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Electric
Technology

PMC-680M
Advanced Multi-Circuit Power Quality Monitor

- Support up to Twelve 3Ø V/I Inputs
- 512 samples/cycle
- 16GB Log Memory
- IEC 62053-22 Class 0.2S Compliant
- IEC 61000-4-30 Class A Compliant
- IEC 61000-4-15 Flicker
- IEC 61000-4-7 Harmonics
- Comprehensive Data Recording
- PQDIF & COMTRADE Support
- Programmable I/O Capabilities
- 5.7” Color LCD Display @ 640x480
- Dip/Swell, Transient and Flicker
- Disturbance WF Recording (DWR)
- 300-second DWR for Fault Capture
- Optional IEC 61850 for Smart Grid
- Modbus RTU/TCP, SNTP
- Dual Ethernet and 2xRS-485
- Industrial Grade Components
- Standard Tropicalization
- Extended Op. Temp. & Warranty

Designed For Reliability Manufactured To Last

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PMC-680M
Advanced Multi-Circuit Power Quality Monitor

The PMC-680M is CET's Advanced Multi-Circuit PQ Monitor designed for the Utility's Compliance monitoring market as it offers un-surpassed functionality by combining Class 0.2S accuracy, multi-circuit monitoring, advanced PQ features and a high resolution, backlit, color TFT LCD display in an enclosure measuring only 224.6x265.8x251.7mm. The PMC-680M satisfies such standards as IEC 62053-22 Class 0.2S, IEC 61000-4-30 Class A, IEC-61000-4-15, IEC 61000-4-7 and optional IEC 61850 for Substation Automation. Further, it offers a large logging capacity with 16GB of on-board memory, extensive I/O with 16xDIs and 8xDOs, GPS Time Sync., dual Ethernet and two RS-485 ports. The PMC-680M can be configured to monitor up to TWELVE 3-phase Voltage/Current Inputs in a single device. These features likely make the PMC-680M the most cost effective PQ Monitor for the Utility market today.

Typical Applications

- Multi-Circuit PQ Monitoring at Power Grids and Power Plants
- PQ Monitoring at HV, MV and LV Utility Substations
- Data Centers, Semiconductor Fabs, Heavy Industries
- 7x24 Automated Manufacturing Facilities
- Mains and critical feeder monitoring

Basic Features Summary

- Extendable modular design. Monitor up to Twelve 3-phase Voltage/Current Circuits
- Flexible combination of V and I measurement channels to meet different measurement needs
- 256 Setpoints and 16 HS Setpoints for each circuit
- 16GB on-board log memory and extensible external memory via USB port for data log and SOE recording
- 16xDIs and 8xDOs with optional 4xAIs for monitoring and control
- Industrial-grade, high-resolution Color TFT LCD @ 640x480
- Time Sync. via RTC, SNTP or GPS 1PPS output
- Dual 100BaseT Ethernet, two RS-485 ports and USB interface
- Optional IEC 61850 support for Substation Automation and Smart Grid

Power Quality Features Summary

- IEC 61000-4-30 Class A, IEC 61000-4-7 and IEC 61000-4-15
- Transients, Dips, Swells, Interruptions, Rapid Voltage Changes (RVC) and In-rush Current monitoring
- Harmonic analysis up to 63rd on-board
- Voltage/Current Unbalance, Voltage and Frequency Deviation
- Disturbance Direction Indicator & Disturbance Waveform Recording (DWR) of up to 300 seconds for Dips, Swells or Interruptions.
- Real-time Waveform Capture (WFC) on Front Panel Display
- Waveform Recording (WFR) triggered by Transients in COMTRADE and PQDIF file format that is compatible with the PQ View software
- Max. 512 samples/cycle for WFC, WFR and DWR

Power Quality Metering

Voltage Flicker as per IEC 61000-4-15

- Plt and Pst based on IEC standard
- Flicker Pass Rate Evaluation
- One year storage for Plt and Pst recording

Harmonic and Interharmonic measurements as per IEC 61000-4-7

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

%HD and %IHD can be configured as % of Fundamental, % of U/I nominal or % of RMS

Symmetrical Components and Unbalances

- Zero, Positive and Negative Sequence Components
- V and I Unbalance based on Zero and Negative Sequence Components

Transient and Dip/Swell Recording

- Transients as short as 40us at 512 samples @ 50Hz for sub-cycle disturbances such as capacitor switching and resonance phenomena
- Dip, Swell and Interruption detection @ 10ms (½ cycle at 50Hz)
- Trigger for DO, High-Speed Data Recording, WFR and DWR
- Display of ITIC or SEMI F47 plot and Event Waveform on Front Panel

Rapid Voltage Changes (RVC)

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

In-rush Current Monitoring

- Monitoring of the ½ cycle RMS Current and capturing of the current waveforms associated with events such as motor starting and transformer being energized
- Trigger for DO, High-Speed Data Recording, WFR and DWR

Disturbance Direction Indicator

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

Waveform Capture (WFC) and Waveform Recorder (WFR)

- Real-time Waveform Capture @ 512 samples/cycle
- Waveform Recorder with 128 entries
- Simultaneous capture of 3-phase Voltage and Current inputs
- # of Cycles x Samples/Cycles with programmable # of pre-fault cycles 20x512, 40x256, 80x128, 160x64, 320x32, 640x16
- Extended recording for up to a maximum of 7 consecutive records
- COMTRADE file format, downloadable from the on-board FTP Server
- Programmable interval and entries

Disturbance Waveform Recorder (DWR)

- Disturbance recording of all Voltage and Current Inputs

Initial Fault:	Up to 35 cycles @ 512 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 @ 512 samples/cycle

Metering

Basic Measurements (1-second update)

- 3-phase Voltages, Currents, Power, PF and Phase Angles
- kWh, kvarh Import/Export/Net/Total and kVAh Total
- Frequency

High-Speed Measurements (½ cycle update)

- 3-phase Voltages or Currents for each circuit

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Data and Event Recorders

Log Memory

- 16GB on-board Non-Volatile Log Memory
- Expandable Log Memory via USB port

Statistical Data Recorder (SDR) Log

- Recording of the Max, Min, Avg. and 95th percentile for real-time measurements including U, I, Freq., Flicker, Harmonics and Unbalances, up to 1024 parameters
- Recording interval from 1 minute to 60 minutes
- Record up to 300 days @10-minute interval
- PQDIF file format, downloadable from the on-board FTP Server

High-Speed (HS) Data Recorder

- One HS Data Recorder for maximum of 16 parameters
- Recording interval from 1/2 cycle to 60 cycles
- Programmable sources
- Configurable capacity with a max. log depth of 65535
- Support FIFO or Stop-When-Full mode

Max/Min Recorder (MMR)

- Logging of Max/Min values for real-time measurements
- V, I, kW, kvar, kVA, PF, Freq., Unbalance, K-factor, THD. etc
- 4 maximum and 4 Minimum registers
- Each register can record up to 20 parameters

RMS Log

- Recording of 3-phase Voltages and Currents ½ cycle True RMS value
- Trigger by Setpoints or DIs
- 1000 points per record (10s @ 50Hz)
- Store up 128 entries with FIFO mode
- Downloadable files with PQDIF and COMTRADE formats

SOE Log

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

PQ Log

- 1024 FIFO entries time-stamped to ±1ms resolution
- Transients, Dips/Swells, Disturbance Direction, Interruptions, Rapid Voltage Changes, Voltage Variations and Inrush Currents
- Record the time and characteristic data of the captured PQ event

Setpoints

PQ Setpoints

- Transients, Dips/Swells
- Rapid Voltage Changes, In-rush Currents
- Harmonics
- Trigger DO, SOE Log, High Speed Data Recording, WFR or DWR

Control Setpoints

- 256 Control Setpoints and 16 High-Speed Setpoints
- Extensive monitoring sources
- Configurable thresholds and time delays
- Trigger DO, SOE Log, High-Speed Data Recorder, WFR and DWR

Digital Input Setpoints

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

Inputs and Outputs

Digital Inputs

- 16 Digital Inputs
- 24VDC self-excitation or 110V/220V AC/DC external excitation
- External status monitoring with programmable debounce

Digital Outputs

- 8 channels for control, alarming and pulsing applications
- Form A Electromechanical Relay

Analog Input (Optional)

- 0-20 / 4-20mA DC input
- Can be used to measure external transducer signal
- Programmable zero and full scales

Expandable 3-Ø Measurement Modules

- 1 Basic and two Optional Measurement Modules
- Each module with four 3-Ø Voltage or Current Inputs with the following possible configurations:
  - 1x3-Ø Voltage Inputs + 3x3-Ø Current Inputs
  - 2x3-Ø Voltage Inputs + 2x3-Ø Current Inputs
  - 3x3-Ø Voltage Inputs + 1x3-Ø Current Inputs

Communications

RS-485 (P1, P2)

- Optically isolated RS-485 ports with baud rate from 1.2 to 115.2 kbps
- Modbus RTU protocol
- Time Sync. via GPS's 1PPS

Ethernet Ports (P3, P4)

- Dual 10/100BaseT Ethernet Ports with RJ45 connectors
- Simultaneous connections for 10xModbus TCP and optionally 12xIEC61580 clients
- Optional one 100BaseFX with ST connector (replaces one 100BaseT port)
- Protocols: Modbus TCP/IP, SNTP, Ethernet Gateway, Optional IEC61850
- Firmware upgrade support via Ethernet port

Time Synchronization

- Battery-backed real-time clock @ 6ppm (≤ 0.5s/day)
- Time Sync. via Modbus RTU protocol, SNTP or GPS 1PPS

System Integration

PecStar iEMS

The PMC-680M is supported by CET's PecStar iEMS software. In addition, the PMC-680M can be easily integrated into other 3rd party systems because of its support of multiple communications ports as well as different industry standard protocols such as Modbus RTU/TCP and the optional IEC 61850 for substation automation applications.

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 supports the configuration for most Setup parameters via a web browser without the use of proprietary software
- The on-board, password protected FTP Server allows logged data in PQDIF or COMTRADE format to be downloaded without any special software
- The downloaded files can be subsequently viewed using software that supports the industry standard PQDIF and COMTRADE file formats

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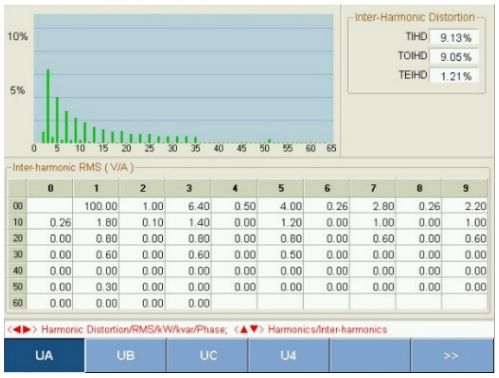
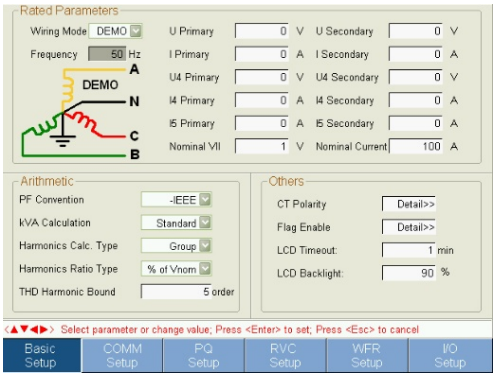
Front Panel Display

- Device Setup, Configuration and Diagnostics
- Real-time, Harmonic Power and Energy measurements
- Real-time WF Capture of 3-phase Voltages and Currents
- PQ Log with ITIC/SEMI F47 and Waveform displays
- Harmonic & Interharmonic histogram and Phasor diagrams
- SOE Log
- I/O status

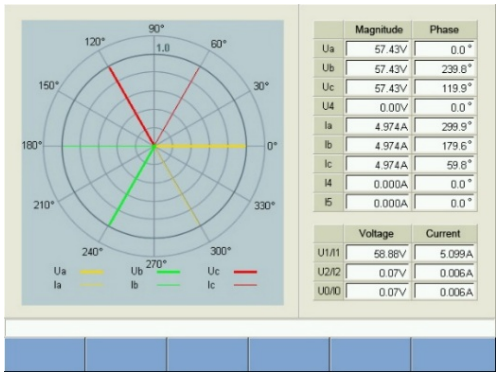
Harmonic Histogram



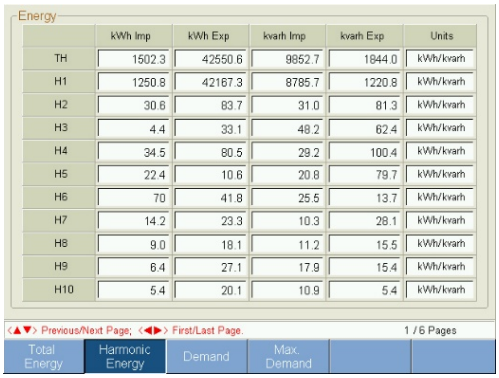
Device Setup



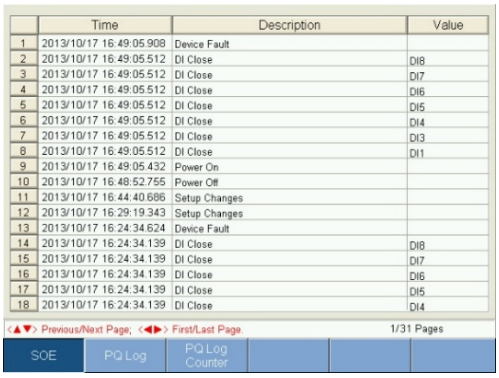
Phasor Diagram



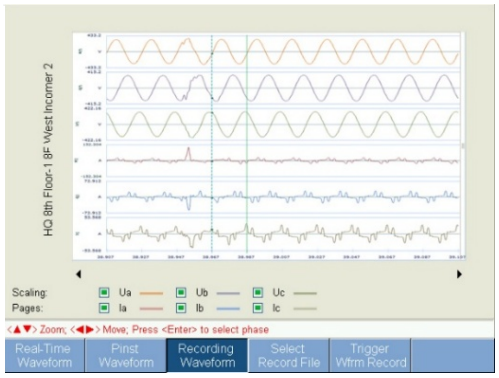
Harmonic Energy



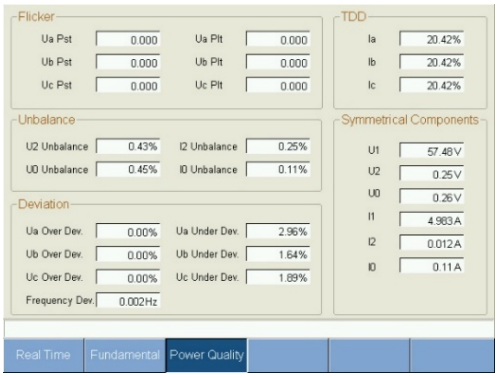
SOE Log



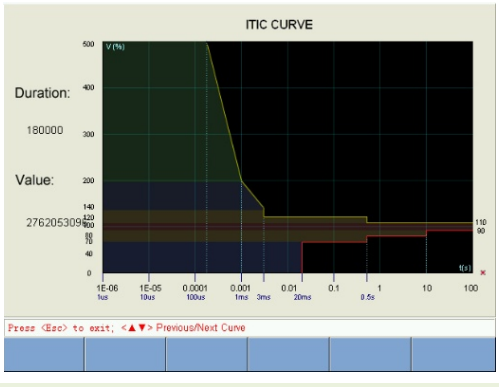
Waveform Capture



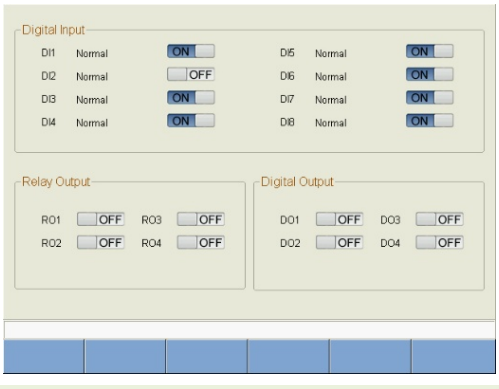
Power Quality Setup



ITIC Curve



IO Status



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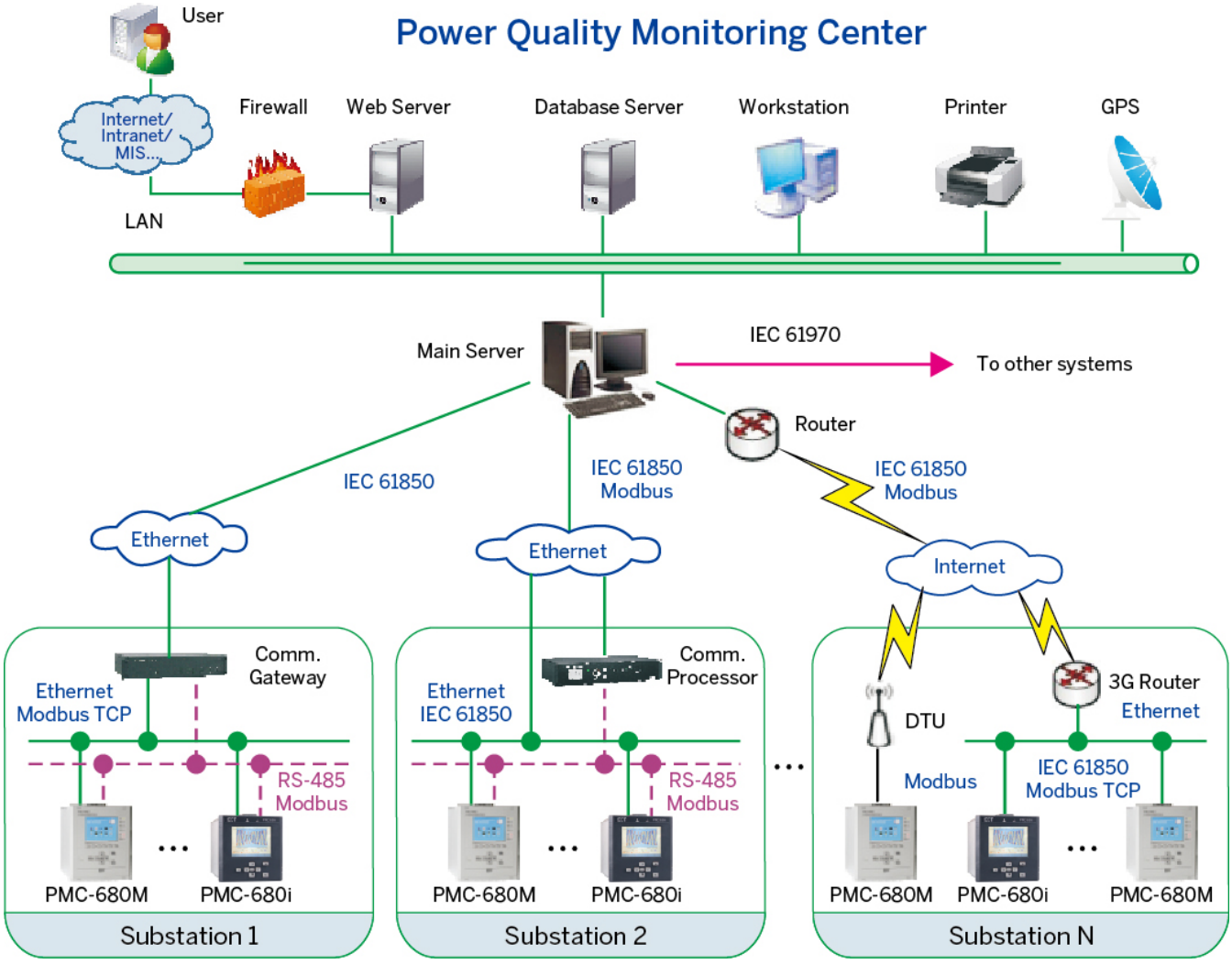
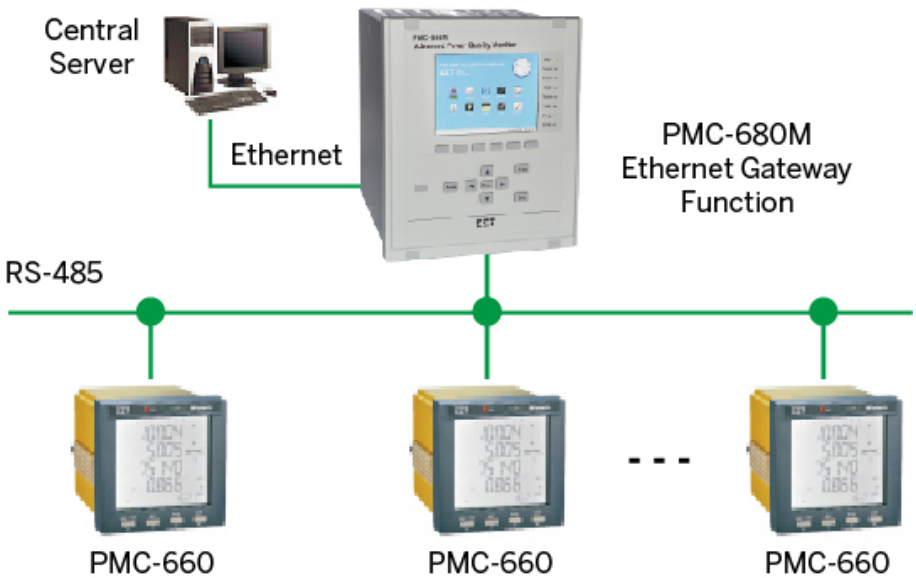
Typical Network Application



Gateway Application



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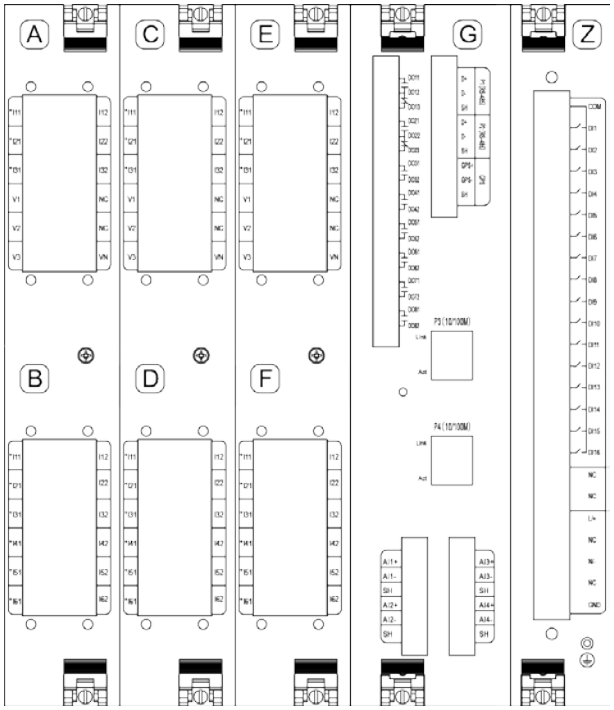
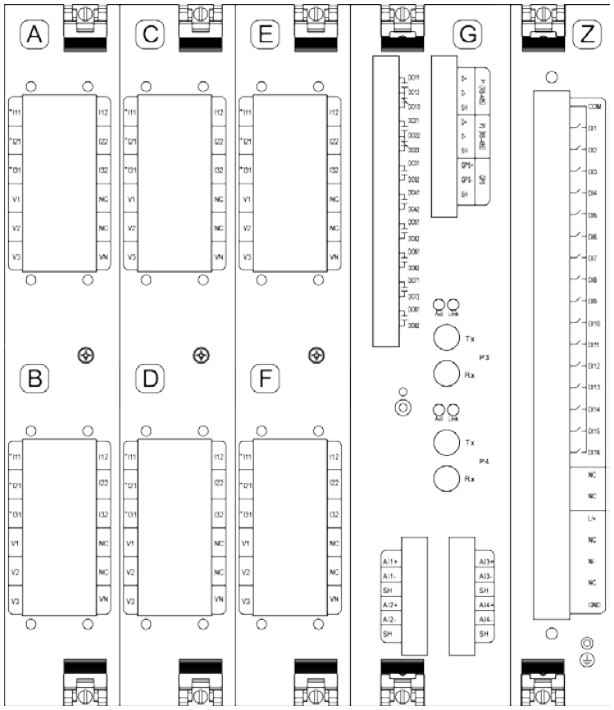
Rear Panel Diagrams

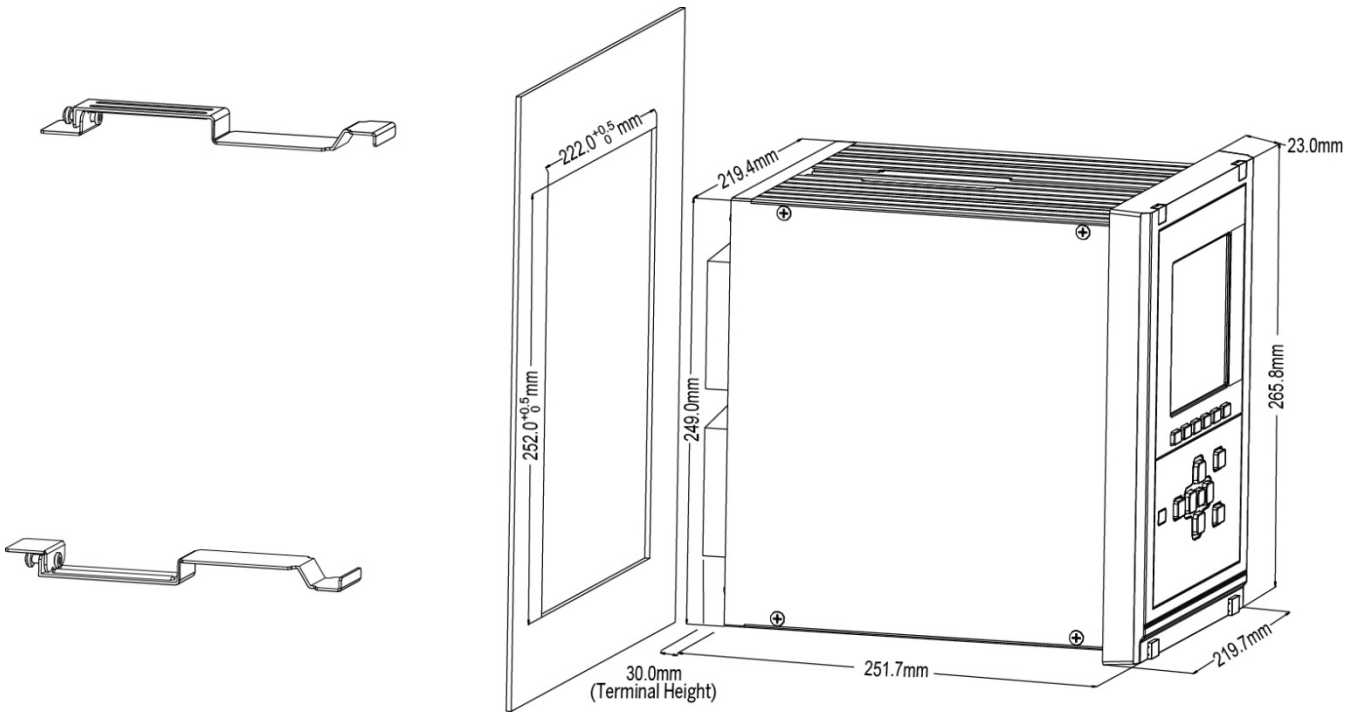


3 Voltage Circuits + 9 Current Circuits + 2x100BaseT + 4AIs



3 Voltage Circuits + 9 Current Circuits + 2x100BaseFx + 4AIs

Mounting Diagram



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Technical Specifications

Voltage Inputs (V1, V2, V3, VN)	
Standard (Un)	220ULN/380ULL
Optional (Un)	400ULN/690ULL
Range	5.0V to 1.5Un
Overload	2xUn continuous, 4xUn for 1s
Burden	< 0.1VA per phase
PT Ratio	
Primary	1-1000000V
Secondary	1-690V
Frequency	42Hz-58Hz @ 50Hz
Current Inputs	
Standard (In)	5A (Standard), 1A (Optional)
Range	0.1% to 1000% In (I1-I3)
Starting Current	0.1% In
Overload	4xIn continuous, 20xIn for 1s
Burden	< 0.5VA/0.1VA per phase @ 5A/1A
CT Ratio	
Primary	1-30000A
Secondary	1-5A
Power Supply (L+, N-, G)	
Standard	100-220VAC/VDC
Frequency	47-440 Hz
Burden	< 20W
Digital Inputs (DI1, DI2, …, DI15, DI16)	
Excitation Mode	24VDC self-excitation or 110/220V AC/DC external excitation
Hysteresis	20~2000ms programmable
Digital Outputs	
Type	Form A Mechanical Relay
Loading	5A @ 250VAC / 30VDC for DO1 ~ DO3 8A @ 250VAC / 24VDC for DO4 ~ DO8
Analog Input	
Type	0~20 / 4~20 mA
Overload	24 mA maximum
LCD Display	
Type	Color TFT LCD, Industrial Grade
Resolution	640x480
Viewing Area	115x86 mm
Environmental Conditions	
Operating Temp.	-25°C to 70°C
Storage Temp.	-40°C to 85°C
Humidity	5% to 100% non-condensing
Atmospheric Pressure	70 kPa to 106 kPa
Pollution Degree	2
Measurement Category	CAT IV
Mechanical Characteristics	
Panel Cutout	222x252 mm
Unit Dimensions	224.6x265.8x251.7 mm
IP Rating	51

Accuracy

Parameters	Accuracy	Resolution
Voltage (U)	±0.1%	0.01V
I1, I2, I3	±0.1%	0.001A
kW, kVA	IEC 62053-22 Class 0.2S	0.001kX
kWh, kVAh	IEC 62053-22 Class 0.2S	0.1kXh
kvar, kvarh	IEC 62053-23 Class 2	0.1kvarh
P.F.	±0.5%	0.0001
Frequency	±0.005 Hz	0.001Hz
Harmonics	IEC 61000-4-7 Class A	0.01
K-Factor	IEC 61000-4-7 Class A	0.1
Phase angles	±1°	0.1°
Symm. Components	±0.2%	0.01V/0.001A
Voltage Unbalance	±0.1 %	0.01%
Current Unbalance	±0.5%	0.01%
Pst, Plt	±5%	0.001

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 Current and GND	>100MΩ
Between Voltage and GND	>5MΩ
Between Power and AC Circuits	
Between GPS and GND	>100MΩ
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 (EN50082-2)	
Electrostatic discharge	IEC 61000-4-2: 2008 Level IV
Radiated field	IEC 61000-4-3: 2008 (10 V/m)
Electric Fast transient	IEC 61000-4-4: 2004 Level IV
Surge	IEC 61000-4-5: 2005 Level IV
Conducted disturbance	IEC 61000-4-6: 2008 Level III
Magnetic Field	IEC 61000-4-8: 2009 Level IV
Oscillatory wave	IEC 61000-4-12: 2006 Level III
Emission (EN50081-2)	
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	EN 61000-3-3: 2006
Emission standard for residential, commercial and light-industrial environments	EN 61000-6-3: 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 interharmonics 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	Testing and measurement techniques - Power quality measurement methods

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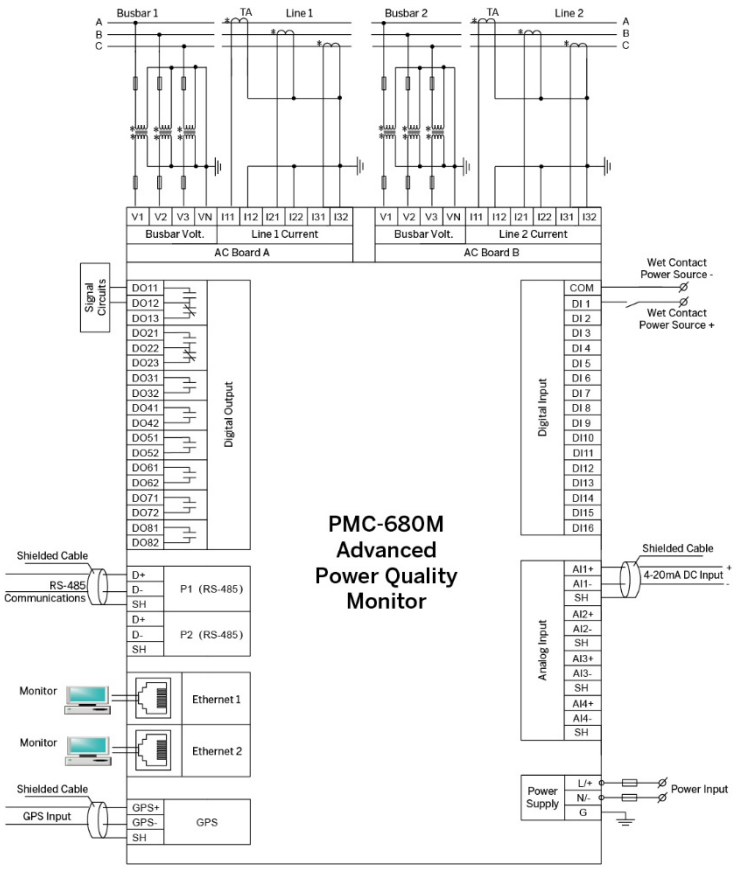
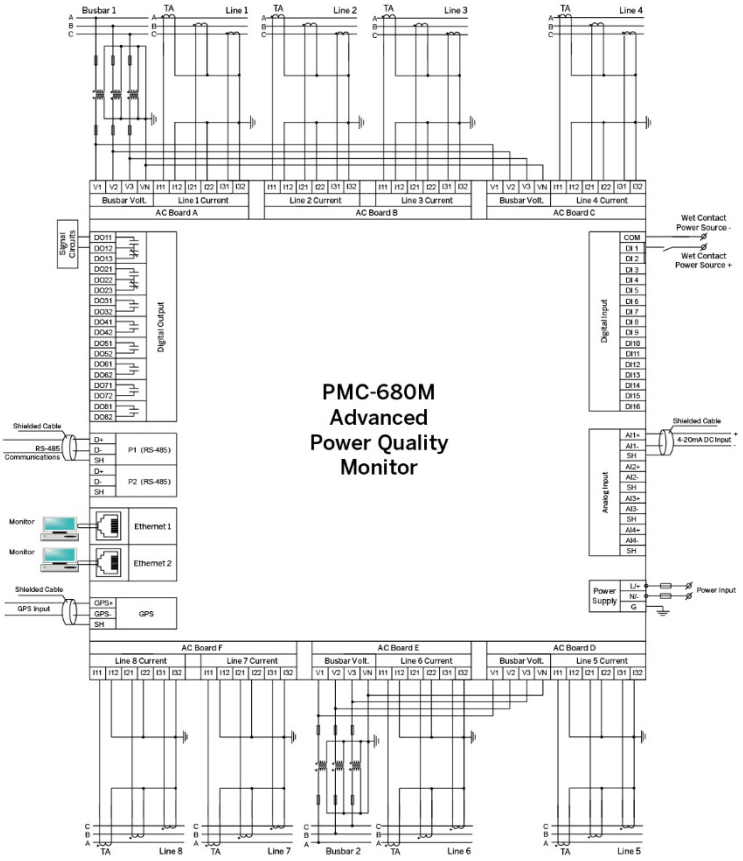
Typical Wiring

2 Voltage Circuits and 2 Current Circuits



1 Voltage Circuit and 3 Current Circuits



Ordering Guide

Ceiec Electric Technology — *Version 20160823*

Product Code	Description
PMC-680M Advanced Multi-Circuit Power Quality Analyzer	
Basic Module	
13	1x3-Ø Voltage Inputs + 3x3-Ø Current Inputs
22	2x3-Ø Voltage Inputs + 2x3-Ø Current Inputs
31	3x3-Ø Voltage Inputs + 1x3-Ø Current Inputs
Expansion Module 1*	
00	None
13	1x3-Ø Voltage Inputs + 3x3-Ø Current Inputs
22	2x3-Ø Voltage Inputs + 2x3-Ø Current Inputs
31	3x3-Ø Voltage Inputs + 1x3-Ø Current Inputs
Expansion Module 2*	
00	None
13	1x3-Ø Voltage Inputs + 3x3-Ø Current Inputs
22	2x3-Ø Voltage Inputs + 2x3-Ø Current Inputs
31	3x3-Ø Voltage Inputs + 1x3-Ø Current Inputs
Input Current	
5	5A
1	1A
Input Voltage	
1	57-347V AC VLN / 100-600V AC VLL
System Frequency	
5	50Hz
6	60Hz
I/O	
A	16xDI + 8xDO
B*	16xDI + 8xDO + 4xAI
DI Excitation Type	
N	24V DC Internal
1	110V AC/DC External
2	220V AC/DC External
Communications	
A	2xRS-485 Port + 2x10/100BaseT
B	2xRS-485 Port + 2x100BaseFX
C*	2xRS-485 Port + 2x100BaseFX + IEC61850 Protocol Support
D*	2xRS-485 Port + 2x100BaseFX + IEC61850 Protocol Support

PMC-680M- | 13 | - | 00 | - | 00 | - | 5 | 1 | 5 | A | N | A — PMC-680M-13-00-00-515ANA (Standard Model)

1) Power Supply: 95 ~ 250V AC/DC，±10%，47 ~ 440Hz

2) *Additional charges apply

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Your Local Representative

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