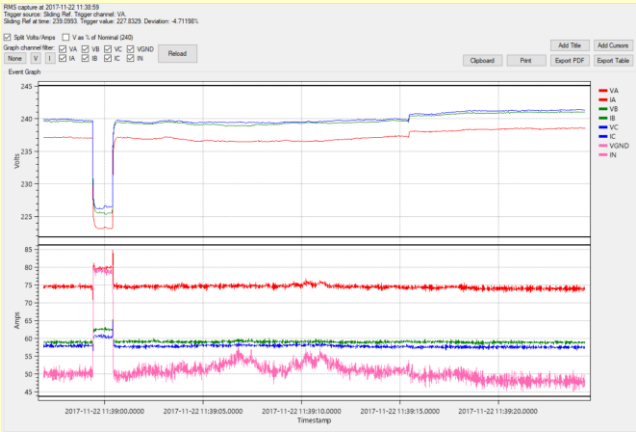

Figure 3: CITRUS - Event - RMS capture

- Configurations
  - Pre-defined configurations for easy setup.
  - Create and store different configuration files for quick retrieval.
- Online monitor, with event trigger option (ideal for motor starts).
- View different log file data on the same graph to compare PQ measurements
- Event type filter included, to view desired events
- Analysis and Compliance reporting
  - Energy; Daily Min/Max.
- Customised reports (available upon request).
- Views
  - Ability to edit an active view: Text and arrow annotation and title options available.
  - Generate a PDF, CSV file, or table.
  - Save and Print view.
  - Split or combine voltage and current graphs.
  - Multiple measurements on a single graph.
  - Horizontal and vertical cursors for accurate measurements.
  - Horizontal and vertical axes zooming functions.

Benefits

Local product

- Designed and made in Australia
- Support - direct from the manufacturer
- Regular software and firmware updates
  - Can add new features on request

Operate directly from mains voltage

- Built in Phase A power supply to cover full 400V operating range
  - No external supplies or batteries required for any current sensor/modem

External supply and backup

- External 12V DC power available
- Backup battery to cover interruptions up to 5 minutes
  - Option for larger battery

Current sensors

- Automatic identification and scaling of current sensor inputs
- Wide range of current sensors
  - 1A and 5A converter (banana terminals)
  - Small and large clamp CTs, 10A to 1000A
  - Flexible rogowski coils

Channel isolation

- Safety:
  - Cat IV 600V
  - >8kV voltage isolation

Portability

- Portable
  - Small and light, but no compromise on safety or features
- Connectors for all inputs
  - No wires hanging around when setting it up
- IP66 – no external housing required

Logging

- User configurable logging interval

Address: Unit 1, 3 Tollis Place, Seven Hills, NSW 2147, Sydney, Australia
Telephone: +61 2 8283 6945; **Fax:** +61 2 8212 8105
Website: www.chkpowerquality.com.au; **Enquiries:** sales@chkpowerquality.com.au

Memory

- 8GB memory
  - Log for up to two years with default configuration
- No lossy compression or other “shortcuts” to extend memory capacity at the cost of accuracy and/or standards compliance

Gapless logging

- Full gapless logging
  - Can download, reconfigure and clear at any time without stopping the logging
  - No interruption or gaps introduced
  - Suitable for fixed or long term monitoring
  - Maximises user convenience even if gapless logging is not required

Fast and easy

- Fast downloads - 60 to 120 MB per minute
- Fast configuration, easy to reset back to defaults
  - All configuration is in a single form
- Fast clearing – less than a second
- Easy firmware updates
  - No special tool or procedure required
  - No need to clear memory or configuration
  - Unit will restart when firmware upload completes and resume logging immediately

No buttons

- No buttons
  - Automatically logs on power up unless configured otherwise
  - No risk of forgetting to log

Display

- LCD:
  - Clearly display logging status
  - Quickly verify correct installation
  - Waveform display available
  - High update rate – every 10 or 12 cycles

Citrus

- Software:
  - Free
  - Small download, easy and fast to install
  - Built for both 32 and 64 bit Windows
  - Supports all Windows versions from XP through to 10
  - Main executable is portable – can view data files without installation and without administrator privileges
  - Digitally signed to verify it came straight from us
  - Easy to use
  - Familiar for existing PowerView users
  - Multiple data windows allowed, or add multiple files to the same window
  - Tabbed view to quickly compare different graphs
  - Easily add additional parameters to graphs
  - Cursors, text and arrow annotations available
    - Tied to data, not to position on screen
    - Correct position maintained when panning and zooming
  - Zooming
    - Click and drag or by scroll wheel
    - Zoom multiple axes or a single axis at a time
    - Quickly reset zoom on double click
  - Convert graph to table or CSV file
  - Date/time range and channel selection available for all parameters and analysis charts
  - Analysis features built in:
    - Daily minimums and maximums
    - Total energy
      - Hourly energy profile
        - Split imports/exports – useful for solar installations

Address: Unit 1, 3 Tollis Place, Seven Hills, NSW 2147, Sydney, Australia
Telephone: +61 2 8283 6945; **Fax:** +61 2 8212 8105
Website: www.chkpowerquality.com.au; **Enquiries:** sales@chkpowerquality.com.au

Hardware specifications

PARAMETER	DESCRIPTION
Power quality parameters	
Nominal input	230V 50Hz/60Hz
Power frequency	IEC61000-4-30 (section 5.1).
Magnitude of the supply voltage	IEC61000-4-30 (section 5.2).
Flicker	IEC61000-4-30 (section 5.3).
Voltage interruptions	IEC61000-4-30 (section 5.5).
Supply voltage unbalance	IEC61000-4-30 (section 5.7).
Voltage harmonics	IEC61000-4-30 (section 5.8).
Measurement	
A to D Conversion	16 bits.
Samples per cycle	384 @ 50 Hz; 320 @ 60 Hz.
Sampling Rate	Nominal: 19.2kHz synchronised to mains.
Anti-aliasing	High-frequency components attenuated by at least 50dB so as not to interfere with harmonic measurements.
Measurement metrics	
Frequency	Range: 50Hz nominal (42.5-57.5)Hz, 60Hz nominal (51.0-69.0)Hz; Full range: (40-70)Hz. Measurement: 10s; Accuracy: ±5mHz referenced to RTC.
Magnitude of the supply voltage (true RMS)	Measurement: 10/12 cycle rms Range: 10% to 150% of nominal value with accuracy of ±0.5% of nominal value
Flicker	IEC61000-4-15, 10 minute Pst (short term) and 2hr Plt (long term).
Voltage interruptions	Measurement: 1-cycle rms updated every half cycle. Accuracy: ±1 cycle. Range (duration) minimum 0.5 cycles by definition. No upper limit.
Voltage and current unbalance	Applicable 3 phase systems and evaluated using the method of symmetrical components. Metrics: u_2 = (U2/U1) and U_0 = (U0/U1). U0, U1 and U2 are sequence components. Range: 0.5% to 5% of U_2 and U_0. Accuracy: ±0.15%.
Power meter	Power-kW, Power-kVA, Power-kVAR, True Power Factor (TPF), Displacement Power Factor (DPF).
Voltage harmonics / interharmonics	Harmonic Magnitude and Phase up to the 25th.
Total harmonic distortion (THD)	IEC61000-4-7, THDS (up to 50th harmonic)
Crest factor	Indicates peak-to-rms ratio of waveform. ±1%.
High speed event recording	
Triggers	User defined. Sliding reference (Voltage & Current), manual (via Online Monitor)
Event RMS capture (half cycle RMS)	2.5s pre trigger, 25s post trigger (50Hz)
Communications	
Wired data (standard)	USB 2.0.
Wireless (options)	Local wireless (WiFi) options will be available and integrated within the instrument.
Logging	
Logged data memory	8GB.
Logging intervals	User configurable log interval
Measurements	All measurements simultaneously.
General	
Circuit connections	Three phase Wye & single phase or Delta
Data file	PQA format binary with CSV export.
Data display	Real time measurements of basic parameters via LCD, all parameters via Online Monitor.
Software tools	CITRUS.

Inputs	
Voltage channels (AC)	4 channel (3 phase + Ground + Neutral) with either croc clips or banana plugs
Voltage range (working maximum per isolated input pair)	Powered from phase A: 400VACrms (560Vpk)
Voltage surge protection (differential)	4kV Fast transients, 6kV 1.2/50us impulse – no effect. Recalibration may be required after impulses significantly exceeding 6kV.
Current channels (AC)	4 AC current channels
Current range	Dependent upon current sensor.
Current Sensors	Flexible current probes or clamp-on current probes with automatic detection.
Accuracy	
Reference conditions	22ºC.
Current (instrument)	±0.2% of full scale. System accuracy depends on sensor.
Voltage	±0.5% of nominal value as specified above.
Voltage temperature coefficient	Approx. 25ppm/C
Environment and safety	
Use	Indoor and outdoor.
Altitude	Up to 2000m.
Operating Temperature	-20°C to +60°C.
Relative Humidity	20% to 99% Relative Humidity.
Degree of Protection	IP66 (all weather housing).
Certifications / type testing	
EMC	EN55022:1998 _A1:2000 +A2:2003 CLASS A.
Salt Spray (Corrosion)	MIL STD 810 G.
Outdoor weathering (UV)	IEEE 495:2007 or equivalent.
Random Vibration	MIL STD 810 G.
Impact Test	IEEE 495:2007 or equivalent.
Safety Category	IEC 61010-1, Pollution degree 3; CAT IV 600V, >8kV withstand.
Power	
Power supply	Phase A voltage, range: (60-400) VACrms; 15VA typical.
USB powered (Mini USB)	Configuration and download.
External DC supply	Plug pack provided.
Backup power	Rechargeable battery - $LiFePO_4$.
Backup battery duration	5 minutes. Longer duration (30 minutes with 24 hours recharge) available on request.
Timing	
Real time clock (RTC) battery	Non rechargeable Lithium backup battery. Functional life: > 10 years.
RTC	Typical ±3ppm from -15 to 60C. Drift <1 second per week.
Mechanical	
Display	Colour graphic LCD (4.3” 480x272 Graphic TFT LCD); Dimensions: (97 x 56) mm.
Enclosure dimensions	(180 x 130 x 60) mm; Length side ports: Current and voltage channels; Width side ports: Data connector.
Weight	1.05kg (instrument only).
Case material and colour	Polycarbonate, moulded in light grey.
Boot	Soft flexible boot for protection.

Address: Unit 1, 3 Tollis Place, Seven Hills, NSW 2147, Sydney, Australia
Telephone: +61 2 8283 6945; **Fax:** +61 2 8212 8105
Website: www.chkpowerquality.com.au; **Enquiries:** sales@chkpowerquality.com.au

Software specifications

FEATURE	DESCRIPTION
General	
Software platform	CITRUS – software platform used to manage all company products.
Application launch	Automatically when clicking on a CITRUS file.
Miro data View	
File	
Features	Open; Open Recent; Add File; Remove File; Exit.
View	
Features	Save view to log file; Load saved view; Set Zoom; Cursors; Add Title ; Add Notes as Footer; Add Text Annotation; Add Arrow Annotation; Toggle Split/Combine; Toggle Date/Time mode ; Close Tab.
Export	
Features	Prints current graph; Generates PDF of the current graph; Generates PNG of the current graph; Generates SVG of the current graph; Generates clipboard of the current graph; Generates CSV of the current graph. Custom CSV upon request; Generates Table of the current graph.
Measurements	
RMS and Frequency	Graphical view of logged: TRMS; AC; DC, Crest Factor; Fundamental Magnitude; Fundamental Phase; Frequency.
Power and Unbalance	Graphical view of logged: Real Power; Reactive Power; Apparent Power; True Power Factor; Displacement Power Factor; Real Power Total; Reactive Power Total; Apparent Power Total; Unbalance (Negative Sequence); and Unbalance (Zero Sequence).
Harmonics	Graphical view of logged: Harmonic Magnitude; Harmonic Percentage of Fundamental; Harmonic Phase; and THD.
Flicker	Graphical view of logged short term (Pst) and long term (Plt) flicker.
Events	
View of events	Interruptions; RMS Capture;
Voltage slider reference filter	Ignores trigger levels less than the set level.
Graphical tools	Split Volts/Amps; Vas a % of Nominal; Graph channel filter (VA, VB, VC, VGND, 1A, IB, IC, IN); Load V and I channels; Reload; Clipboard; Print; Add Title; Export PDF; Add Cursors; Export Table.
Analysis	
Daily Min/Max	TRMS, Frequency, THD, TPF, kW, kVAR, kVA.
Energy calculator	kWh, kVarh, kVAh, kWh hourly profile, kWh hourly import/export (useful for solar installations) and power.
Custom	Upon request.
Device Configuration	
Configuration tabs	Inputs, Log Intervals, RMS and Power, Harmonics and Flicker, IEC Events, Capture Triggers, Capture Types, LCD, Comms.
Configuration file	Can append a description.
General configuration features	Load From file; Save To file; Save Config To Device; Reset To Default; Enable All Log Points; Disable All Log Points.
Set log date-time range	Log start, Log stop, Reset.
Data usage estimate	Estimated data per day; Estimated data per month; Days to 100 MB; Days to 1 GB.

Address: Unit 1, 3 Tollis Place, Seven Hills, NSW 2147, Sydney, Australia
Telephone: +61 2 8283 6945; **Fax:** +61 2 8212 8105
Website: www.chkpowerquality.com.au; **Enquiries:** sales@chkpowerquality.com.au

Device information	Model, serial number, calibration date, CT types and firmware version.
Notes	Log notes - add text to be viewed as footer.
Tools	
Features	Join Open Files; Split File; Set Voltage Scaling; Set Current Scaling: Custom ratio; CK1/CK5 with 1A/5A CT.
Options	
Features	Display Time Zone; Colour Settings.
Online Monitor	
Features	Ability to view all parameters plus waveforms in real-time. Tabs: RMS and Power; Phasor Diagram; RMS Plot; Harmonic Magnitude (table); Harmonic Magnitude (bar chart); Harmonic Phase; Harmonic Power (bar chart) [Displays direction for selected harmonics, and referenced to the direction of the Power frequency]; Flicker; Events; Waveforms.
Aggregation interval	Adjustable.
Sampling rate	Displayed.
Operations Window	
Operations	Online Monitor; Configuration; Download; Clear memory after download; Clear Download Portion; Clear All Memory; Set Time; Update Firmware.
Status information	Mode1; Serial Number; Calibration state; Firmware; Boot Counter; Channel; CT Types; Operating mode; Comms status.
Configuration	
Configuration tabs	Inputs, Log Intervals, RMS and Power, Harmonics and Flicker, IEC Events, Capture Triggers, Capture Types, LCD, Comms.
Management Window	
Open data File	Opens Miro data file with ability to browse.
Connect USB	Connects to the Miro using direct cable connection.
Offline configuration (tabs)	Inputs, Log Intervals, RMS and Power, Harmonics and Flicker, IEC Events, Capture Triggers, Capture Types, LCD, Comms.
Tools (Join Multiple Files)	Data files must have same serial number (data generated from the same instrument).
Open Recent	Select a Miro file from a list of recently opened files.