Advanced Power Quality Analyzer

For Utility, Industrial and Commercial
Power Quality Monitoring

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Power Quality (PQ) is an important issue for many electricity consumers at all levels due to the recent proliferation of sensitive power electronic equipment and non-linear loads in industrial, commercial and domestic applications, which cause them to be much more sensitive to voltage dips and transients. At the same time, these loads are highly harmonic and would potentially pollute the supply networks, cause safety concerns, reduce supply reliability and above all result in damages to capital-intensive appliances and significant economic losses. Utilities have recently raised their alert levels and started to invest heavily on power quality monitoring and reporting to obviate the much-needed information to validate compliance, improve system stability as well as supply reliability. Further, the large-scale deployment of renewable energy generation as well as high penetration of solar inverters would cause additional PQ concerns and destabilize public electricity supply networks.

PMC-680i & PMC-670 are advanced power quality monitoring products that have been certified for IEC 61000-4-30 Class A compliance and therefore can provide a complete picture of PQ Compliance Level at any critical points in a power transmission or distribution network. This allows both the suppliers and the consumers to understand power quality related issues as well as make decisions quickly and effectively to address any potential problems. CET’s PMC-680i & PMC-670 provide complete IEC 61000-4-30 compliance measurements, generate EN 50160 reports and capture power quality events such as Dips, Swells, Transients and Interruptions with high-resolution Voltage and Current waveforms and extended duration.

**International Standards**
- IEC 61000-4-30 Class A Certified
- IEC 61000-4-15 Flicker
- IEC 61000-4-7 Harmonics
- IEC 62053-22 Class 0.2S Compliant
- IEC 61850 for Smart Grid (optional)

**Industrial Grade Components**
- Extended Temperature Range
- Standard Tropicalization
- Extended Warranty

**Comm. & I/Os**
- 2xRS-485
- 2xEthernet Ports (PMC-680i)
- 1xEthernet Port (PMC-670)
- 8xDIs, 4xROs
- 4xDOs (PMC-680i)
- 2xDOs (PMC-670)
- Modbus RTU/TCP, HTTP, SNTP, SMTP

**Typical Applications**
- Utility
  - PQ monitoring at HV, MV and LV Utility Substations
  - Benchmarking for Supply Reliability and PQ performance
  - Identify the improvement areas on Power System
  - Fault location and PQ Event investigation
  - Substation Automation
- Industrial and Commercial
  - PQ monitoring at Mains and Critical feeders
  - Harmonic and Disturbance Monitoring
  - EN 50160 & IEC 61000-4-30 Class A Compliance Verification
  - Energy Efficiency improvement

**Features Summary**
- **PMC-680i**
  - DIN 192 (186x186 Cutout)
  - 4GB Log Memory
  - Optional Split-Core CT
- **PMC-670**
  - DIN 144 (138x138 Cutout)
  - 2GB Log Memory

**Comprehensive Data Recording**
- Statistical Data Recorders
- Real-Time / HS Data Recorders
- Interval Energy Log
- Max/Min Log
- SOE Log
- PQ Log

**Enhanced Monitoring, Alarming & Control**
- PQ Setpoints
- Control Setpoints
- DI Setpoints
- Trigger DO, SOE Log, Data Recording, Waveform Recording or Alarm Email

**Time Synchronization**
- Battery-backed real-time clock @ 6ppm
- Time Sync. via Modbus RTU protocol, SNTP and GPS @ 1PPS
- Optional IRIG-B input

**Advanced Power Quality Features**
- Dips/Swells, Transients, Flickers & Harmonics Monitoring
- Disturbance Waveform Recording (DWR) and Waveform Recording (WFR) @ 512 Samples/Cycle for Power Quality events
- Disturbance Direction Indicator (PMC-680i)
- COMTRADE compatible
- EN 50160 Compliance Reporting
- PQDIF Support for PMC-680i
- Optional 1024 Samples/Cycle for PMC-680i

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Both PMC-680i and PMC-670 comply with IEC 61000-4-30 Class A, IEC 61000-4-15, IEC 61000-4-7 and EN 50160, offering accurate harmonic Power Quality (PQ) Metering.

**High-speed Measurements (½ cycle update)**
- 3-phase V/A, Power, PF, V, I, (for PMC-680i only)
- High-Speed Frequency detection
  - 1-cycle for PMC-680i
  - 5 cycles for PMC-670

**Power Quality (PQ) Metering**
Both PMC-680 and PMC-670 comply with IEC 61000-4-30 Class A, IEC 61000-4-15, IEC 61000-4-7 and EN 50160, offering accurate harmonic measurements up to the £9 order and capable of capturing disturbance events such as Transients, Dips, Swells and Interruptions. In addition, the PMC-680i provides high-end record feature collector with its Disturbance Waveform Recorder (DWR), capable of capturing events that last over 300 seconds in duration in varying resolutions. This feature likely gives the PMC-680i the highest Performance/Cost ratio of any panel-mount PQ Analyzers for the utility market today.

**Data and Event Recorders**
- PMC-680i and PMC-670 offer 4GB and 2GB, respectively, of extended on-volatile memory for data and event recording. Data Recorders support programmable Sources, Recording Intervals, Depths and Offsets in FIFO or Stop-When-Full mode.
- Interval Energy Recorder (IER)
  - kWh, kvarh Import/Export and kVarh Total, Harmonic kWh, kvarh Import/Export
  - Recording interval from 1 to 65,535 minutes
  - FIFO and Stop-When-Full mode

**Real-time and High-speed (HS) Data Recorder**
- Recording interval
  - 1s to 40 days for Real-Time Data Recorder
  - ½ cycle to 60 cycles for HS Data Recorder
  - Max. Depth £9 £5,355

**Multifunction**
Max/Min Recorders (MMR)
- Logging of Max/Min values for real-time measurements of V, I, kVA, kVAR, PF, Freq., Unbalance, K-factor, THD.

**PQ Log**
- Recording the time and characteristic data of the captured PQ events such as Transients, Dips/Swells, Interruptions, Rapid Voltage Changes and all PQ related parameters with maximum 1024 FIFO entries time-stamped to ±1ms resolution.

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

**Statistical Data Recorder (SDR) Log (PMC-680i only)**
- Recording of the Max, Min, Avg, and 95th percentile for real-time measurements including V, I, Freq., Flicker, Harmonics and Unbalance in 16 different recorders of 64 parameters each
- Recording interval from 1 minute to 60 minutes
- 30 days @ 1 minute, 300 days @ 30 minute, 450 days @ 15-minute
- On-board trending via Front Panel display
- PQOIF file format, downloadable from the on-board FTP Server

**Setpoints**
PMC-680 and PMC-670 provide extensive control by allowing users to initiate an action in response to a specific condition from PQ events. Control parameters or Digital Input status. Typical applications include SOE or PQ Log reporting, Waveform and Data Recording as well as DO (Digital Output) Triggering for Alarm or Control Actions.
Communications
- RS-485
  - Both PMC-680i and PMC-670 are equipped with 2 RS-485 ports for serial communications
  - Optimally isolated with baud rate from 1 to 115.2 kbps
  - Modbus RTU protocol

System Integration
- Ethernet Gateway
  - Optional IEC 61850

Ethernet Port
- 10/100BaseT for high-speed data communication supporting the following Protocols:
  - Modbus TCP
  - Ethernet Gateway
  - TCP, HTTP, SMTP, SNMP, FTP

Simultaneous Client Connections
- 10 Modbus TCP
- 10 Modbus RTU
- 8 IEC 61850 (optional)

3rd Party System Integration
- Easy integration into Substation Automation or Utility SCADA systems via Modbus RTU, Modbus TCP or IEC 61850.

Web Interface
- The on-board Web Server allows complete access to its data and supports the configuration for most Setup parameters via a web browser without using any proprietary software. The on-board, password-protected FTP Server allows logged data in PQDIF or COMTRADE file formats.

Time Synchronization
- Battery-backed real-time clock @ 6ppm (< 0.5s/day)
- Time Synchronization via Modbus RTU, Modbus TCP or IEC 61850.

Typical Network Application
- PMC-SCCP-500A-500A
- PMC-SCCP-500A-200A
- PMC-SCCP-50A-50A
- PMC-SCCP-200A-200A
- PMC-SCCP-200A-200A
- PMC-SCCP-200A-50A
- PMC-SCCP-50A-50A

Technical Specifications

- Voltage Inputs (V1, V2, V3, V4, VN)
  - Standard (Vn) 400V/400V/400V/400V
  - Optional (Vn) 600V/600V/600V/600V

- Current Inputs (I11, I12, I21, I22, I31, I32, I41, I42, I51, I52)
  - Standard (I) ±0.5% rdg. ±1.5% f.s.
  - Optional (I) ±0.2% rdg. ±0.5% f.s.

- Frequency
  - Standard (f) 42Hz-58Hz @ 50Hz
  - Optional (f) 50Hz-70Hz @ 60Hz

- Harmonics
  - IEC 61000-4-7 Class A 0.01%
  - IEC 61000-4-2009

- Voltage Deviation
  - IEC 62053-22 Class 0.2S
  - ±0.2%

- Voltage Unbalance
  - ±0.1%

- Current Unbalance
  - ±0.1%

- Power
  - ±0.1% In
  - ±0.5% Imax

- Power Quality
  - ±0.1% In

- Energy
  - IEC 62053-21
  - ±0.001kWh, ±0.001kWh

- Impedance
  - IEC 62053-22
  - ±0.01%

- Harmonics
  - IEC 61000-4-3
  - ±0.01%

- Voltage Fluctuations
  - ±0.1%

- Flicker
  - IEC 61000-4-15
  - ±0.1%

- Emission Limitation
  - ≤100mV

Safety Standards

- UL61010-1/2/3/4/5-2010
- EN 61010-1/2/3/4/5-2009
- IEC 61010-1/2/3/4/5-2009
- GB17625.1-2012
- EN 55022:2010/AC:2011

EMC Compatibility


Immunity Test

- Electromagnetic Interference
  - EN 61000-4-2:2009
- Radiated Fields
  - EN 61000-4-3:2008+A1:2010
- Power Supplies
  - EN 61000-4-4:2009+A1:2010

- Surge
  - EN 61000-4-5:2006
- Conducted Disturbances
  - EN 61000-4-6:2010
- Magnetic Fields
  - EN 61000-4-8:2009
- Overvoltage Impacts
  - EN 61000-4-11:2009

- Electromagnetic Emission
  - EN 61000-3-12:2001

- Emission Limitation
  - EN 55022:2010/AC:2011
- Emission Standard for Industrial environments
  - EN 55026-2-1:2007
- Testing and measurement techniques - Ring wave immunity test
  - EN 61000-4-12:2006
Environmental and Mechanical Specifications

### Environmental Conditions

<table>
<thead>
<tr>
<th></th>
<th>PMC-680i</th>
<th>PMC-670</th>
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<tbody>
<tr>
<td>Operating Temp.</td>
<td>-25°C to 70°C</td>
<td></td>
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<tr>
<td>Storage Temp.</td>
<td>-40°C to 85°C</td>
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<tr>
<td>Humidity</td>
<td>5% to 95% non-condensing</td>
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<tr>
<td>Atmospheric Pressure</td>
<td>70kPa to 106kPa</td>
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<td>Pollution Degree</td>
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<td>CAT III</td>
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<td>Measurement Category</td>
<td>CAT IV</td>
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### Mechanical Characteristics

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<tr>
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<th>PMC-680i</th>
<th>PMC-670</th>
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<tbody>
<tr>
<td>Panel Cutout</td>
<td>186x186mm</td>
<td>136x136mm</td>
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<tr>
<td>Unit Dimensions</td>
<td>192x192x187mm</td>
<td>144x144x129mm</td>
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<td>IP Rating</td>
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### Mechanical Tests

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<tr>
<th>Test Type</th>
<th>Response</th>
<th>IEC 60255-21-1: 1988 Level I</th>
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<tr>
<td>Vibration Test</td>
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<tr>
<td>Shock Test</td>
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<tr>
<td>Bump Test</td>
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### Power Quality

- Voltage characteristics of electricity supplied by public distribution systems: EN 50160
- General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto: IEC 61000-4-7
- Flicker meter - Functional and design specifications: IEC 61000-4-35
- Testing and measurement techniques: IEC 61000-4-30 (Certified by PSL)

### Ordering Information

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
<th>Sample/Cycle</th>
<th>Onboard Memory</th>
<th>Input Current</th>
<th>Power Supply</th>
<th>System Frequency</th>
<th>I/O</th>
<th>Communications</th>
<th>IEC 61850</th>
<th>Language</th>
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<td>PMC-680i</td>
<td>Advanced Power Quality Monitor</td>
<td>A</td>
<td>5A</td>
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<td>60Hz</td>
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<td>English</td>
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<td>B</td>
<td>1A</td>
<td>4</td>
<td>2</td>
<td>50Hz</td>
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<td>SCCP50'</td>
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<td>95-250VAC/DC, 47-440Hz</td>
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<td>IEC 61850 Protocol Support</td>
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### Additional Information

- Additional charges apply
- Please consult Factory for availability

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