MIRO PQ20 Single Phase Voltage Quality and Mains Signalling Logger and Analyser

The **MIRO** PQ20 (Figure 1) is the ideal tool to measure voltage quality in homes, commercial and industrial installations to determine if the voltage measurements are within expected limits. The PQ20 comes with two voltage channels (Phase to Neutral and Ground to Neutral). Its compact profile and lightweight design make it easy to transport, and use. Voltage quality measurements include Total Harmonic Distortion (THD), Harmonic Magnitudes, and Flicker.

The Miro PQ20 also measures Mains Signalling (MS) (ripple control) voltages. Mains Signalling is where voltages (typically several volts), at different frequencies (e.g., 744Hz, 1050Hz), are injected into an electrical network to control loads, i.e. equipment connected to the network. Examples include switching streetlights at designated times and hot water systems, air conditioners and other loads at specified intervals, e.g., peak and off-peak periods. Excessive MS voltages can be annoying (e.g. buzzing fans, noisy public address systems) and can even cause detrimental effects to connected equipment, (e.g. dropping out of inverters). The Miro PQ20 can help determine if MS signals are excessive and if they are contributing to equipment disturbance or malfunction.

The Miro PQ20 comes with a fixed voltage lead with a standard plug that customers connect to a wall socket. An adapter with appropriate leads and connectors can be provided, if direct connections to energised circuits are required, e.g. busbars and distribution panels.

Data can then be downloaded after the monitoring period (typically seven days). The quick and easy reporting tools allow the customer to determine if the voltage quality is within compliance limits. The built in Wi-Fi lets users view real time measurements, change configurations, download data files, and upgrade firmware directly from a smart phone or tablet. The PQ20 is the ideal instrument for professionals, including utility engineers, electricians, linesmen, and technicians.

Key hardware features

- Compact design and easy connections. Just plug into a wall socket.

- AC voltage and mains signalling measurements. See Figures 2 and 3.

- All weather conditions: rugged, shock resistant, portable, and weatherproof (IP66). Note: Wall socket or connections needs to be appropriately rated for outdoor use.

- Local (WiFi) communication is integrated within the enclosure - no additional peripherals required. Optional remote cellular communications available.

- Safety
  - Voltage transients: Minimum CAT II 300V
  - Fixed voltage leads.
  - Reinforced insulation / double insulated.

- Graphical colour display
  - Voltage waveforms.
  - Phasor diagrams.
  - Measurements.
  - User defined screen.

Figure 1: MIRO PQ20 – Single phase voltage quality logger and analyser

Brochure (full) - MIRO PQ20 single phase voltage quality logger and analyser, rev 1.10
Address: Unit 1, 3 Tollis Place, Seven Hills, NSW 2147, Sydney, Australia
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Website: www.chkpowerquality.com.au; **Enquiries:** sales@chkpowerquality.com.au

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- Internal backup battery: 5 minutes back up time as standard, with option to extend upon request.

- 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 interval.

- Logged memory: 8GB.

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.
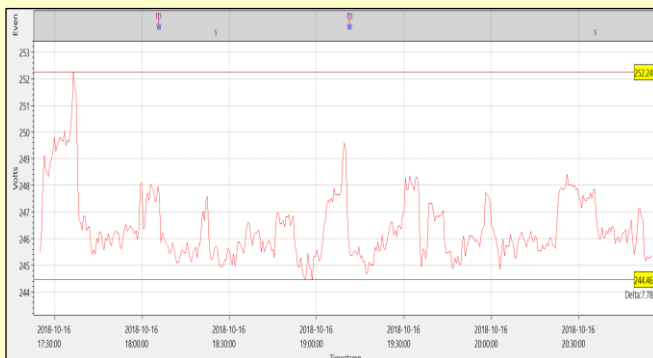

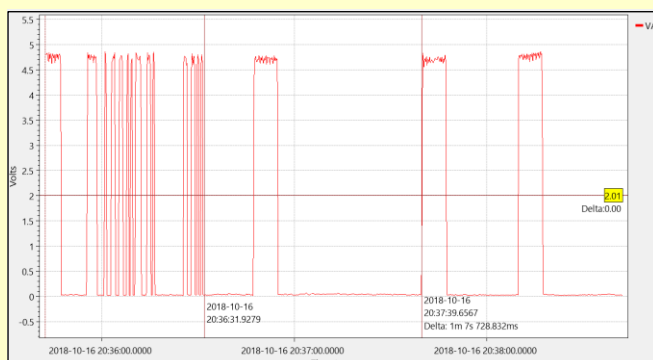**Figure 2: CITRUS – RMS voltage profile**

Figure 3: CITRUS – Main signalling capture

- Configurations
  - Pre-defined configurations for easy setup.
  - Create and store different configuration files for quick retrieval.

- Online monitor to view real time measurements.

- View different log file data on the same graph to compare PQ measurements.

- Analysis and Compliance reporting
  - Daily Min/Max. (RMS, THD etc)
  - Voltage, Harmonics
  - Scatter plot, Statistics

- 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 other 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
  - New features can be added upon request.

Operate directly from mains voltage.
- Built in Phase A power supply.

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

Portability
- Portable
  - Small and light, but no compromise on safety or features
- IP66 – no external housing required.

Logging
- User configurable logging interval

Memory
- 8GB memory

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- o 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.
  - o Download, reconfigure, and clear at any time without stopping the logging.
  - o No interruption or gaps introduced.
  - o Suitable for fixed or long-term monitoring.
  - o 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.
  - o All configuration is in a single form.
- Fast clearing – less than a second.
- Easy firmware updates.
  - o No special tool or procedure required.
  - o No need to clear memory or configuration.
  - o Unit will restart when firmware upload completes and resume logging immediately.

No buttons

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

Display

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

Citrus

- Software:
  - o Free.
  - o Small download, easy and fast to install.
  - o Built for both 32 and 64 bit Windows.
  - o Supports all Windows versions from 7 through to 10.
  - o Main executable is portable – data files can be viewed without installation and without administrator privileges.
  - o Digitally signed to verify it came straight from CHK Power Quality.
  - o Easy to use.
  - o Familiar for existing PowerView users.
  - o Multiple data windows allowed or add multiple files to the same window.
  - o Tabbed view to quickly compare different graphs.
  - o Easily add additional parameters to graphs
  - o Cursors, text, and arrow annotations available
    - ▪ Tied to data, not to position on screen.
    - ▪ Correct position maintained when panning and zooming.
  - o Zooming
    - ▪ Click and drag or by scroll wheel.
    - ▪ Zoom multiple axes or a single axis at a time.
    - ▪ Quickly reset zoom on double click
  - o Convert graph to table or CSV file.
  - o Date/time range and channel selection available for all parameters and analysis charts

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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 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	
Magnitude of the supply voltage (true RMS)	Range: 10% to 150% of nominal value with accuracy of ±0.5% of nominal value (Class S).
Flicker	IEC61000-4-15, 10 minute Pst (short term) and 2hr Plt (long term).
Voltage harmonics	Harmonic Magnitudes, up to the 25th.
Total harmonic distortion (THD)	IEC61000-4-7, THD (up to 50th harmonic).
Crest factor	Indicates peak-to-rms ratio of waveform. ±1%.
Communications	
Wired data (standard)	USB 2.0.
Wireless (options)	Local wireless (Wi-Fi) integrated within the instrument as standard. Optional remote cellular
Logging	
Logged data memory	8GB.
Logging intervals	User configurable log interval.
Measurements	All measurements simultaneously.
General	
Circuit connections	Single phase.
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)	2 channels (Phase to Neutral + Ground to Neutral).
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.
Accuracy	
Reference conditions	22ºC.
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.

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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; CATII 300V, >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: Voltage channels; Width side ports: USB, DC power, remote cellular antenna.
Weight	1.05kg (instrument only).
Case material and colour	Polycarbonate, moulded in light grey.
Holster	Soft flexible holster for protection.

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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	Graphical view of logged: TRMS, Crest Factor
Harmonics	Graphical view of logged: Harmonic Magnitude; Harmonic Percentage of Fundamental and THD.
Flicker	Graphical view of logged short term (Pst) and long term (Plt) flicker.
Analysis	
Daily Min/Max	TRMS, THD
Graph Analysis	Scatter plot, Statistics
Custom	Upon request.
Device Configuration	
Configuration tabs	Inputs, Log Interval, RMS, Harmonics and Flicker, LCD and Communication.
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.
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
Options	
Features	Display Time Zone; Colour Settings.
Online Monitor	
Features	Ability to view all parameters plus waveforms in real-time. Tabs: RMS; RMS Plot; Harmonic Magnitude (table); Harmonic Magnitude (bar chart); Waveforms.
Aggregation interval	Adjustable only.
Sampling rate	Displayed.

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Operations Window	
Operations	Online Monitor; Configuration; Download; Clear memory after download; Clear Download Portion; Clear All Memory; Set Time; Update Firmware.
Status information	Model; Serial Number; Calibration state; Firmware; Boot Counter; Channel; 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, Harmonics and Flicker, 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.

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