PMC-670
Advanced C&I Power Quality Analyzer



- 512Samples/Cycle
- 2GB Log Memory
- IEC 62053-22 Class 0.2S Compliant
- IEC 61000-4-30 Class A Certified
- IEC 61000-4-15 Flicker
- IEC 61000-4-7 Harmonics
- Comprehensive Data Recording
- COMTRADE Compatible
- Extensive I/O Capabilities
- Industrial Grade Components
- Extended Warranty
- 5.7” Color LCD Display @ 640x480
- EN50160 Compliance Reporting
- Dip/Swell, Transient and Flicker
- Optional Disturbance WFR (DWR) and Disturbance Direction Indicator
- Optional IEC61850 for Smart Grid
- Modbus RTU/TCP, HTTP, SNTP, SMTP
- Ethernet and 2xRS-485
- DIN 144 (138x138 Cutout)
- Standard Tropicalization
- Extended Temperature Range

Designed For Reliability ***Manufactured To Last***

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Advanced C&I Power Quality Analyzer



The PMC-670representsthe latest offer from CET for the Advanced C&I PQmonitoring market as it offers un-surpassed functionality by combining Class 0.2S accuracy and advanced PQ features in a compact DIN 144 form factor with a stunning, high resolution, color TFT LCD display. The PMC-670 satisfies such standards as IEC 62053-22 Class 0.2S, IEC 61000-4-30 Class A, IEC-61000-4-15, IEC 61000-4-7as well as IEC 61850 for Substation Automation and Smart Grid applications. Further, the PMC-670 offers 2GBon-board memory, extensive I/O with 8xDIs, 4xROs, 2xDOs, optional IRIG-B inputs for GPS Time Sync., one100BaseT Ethernet and two RS-485 ports.These features likely make the PMC-670one of the most advanced PQ monitors for the C&I market today.

Typical Applications

- HV, MV and LV distribution substations at critical customers
- Data Centers, Semiconductor Fabs, Heavy Industries
- 7x24 Automated Manufacturing Facilities
- Dips, Swells, Transients, Harmonics and Flicker monitoring
- Mains and critical feeder monitoring
- Optional IEC61850 support for Substation Automation and Smart Grid

Basic Features

- IEC 62053-22 Class 0.2S kWh metering
- Standard 512 samples/cycle sampling
- 2GB on-board log memory
- Industrial-grade, high-resolution Color TFT LCD @ 640x480
- Multi-Tariff TOU
- Time Sync. via SNTP, GPS 1PPS or optional IRIG-B inputs
- 32Setpointswith programmable logic
- Standard 100BaseT Ethernet and two RS-485 ports

Power Quality Features

- IEC 61000-4-30 Class A Certified by PSL
- IEC 61000-4-7, IEC 61000-4-15 and EN50160 Reporting
- Transients, Dips, Swells, Interruptions, Rapid Voltage Changes and optional Disturbance Direction Indicator
- Harmonic analysis up to 63rd on-board and 256th via software
- Waveform recording in COMTRADE file format

Front Panel and Web Interface

- Real-time, Harmonic Power and Energy measurements
- Real-time WF Capture of 4-phase Voltages and Currents for 4 cycles/second @128 samples/cycle
- PQ Log with ITIC/SEMI F47 and Waveform displays
- Harmonic &Interharmonic Histogram and Phasor diagrams
- EN50160 Report
- SOE Log
- I/O status
- Device configuration
- Diagnostics

Power Quality Metering PQ

Parameters as per IEC 61000-4-30

- Power Frequency
- Magnitude of the Supply Voltage
- Flicker
- Supply Voltage Dips (Sags) and Swells
- Voltage Interruptions
- Transient Voltages
- Supply Voltage Unbalance
- Voltage Harmonics and Interharmonics
- Mains Signalling Voltage on the Supply Voltage
- Rapid Voltage Changes
- Measurement of Underdeviation and Overdeviation parameters

Harmonic and Interharmonic measurements

- K-Factor for Current
- U and I THD, TOHD, TEHD
- U and I Individual Harmonics (%HD) from 2nd to 63rd#
- U and I Individual Interharmonics(%IHD)from 0 to 63rd#
- Harmonic kW, kvar and kVA from 2nd to 63rd
- Fundamental U, I, kW, kvar, kVA and PF
- Fundamental kWh, kvarh Import/Export
- Total Harmonic kWh,kvarh Import/Export
- Total Harmonic kWh, Harmonic kvarh Import/Export from 2nd to 63rd

%HD and %IHD can be configured as % of Fundamental or % of RMS

Symmetrical Components and Unbalances

- Zero, Positive and Negative Sequence Components
- U and IUnbalancebased on Zero and Negative Sequence Components

Transient and Dip/Swell Recording

- Transientscapture as short as 40us at 512 samples @ 50Hz for sub-cycle disturbances such as capacitor switching and resonance phenomena
- Dips and Swells detection @ 10ms (½ cycle at 50Hz)
- Trigger for DO,Data Recording, High-Speed Data Recording, WF Recording, optional Disturbance Waveform Recording and Alarm Email
- Display of ITIC or SEMI F47 plot as well as the event waveform on the Front Panel and Web Interface

Rapid Voltage Changes (RVC)

- Detection of a quick transition in RMS voltage between two steady state conditions

Disturbance Direction Indicator - Optional

- Determine if a Dip Event is located upstream or downstream
- Pinpoint if the cause of the event is external or internal

WaveformCapture (WFC) and Waveform Recorder (WFR)

- Real-time WF Capture @ 128 samples/cycle via front panel display
- 2 independent WF Recorders with a combined total of 128 entries
- Simultaneous capture of 4-phase Voltage and Current inputs
- # of Cycles x Samples/Cycles(# of pre-fault cycles)
  - 20x512 (6), 40x256 (12), 80x128 (24)
  - 160x64 (48), 320x32 (96), 640x16 (192)
- COMTRADE file format, downloadable from the on-board FTP Server

Disturbance Waveform Recording (DWR) - Optional

- Disturbance recording of all Voltage (U1-U4) and Current (I1-I4) Inputs
  - Initial Fault: Up to 35 cycles @ 256 samples/cycle
  - Extended Fault: 150 cycles @ 16 samples/cycle
  - Steady State: 360 seconds of 1-cycle RMS recording @ 50Hz
  - Post Fault: Up to 15 cycles @ 256 samples/cycle

PQ Event Counters

- Transients, Dips, Swells, Interruptions, Rapid Voltage Changes, Mains Signaling Voltages and Total PQ Event Counters

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Metering

Basic Measurements (1-second update)

- 3-phase Voltage,Current, Power, PF and Phase Angles
- kWh, kvarh Import/Export/Net/Total and kVAh Total
- U4, I4,Frequency
- Configurable timestamped measurements include 10/12-cycle, 1-second, 3-second, 10-minute and 2-hour

High-speed Measurementsfor Event Detection

- 4-phase Voltage, Current, Power, PF @ ½ cycle
- Frequency @ 5 cycles

Demands

- Present and Predicted Demand for 3-phase Voltage, Current, Power, PF, U4, I4,Frequency
- Present Demand of 4-phase U& I THD/TOHD/TEHD/HD 2nd to HD 63rd, and 4-phase CurrentK-factor
- Max/Min valuesper Demand Interval
- Peak Demands for This Month and Last Month, or Before the Last Reset and Since the Last Reset
- Demand synchronization with DI

Multi-Tariff TOU capability

- Two independent sets of TOU Schedules
  - Up to 12 Seasons
  - 90 Holidays or Alternate Days and 3 Weekend Days
  - 20 Daily Profiles, each with 12 Periods in 15-minute interval
  - 8 Tariffs, each providing the following information:
    - kWh/kvarh Import/Export and kVAh
    - kW/kvar Import/Export Peak Demands
    - Register rollover at 1,000,000,000kXh

Data and EventRecorders

Non-Volatile Log Memory

- 2GBon-board log memory

Interval Energy Recorder (IER) Log

- kWh, kvarh Import/Export and kVAh Total
- Programmable recording interval from 5 minutes to 60 minutes
- Support FIFO and Stop-When-Full mode

Data Recorder and High-Speed (HS) Data Recorder Log

- 16 Data Recorders and4 HS Data Recordersof 16 parameters each
- Recording interval from 1s to 40 days for Data Recorder and from 1/2 to 60 cycles for HS Data Recorder
- Programmable Sources
- Configurable Depths and Recording Offsets, max. depths @ 65535
- Support FIFO orStop-When-Full mode

Max/Min Recorder (MMR) Log

- Logging of Max/Min values for real-time measurements such as U, I, kW,kvar, kVA, PF, Freq., Unbalance, K-factor, THD
- Two transfer modes:
  - Manual: Max/Min Since Last Reset and Before Last Reset
  - Automatic: Max/Min of This Month and Last Month

SOELog

- 1024 FIFO events time-stamped to ±1ms resolution
- Setup changes,System events, Setpoint events and I/O operations

PQ Log

- 1024 FIFO entries time-stamped to ±1ms resolution
- Transient, Dip/Swell, Disturbance Direction, Interruptions, Rapid Voltage Changes, Mains SignallingVoltages, ...etc.
- Record the time and characteristic data of the captured PQ event

Setpoints

PQ Setpoints

- Transients
- Dips/Swells
- Rapid Voltage Changes
- Harmonics
- Trigger DO, SOE Log, PQ Log, Data Recording,WFR or DWR

Control Setpoints

- 24 control setpoints with programmable Combinational Logic
- 8 High-Speedsetpoints
- Extensive monitoring sources
- Configurable thresholds and time delays
- Trigger DO/RO, SOE Log, Data Recorder High-Speed Data Recorder,Waveform Recorder and Alarm Email

Digital Input Setpoints

- Provides control output actions in response to changes in Digital Input status
- Demand synchronization
- Trigger DO, SOE Log, Data Recording, High-Speed Data Recording,WFR, optional DWR and Alarm Email

Inputs and Outputs

Digital Inputs

- 8 channels, volts free dry contact, 24VDC internally wetted
- 1000Hz sampling
- External status monitoring with programmable debounce
- Pulse counting with programmable weight for each channel for collecting WAGES (Water, Air, Gas, Electricity, Steam) information
- Demand Synchronization
- Time-Sync via GPS's 1PPS output

Digital Outputs

- Standard6 channels for control, alarming and pulsing applications
- RO1-RO4: Form A Mechanical Relay
- DO1-DO2: Optically Isolated Solid State Relay

Communications

RS-485(P1, P2)

- Optically isolated RS-485port with baudrate from 1.2 to 38.4 kbps
- Modbus RTU protocol
- Time Sync. via P1 withGPS 1PPS or IRIG-B outputs

Ethernet Port (P3)

- 1x10/100BaseT with RJ45 connector
- Protocols
  - Modbus TCP
  - HTTP, SNTP, FTP, SMTP
  - Ethernet Gateway for P1 & P2
  - OptionalIEC61850
- Multiple simultaneous client connections
  - 10xModbus TCP
  - 8xIEC61580 (optional)
- Firmware upgrade via Ethernet port

Time Synchronization

- Battery-backed real-time clock @ 6ppm(≤ 0.5s/day)
- Time Synchronization via Modbus RTU protocol, SNTP, GPS 1PPSor optional IRIG-B input

System Integration

PecStariEMS

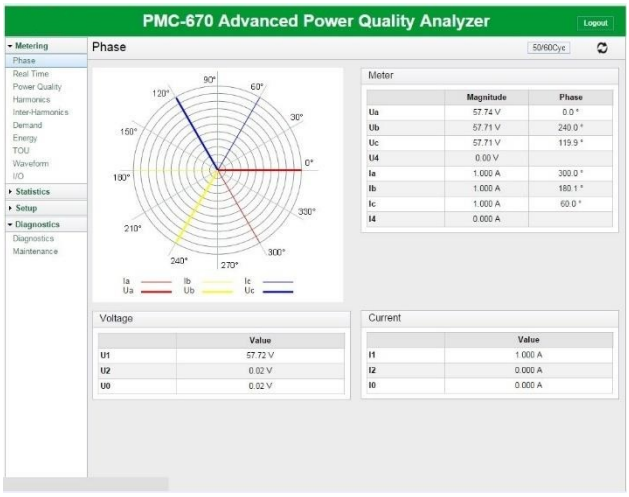
ThePMC-670 is supported by CET's PecStariEMS. In addition, the PMC-670 can be easily integrated into other 3rd party systems because of its support of multiple communications ports as well as different industry standard protocolssuch as Modbus and optional IEC 61850.

PMC Setup

- Free Setup configuration tool
- Real-time and log display
- Remote control

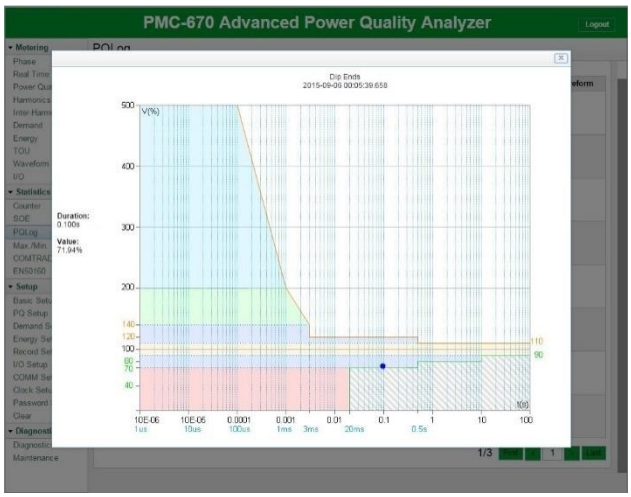
3rd Party System Integration

- Easy integration into Substation Automation or Utility SCADA systems via Modbus RTU, Modbus TCP or IEC61850
- The on-board Web Server allows complete access to its data and supports the configuration for most Setup parameters via a web browser (Google Chrome) without the use of proprietary software
- The on-board, password protected FTP Server allows logged data in COMTRADE format to be downloaded without any special software.The downloaded files can be subsequently viewed using software that supports the industry standard COMTRADE file formats

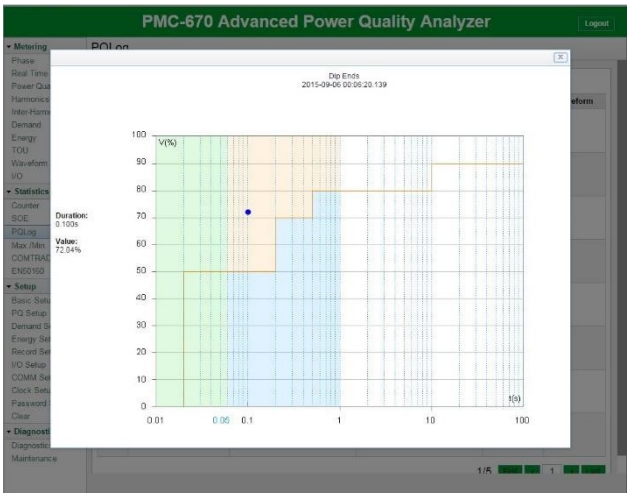


Phasors

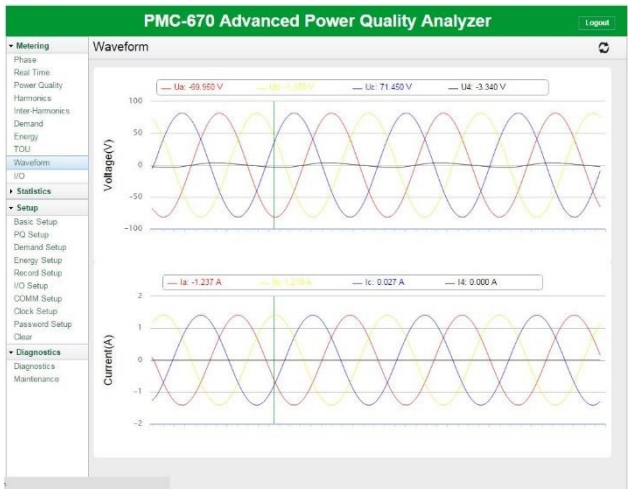
Web Interface



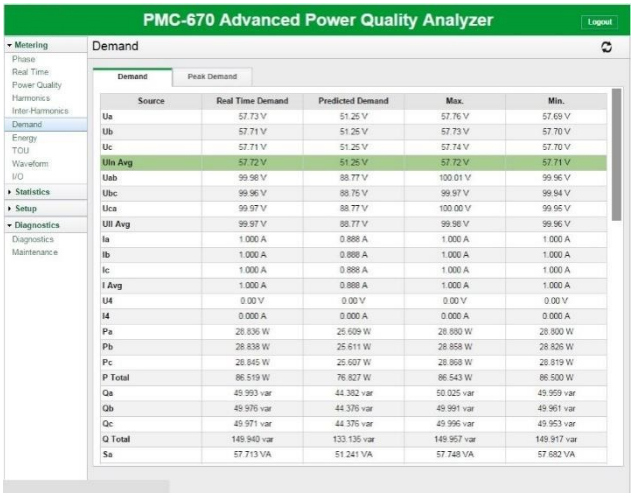
ITIC Curve



SEMI F47 Curve



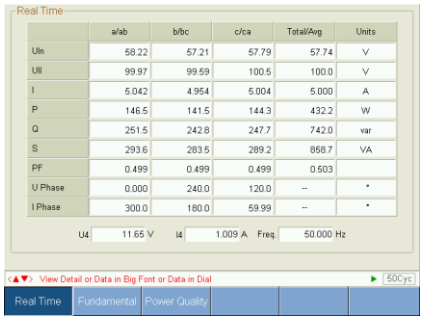
Waveform



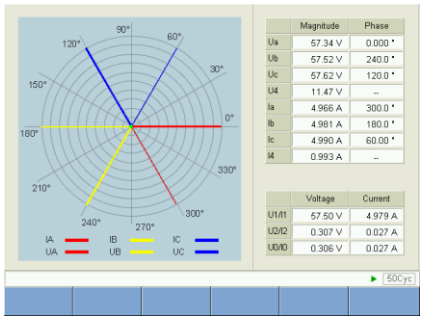
Demand

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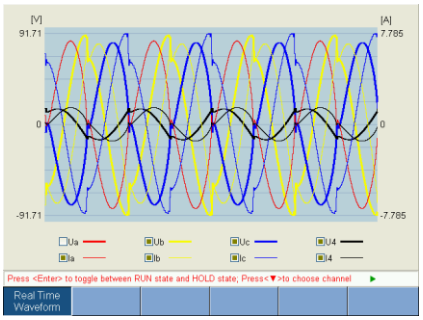
Front Panel User Interface



Basic Measurements



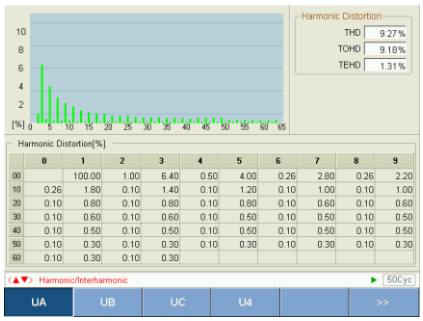
Phasors,Sequence Components & Unbalance



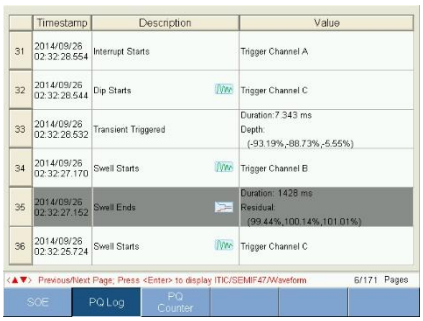
Real-time WF Capture



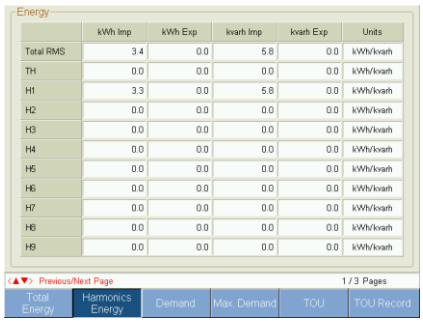
Energy Measurements



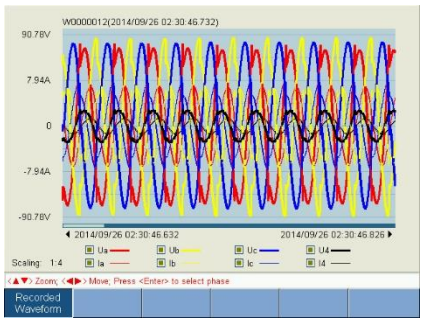
Harmonics



PQ Log



Harmonics Energy Measurements



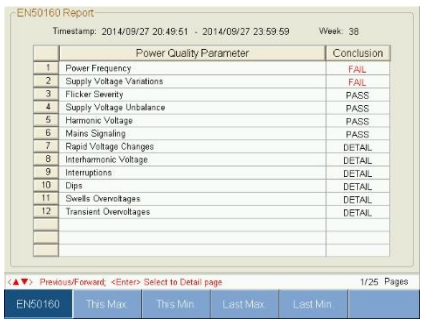
Waveform Recorder



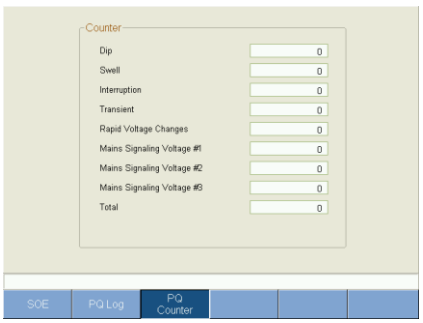
ITIC (or SEMi F47) Plot



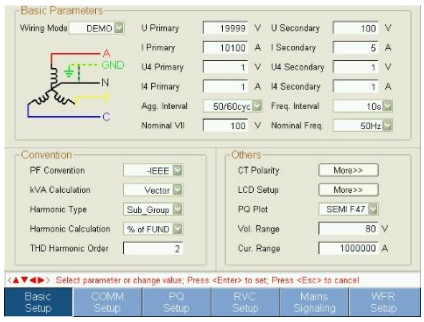
Power Quality Measurements



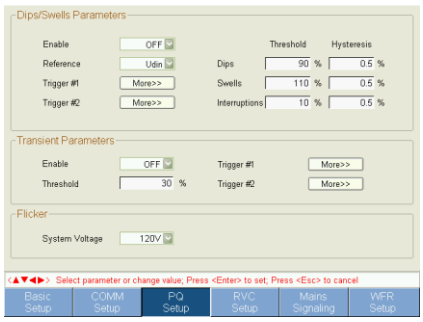
EN50160 Report



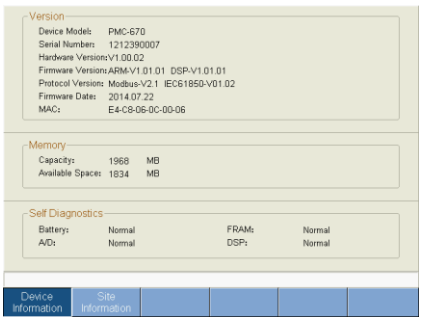
PQ Log Counters



Basic Setup



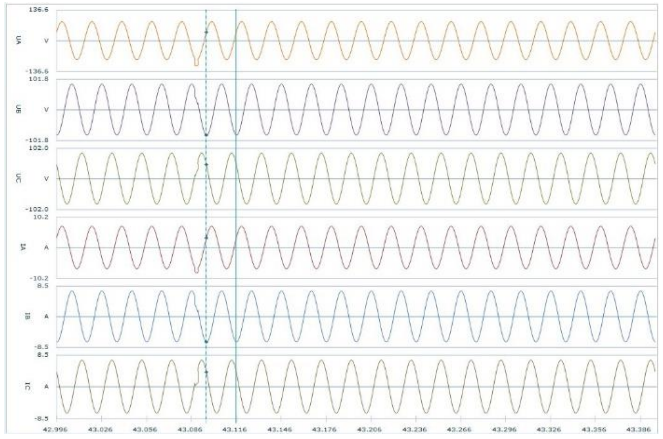
PQ Setup



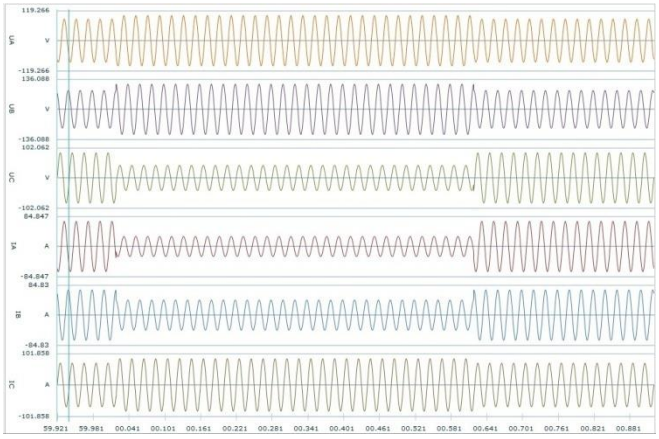
Device and Diagnostics Information

Designed For Reliability Manufactured To Last

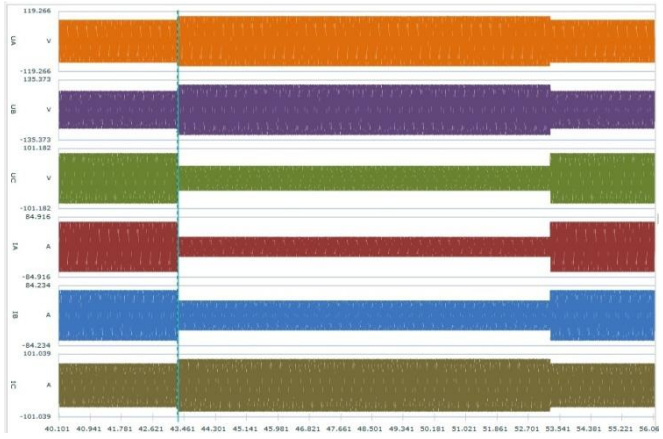
Waveform Examples at Different Resolutions



WFR @ 512 samples/cycle

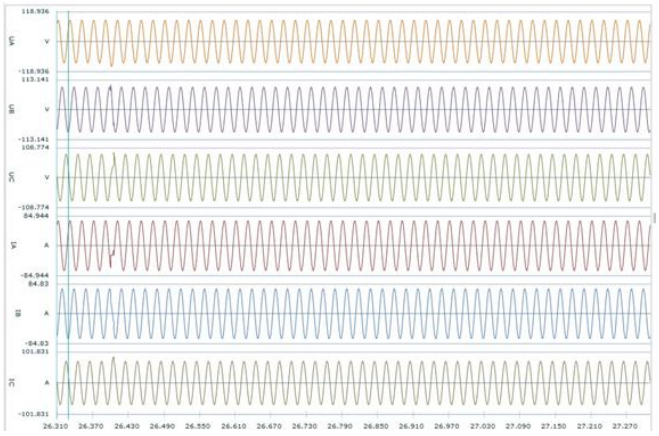


WFR @ 256 samples/cycle

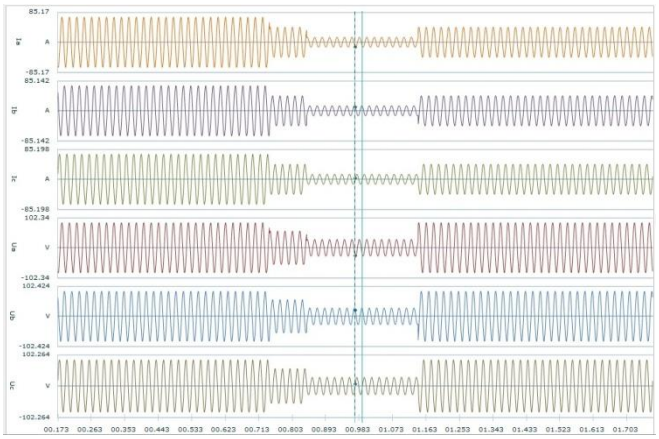


WFR @ 16 samples/cycle

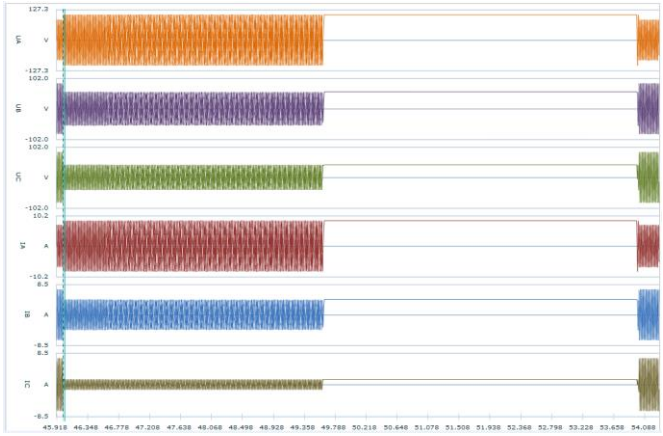
Waveform Examples of Different PQ Events



WFR of a Transient Event



WFR of a Dip Event



DWR of a Dip/Swell Event

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Technical Specifications

Voltage Inputs (V1, V2, V3, V4, VN)	
Standard (Un)	400VLN/690VLL
Range	10V to 120% of Un
Overload	1.2xUn continuous, 4xUn for 1s
Burden	<0.1VA per phase
PT Ratio	
Primary	1-1,000,000V
Secondary	100-690V
V4 Primary	1-1,000,000V
V4 Secondary	1-400V
Frequency	42Hz-58Hz@ 50Hz 50 Hz-70Hz@ 60Hz
Current Inputs (I11, I12, I21, I22, I31, I32, I41, I42)	
Standard (In)	5A
Optional (In)	1A
Range	0.1% to400% In
Starting Current	0.1% In
Overload	4xIn continuous, 10xIn for 1s
Burden	<0.5VA per phase
CT Ratio	
Primary	1-30000A
Secondary	1-5A
I4 Primary	1-30000A
I4 Secondary	1-5A
Power Supply (L+, N-)	
Standard	95-250VAC/VDC ± 10%, 47-440 Hz
Optional	20-60VDC
Burden	<8W
Digital Inputs (COM, DI1, DI2, …, DI7, DI8)	
Standard	Dry contact, 24VDC internally wetted
Sampling	1000Hz
Hysteresis	1ms minimum
Relay Outputs (RO1, RO2,RO3,RO4)	
Type	Form A Mechanical Relay
Loading	5A @ 250VAC / DC
Digital Outputs (COM, DO1, DO2)	
Type	Form A Solid State Relay
Isolation	Optical
Max. Load Voltage	80V
Max. Forward Current	50mA
GPS/IRIG-B(Optional)	
Hardware Interface	D+, D-, SH
LCD Display	
Type	Color TFT LCD, Industrial Grade
Resolution	640x480
ViewingArea	115x86mm
Environmental Conditions	
Operating Temp.	-25°C to 70°C
Storage Temp.	-40°C to 85°C
Humidity	5% to 95% non-condensing
Atmospheric Pressure	70 kPa to 106kPa
Pollution Degree	2
Measurement Category	CAT III
Mechanical Characteristics	
Panel Cutout	138x138mm
Unit Dimensions	144x144x129mm
IP Rating	52

Accuracy

Parameters	Accuracy	Resolution
Voltage	±0.1%	0.01V
Current	±0.1%	0.001A
kW, kVA	IEC 62053-22 Class 0.2S	0.001k
kvar	±0.2%	0.001k
kWh, kVAh	IEC 62053-22 Class 0.2S	0.001kXh
kvarh	IEC 62053-23 Class 2	0.001kvarh
P.F.	±0.5%	0.0001
Frequency	±0.005 Hz	0.001Hz
Harmonics	IEC 61000-4-7 Class A	0.001%
Phase angles	±1°	0.1°
Voltage Deviation	±0.1%	0.01%
Voltage Unbalance	±0.1%	0.01%
Current Unbalance	±0.5%	0.01%

Standards of Compliance

Safety Requirements	
LVD Directive 2006/95/EC	EN61010-1-1-2001
Insulation	IEC 60255-5-2000
Dielectric test	
Between Power, AC circuits, and GND	2kV @ 1 minute
Between I/O, GPS and GND	500V @ 1 minute
Insulation resistance	
Between Power, AC Circuits, and GND	>100MΩ
Between GPS and GND	>10MΩ
Impulse voltage	
Rated input voltage > 60V	6kV, 1.2/50µs
Rated input voltage ≤ 60V	1kV, 1.2/50µs

EMC Compatibility EMC Directive 2004/108/EC (EN 61326: 2006)	
Immunity Tests	
Electrostatic discharge	IEC 61000-4-2:2008 Level IV
Radiated fields	IEC 61000-4-3:2008 (10 V/m)
Fast transients	IEC 61000-4-4:2004 Level IV
Surges	IEC 61000-4-5:2005 Level IV
Conducted disturbances	IEC 61000-4-6:2008 Level III
Magnetic Fields	IEC 61000-4-8:2009 Level IV
Oscillatory waves	IEC 61000-4-12:2006 Level III
Electromagnetic Emission	IEC 60255-25:2000
Emission Tests	
Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment	EN 55011: 2009 (CISPR 11)
Limits and methods of measurement of radio disturbance characteristics of information technology equipment	EN 55022: 2006+A1: 2007 (CISPR 22)
Limits for harmonic current emissions for equipment with rated current ≤16 A	EN 61000-3-2: 2006+A1: 2009
Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤16 A	EN61000-3-3: 2006
Emission standard for residential, commercial and light-industrial environments	EN61000-6-3: 2007
Electromagnetic Emission Tests for Measuring Relays and Protection Equipment	IEC 60255-25:2000

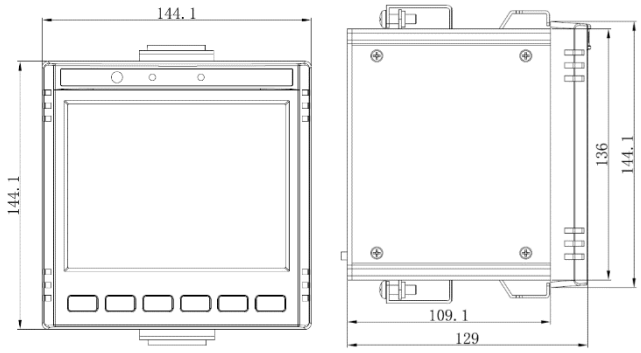
Mechanical Tests		
Vibration Test	Response	IEC 60255-21-1:1998 Level II
	Endurance	IEC 60255-21-1:1998 Level I
Shock Test	Response	IEC 60255-21-2:1998 Level I
	Endurance	IEC 60255-21-2:1998 Level I
Bump Test		IEC 60255-21-2:1998 Level I

Power Quality	
EN 50160	Voltage characteristics of electricity supplied by public distribution systems
IEC 61000-4-7	General guide on harmonics and inter-harmonics measurements and instrumentation, for power supply systems and equipment connected thereto
IEC 61000-4-15	Flicker meter - Functional and design specifications
IEC 61000-4-30 (Certified by PSL)	Testing and measurement techniques - Power quality measurement methods

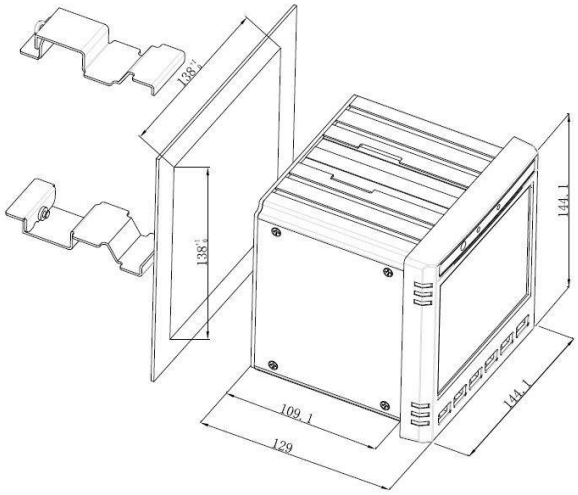
Designed For Reliability **Manufactured To Last**

PMC-670
Advanced C&I Power Quality Analyzer

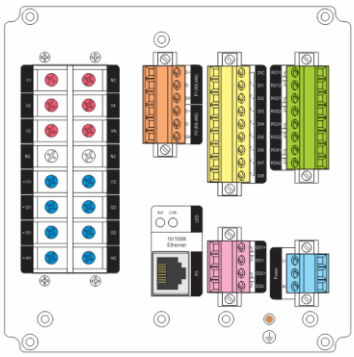
Device Views



Front View Side View



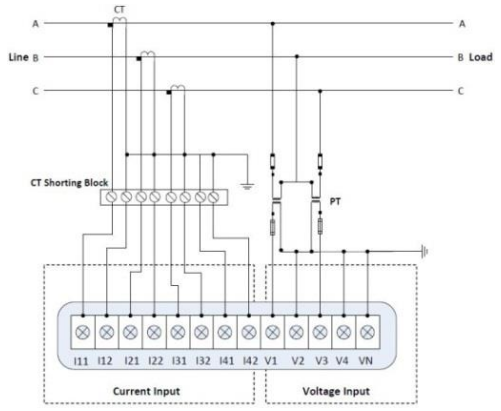
Panel Cutout and Device Installation



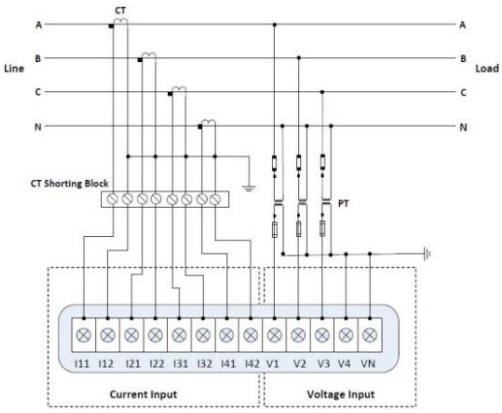
- Current Input Terminals
- Voltage Input Terminals
- RS485 Terminals
- 10/100BaseT Ethernet Port
- DI Terminals
- DO Terminals
- Relay Output Terminals
- Power Supply Terminals
- Ground Terminal

Rear Panel

Wiring Diagrams



3-Wire Delta



4-Wire Wye

Product	Description
PMC-670 C&I Advanced Power Quality Monitor	
Input Current	
5	5A
1	1A
Input Voltage	
3	57V-400VLN
Power Supply	
2	95-250VAC/DC, 47-440Hz
3	20-60VDC
System Frequency	
5	50Hz
6	60Hz
I/O	
A	8DI + 4RO + 2DO
Communications	
A	1 Ethernet port + 2RS-485 ports
IEC61850	
X	No
A*	Support IEC61850 Protocol
Display Language	
E	English

PMC- 670	-	5	3	2	5	A	A	X	E	PMC-670-5325AAXE (Standard Model)

* Additional charges apply

Contact us

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Designed For Reliability Manufactured To Last