



- |                              |                   |                      |
|------------------------------|-------------------|----------------------|
| 1 Voltage Input Terminals    | 5 TFT LCD Display | 9 Ethernet Port      |
| 2 Front Panel                | 6 CT Clamp Inputs | 10 Earthing Terminal |
| 3 Power Input                | 7 SD Card         | 11 Buttons           |
| 4 Battery Charging Indicator | 8 USB Port        |                      |

- 512 samples/cycle
- 16GB Removable SD Card
- IEC 62053-22 Class 0.5S Compliant
- IEC 61000-4-30 Class A
- IEC 61000-4-15 Flicker
- IEC 61000-4-7 Harmonics
- Comprehensive Data Recording
- PQDIF & COMTRADE Support
- Industrial Grade Components
- Extended Warranty
- 5.7" TFT Color LCD Display @ 640x480
- Dip/Swell, Transient and Flicker
- Disturbance Waveform Recording
- Statistical Data Recording (SDR)
- IEC61850 for Smart Grid
- 10/100BaseT Port with RJ45
- Modbus TCP, SNTP&IEC61850
- Firmware Upgrade via Ethernet or USB
- Standard Tropicalization
- Extended Temperature Range

*Designed For Reliability*

*Manufactured To Last*



The PMC-690 Portable Power Quality Analyzer is CET's latest offer to assist engineers to diagnose the PQ events at site as it provides advanced functionality by combining Class 0.1 accuracy and advanced PQ features in a portable lightweight handheld form with a large, high-resolution, backlit, color TFT LCD display. It is compliant with the standards as IEC 62053-22 Class 0.5S, IEC 61000-4-30 Class A, IEC-61000-4-15, IEC 61000-4-7 and IEC 61850. What's more, it supports 4 channels each of voltage inputs and current inputs and comes up with a large logging capacity of 16GB on-board memory with data recording in COMTRADE and PQDIF file format which is downloadable via USB port and compatible with PQ View software. With these features, the PMC-690 Power Quality Analyzer becomes the most advanced and convenient diagnostic tool at site.

### Typical Applications

- PQ Check-up at HV, MV and LV Utility Substations
- Site investigation & diagnosis for PQ problems, industrial & Commercial
- Electrical Testing and Recording
- Fault investigation and identification
- No Load and Full Load Test
- Mains and Critical feeder Dips, Swells, Transients, Flickers and Disturbance monitoring
- Harmonics Monitoring

## Features Summary

### Basic Features

- 5.7" Backlit Color LCD Display @ 640x480
- Light weight (1.16kg) – for easy transport
- Simple configuration for quick measurement setup
- Low power consumption with 8 hours battery
- PQ Insight™ for capturing Waveforms for 3-phase Voltages and Currents in "Scope Mode"
- Communications - 10/100BaseT with RJ45 connector
- Protocol - Modbus TCP, SNMP & IEC 61850
- Industrial Grade Components
- Standard Tropicalization
- Extended Temperature Range
- Extended Warranty
- Weatherproof Carrying Case (Optional)

### Key Measuring Features

- 3-phase Voltages, Current, Power, P.F. and Phase Angles
- Disturbance Detection - Transients, Dips, Swells, Interruptions, Rapid Voltage Changes
- Disturbance Waveform Recording - 512 samples/cycle max.
- Harmonic analysis up to 63rd order
- Statistical Data Recorders & Monitor Logs (16GB Removable SD Card for storage)
- In-rush Current Monitoring
- Setpoints - PQ Setpoints, 24 Control & 16 High-Speed Setpoints

### Power Quality Features

- IEC 61000-4-30 Class A
- IEC 61000-4-7, IEC 61000-4-15
- Transients, Dips, Swells, Interruptions, Rapid Voltage Changes (RVC) and In-rush Current monitoring
- Harmonic analysis up to 63<sup>rd</sup> on-board
- Disturbance Waveform Recording (DWR)
- Downloadable waveform records in COMTRADE format via SD Card
- Trending and Statistical Reporting
- Up to 1024 PQ Logs
- PQ Insight™ for capturing Transient Waveforms for 3-phase Voltages and Currents in "Scope Mode".

### Front Panel Display

- Real-time, Harmonic Power and Energy measurements
- PQ Log and Waveform displays
- Harmonic & Interharmonic histogram and Phasor diagrams
- Statistical Trending
- SOE Log
- Device configuration
- Diagnostics

### 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

#### High-speed Measurements (½ cycle update)

- 3-phase Voltages and Currents, U4, I4, Power, PF, Frequency

#### Demands

- 3-phase Voltage, Current, Power, PF, U4, I4, Frequency
- Predicted Demands
- Present Peak Demands, and Max. Demand of Last Time

### Power Quality Metering

#### PQ Parameters as per IEC 61000-4-30 Class A

- 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
- Rapid Voltage Changes
- Measurement of Underdeviation and Overdeviation parameters

#### Harmonic and Interharmonic measurements

- K-Factor for Current, Crest Factor for Current and Voltage
- V and I THD, TOHD, TEHD
- V and I Individual Harmonics (%HD) from 2<sup>nd</sup> to 63<sup>rd</sup> #
- V and I Individual Interharmonics (%IHD) from 1 to 63<sup>rd</sup> #
- Harmonic kW, kvar, kVA and PF from 2<sup>nd</sup> to 63<sup>rd</sup> in RMS
- Fundamental V, I, kW, kvar, kVA, PF and Phasor
- Fundamental kWh, kvarh Import/Export/Net/Total
- Total harmonic kWh, kvarh Import/Export/Net/Total
- Total Harmonic kWh, kvarh Import/Export from 2<sup>nd</sup> to 63<sup>rd</sup>  
\*%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
- U and I Unbalance based on Zero and Negative Sequence Components

#### Transient and Dip/Swell Recording

- Transients capture 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 Data Recording and High-Speed Data Recording, WF Recording, Disturbance Waveform Recording, PQ Log and Buzzer Alarm

#### 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

#### Waveform Capture (WFC) and Waveform Recorder (WFR)

- Real-time Waveform Capture via front panel display
- Waveform Recorder with 500 entries
- Simultaneous capture of 3-phase Voltage and Current inputs
- # of Cycles x Samples/Cycles with programmable # of pre-fault cycles
  - 640x16, 320x32, 160x64
  - 80x128, 40x256, 20x512
- Extended recording for up to a maximum of 4 consecutive captures
- COMTRADE file format, downloadable via SD Card

#### Disturbance Waveform Recorder (DWR)

- Disturbance recording of all Voltage and Current up to 500 entries
  - Initial state: Up to 35 cycles @ 512 samples/cycle
  - Steady State: 3-Up to 150 cycles@16 samples/cycle  
Up to 18,000 cycles@1sample/cycle
  - Ending Stage: Up to 15cycles @ 512 samples/cycle

#### Metering

##### Basic Measurements (1-second update)

- 3-phase Voltage, Current, Power, PF, V4, I4, Frequency and Phase Angles
- kWh, kvarh Import/Export/Net/Total and kVAh Total
- U4, I4, Frequency

##### High-Speed Measurements

3-phase Voltages and Currents, U4, I4, Power, Frequency

#### Data and Event Recorders

##### Log Memory

- 16GB Removable SD Card (SanDisk Extreme Class 10 @ 45MB/s)

##### Statistical Data Recorder (SDR) Log

- Recording of the Max., Min., Avg. and 95<sup>th</sup> percentile of statistical measurements including V, I, Freq., Flicker, Harmonics & Unbalances
- Recording interval from 1 to 60 minutes
- 5 recorders (64 parameters/recorder)
- FIFO mode with configurable depth
- PQDIF file format, downloadable via the USB port

##### Max/Min Recorder (MMR) Log

- 4 records (20 parameters/recorder) with timestamp
- Logging of Max./Min. values for real-time measurements such as V, I, kW, kvar, kVA, PF, Freq., Unbalance, K-factor, THD
- Two log transfer modes:
  - o Manual: Max./Min. Since Last Reset/Before Last Reset
  - o Automatic: Max./Min. of This Month/Last Month

##### Monitor Log

- 1024 FIFO entries time-stamped to ±1ms resolution
- Transient, Dip/Swell, Interruption, Rapid Voltage Change, In rush Current, Setpoint events

##### Device Log

- 1024 FIFO events time-stamped to ±1ms resolution
- Setup changes, System events, Setpoint events

#### Setpoints

##### PQ Setpoints

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

##### Control Setpoints

- 24 Control Setpoints and 16 High-Speed Setpoints
- Extensive monitoring sources
- Configurable thresholds and time delays
- Trigger SOE Log, RMS Recorder, WFR or DWR

#### Communications

##### Ethernet Port

- 100BaseT TCP/IP Ethernet Ports with RJ45 connector
- Simultaneous connection for 10xModbus TCP and 12xIEC61580 clients
- Protocols
  - Modbus TCP
  - IEC61850
  - SMTP
- Firmware upgrade via Ethernet port

##### SD Card

- 16GB Capacity
- Removable SD Card for easy data transfer to PC
- Solid State technology that is immune from mechanical breakdown

##### USB Port

- For Data transfer to USB storage device
- User friendly interface for transferring data/waveform through USB port

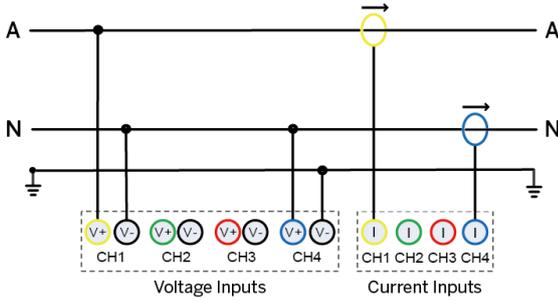
#### Time Synchronization

- Battery-backed real-time clock @ 6ppm(≤ 0.5s/day)
- Time Sync. via Modbus SNTP

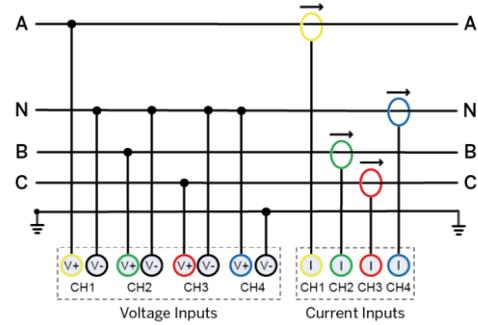
#### Accuracy

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

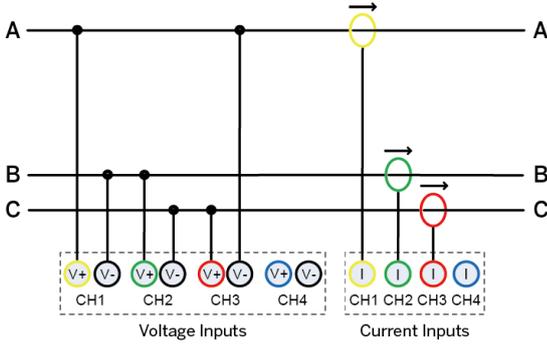
## Typical Wiring



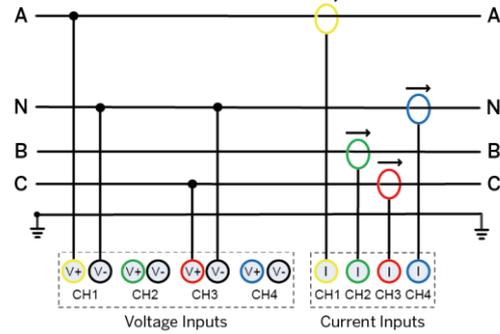
Single-Phase 2-Wire Connection



3-Phase 4-Wire Wye Connection

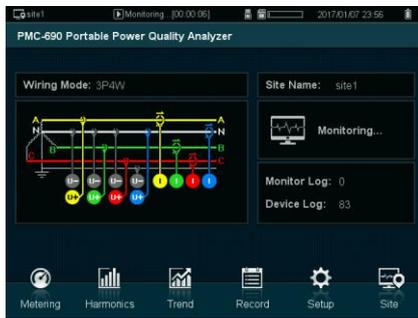


3-Phase 3-Wire Delta Connection

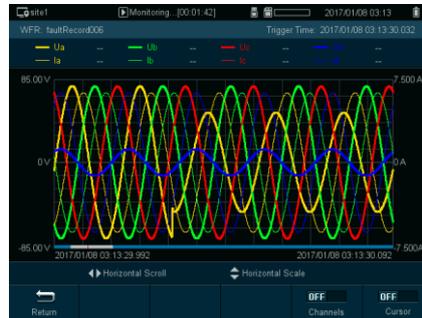


3-Phase 4-Wire 2.5E-2PT Connection

## Front Panel User Interface



Main Display



SOE Log



Ua THD	9.13 %	Ua THD	0.03 %
Ub THD	9.13 %	Ub THD	0.03 %
Uc THD	9.13 %	Uc THD	0.03 %
U4 THD	9.13 %	U4 THD	0.03 %
Ia THD	9.13 %	Ia THD	0.03 %
Ib THD	9.13 %	Ib THD	0.03 %
Ic THD	9.13 %	Ic THD	0.03 %
I4 THD	9.13 %	I4 THD	0.03 %

Power Quality



Real-time Data Recording

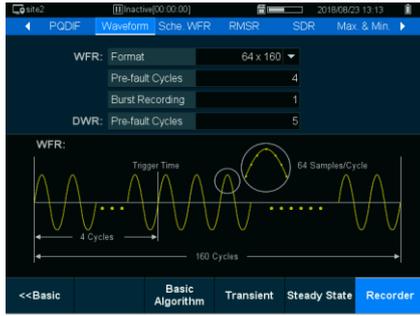


	Demand	Pred. DMD
P Total Imp.	442.4 W	442.4 W
P Total Exp.	0.000 W	0.000 W
Q Total Imp.	747.5 var	747.5 var
Q Total Exp.	0.000 var	0.000 var
S Total	988.6 VA	988.6 VA
PF Avg.	0.509	0.509
Ia	5.000 A	5.000 A
Ib	4.997 A	4.997 A
Ic	4.999 A	4.999 A

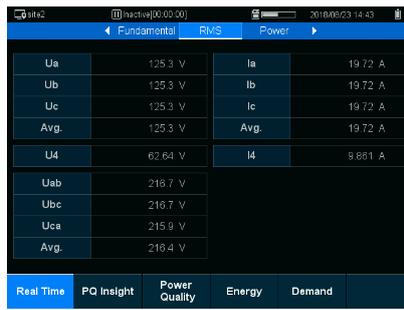
Demand



Harmonics

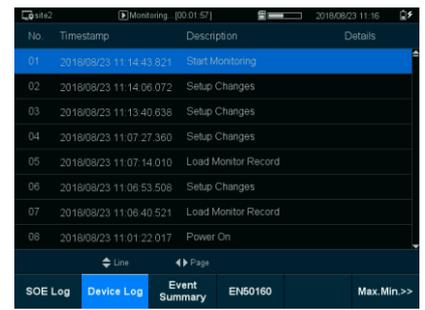


**WFR Setup**



Parameter	Value	Parameter	Value
Ua	125.3 V	Ia	19.72 A
Ub	125.3 V	Ib	19.72 A
Uc	125.3 V	Ic	19.72 A
Avg.	125.3 V	Avg.	19.72 A
U4	62.64 V	I4	9.881 A
Uab	216.7 V		
Ubc	216.7 V		
Uca	215.9 V		
Avg.	216.4 V		

**Real-time Capture**



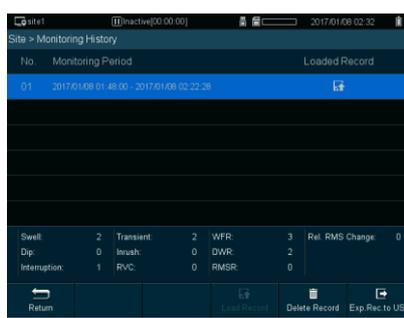
No.	Timestamp	Description	Details
01	2018/08/23 11:14:43.821	Start Monitoring	
02	2018/08/23 11:14:06.072	Setup Changes	
03	2018/08/23 11:13:40.638	Setup Changes	
04	2018/08/23 11:07:27.360	Setup Changes	
05	2018/08/23 11:07:14.010	Load Monitor Record	
06	2018/08/23 11:06:53.508	Setup Changes	
07	2018/08/23 11:06:40.521	Load Monitor Record	
08	2018/08/23 11:01:22.017	Power On	

**Device Log**



Parameter	Value	Parameter	Value
Ua THD	9.13 %	Ua THD	0.03 %
Ub THD	9.13 %	Ub THD	0.03 %
Uc THD	9.13 %	Uc THD	0.03 %
U4 THD	9.13 %	U4 THD	0.03 %
Ia THD	9.13 %	Ia THD	0.03 %
Ib THD	9.13 %	Ib THD	0.03 %
Ic THD	9.13 %	Ic THD	0.03 %
I4 THD	9.13 %	I4 THD	0.03 %

**Qualification THD Log**



No.	Monitoring Period	Loaded Record
01	2017/01/08 01:48:00 - 2017/01/08 02:22:28	

Swell: 2 Transient: 2 WFR: 3 Rel. RMS Change: 0  
Dip: 0 Inrush: 0 DWR: 2  
Interruption: 1 RVC: 0 RMSR: 0

**Monitoring History**



**SDR Trend**



Statistics Interval 1 min  
Statistics Templet Templet 1

Record Data

Voltage Harmonics: %HD, H RMS, IH RMS  
Current Harmonics: %HD, H RMS, IH RMS

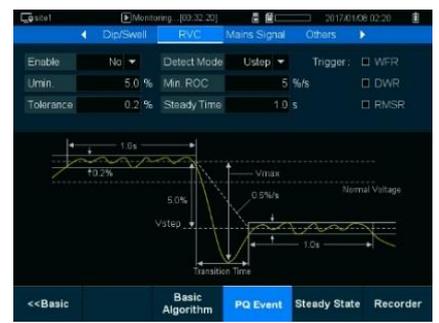
Note 1: Real-time data are automatically recorded, no setting is required.  
Note 2: Only two groups of SDR parameters can be set.

**Advanced Setup**



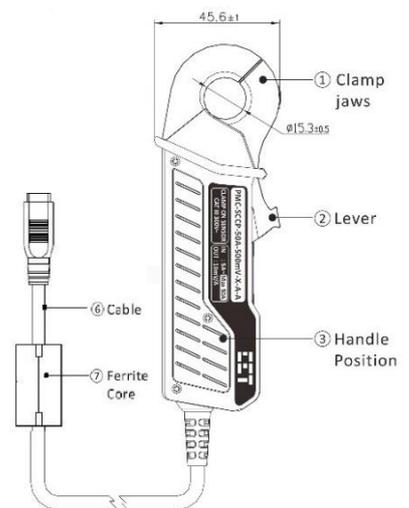
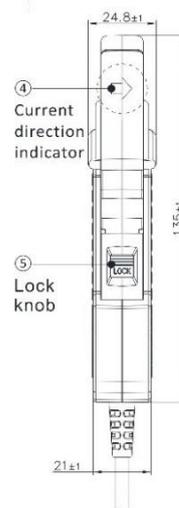
No.	Power Quality Parameter	Conclusion
01	Power Frequency	--
02	Supply Voltage Variations	--
03	Rapid Voltage Changes	--
04	Flicker Severity	--
05	Supply Voltage Unbalance	--
06	Harmonic Voltages	--
07	Interharmonic Voltages	--
08	Mains Signalling Voltages	--
09	Interruptions of the Supply Voltage	--
10	Supply Voltage Dips	--
11	Supply Voltage Swells	--
12	Transient Overvoltages	--

**EN50160 Report**

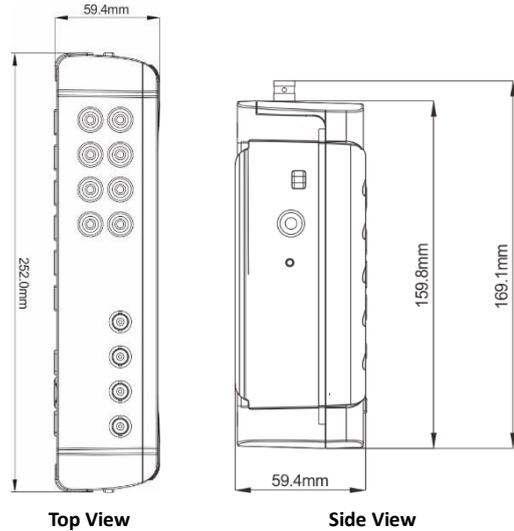


**Rapid Voltage Changes**

**Standard 5A (50A Max.) CATIII Split-Core Current Probe**



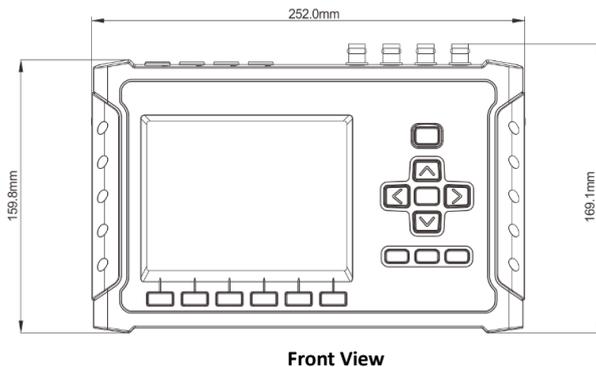
## Device Appearance Views and Dimensions



## Accessories



## Device



## Technical Specifications

Voltage Inputs (CH1, CH2, CH3, CH4)	
Voltage Range	5V to 600V
Burden	<0.1VA per phase
PT Ratio	
Primary	1-1,000,000V
Secondary	1-690V
V4 Primary	1-1,000,000V
V4 Secondary	1-400V
Frequency	40Hz-60Hz @ 50Hz 48Hz-72Hz @ 60Hz
CT Clamps Current Inputs (CH1, CH2, CH3, CH4)	
Input Range	550mV max.
CT Ratio	
Primary	1-30,000A
Secondary	1-50A
I4 Primary	1-30,000A
I4 Secondary	1-50A
Power Supply (L+, N-, G)	
Power Adaptor	100-240VAC± 10%, 47-63 Hz
Rated Output	12VDC/3A, Eff. > 75%
Burden	<2.5W
Battery	
Capacity	7.2V, 4400mAh, Lithium
Battery Life	8 hours (Backlit on) 16 hours (Backlit off)
Charge Time	3.5 hours
LCD Display	
Type	Color TFT LCD, Industrial Grade
Resolution	640x480
Viewing Area	115x86mm
Environmental Conditions	
Operating Temp.	-10°C to 55°C
Storage Temp.	-20°C to 60°C
Humidity	5% to 95% non-condensing
Atmospheric Pressure	70kPa to 110kPa
Pollution Degree	2
Measurement Category	CAT IV
Mechanical Characteristics	
Unit Dimensions	252x160x59 mm
IP Rating	51

**Standards of Compliance**

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 61000-4-15
Testing and measurement techniques - Power quality measurement methods	IEC 61000-4-30
Safety Requirements	
Insulation	IEC 60255-5-2000
Dielectric test:	2kV @ 1 minute
Insulation Resistance	>100MΩ
Impulse voltage	5kV, 1.2/50μs
Electromagnetic Compatibility EMC Directive 2004 / 108 / EC (EN 61326: 2006)	
Immunity Tests	
Electrostatic Discharge	IEC 61000-4-2: 2009 Level IV
Radiated Fields	IEC 61000-4-3: 2008 Level III
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
Voltage Dips, Short Interruptions & Voltage Variation	IEC 61000-4-11: 2004
Emission Tests	

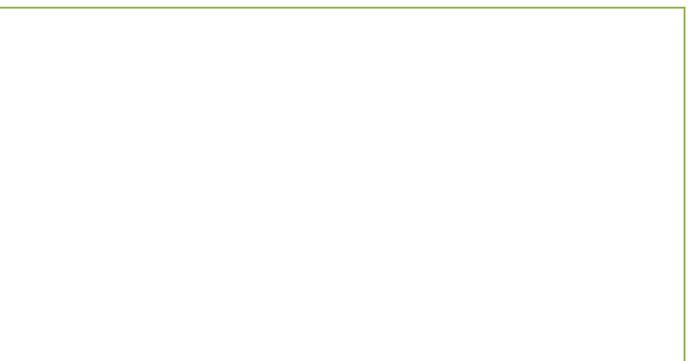
Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment	EN 55011: 2009 (CISPR 11)	
Limits and methods of measurement of radio disturbance characteristics of information technology equipment	EN 55022: 2006 + AI: 2007 (CISPR 22)	
Limits for harmonic current emissions for equipment with rated current ≤16 A	EN 61000-3-2: 2006 + AI: 2009	
Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤16 A	EN 61000-3-3: 2008	
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: 1988 Level I
	Endurance	IEC 60255-21-1: 1988 Level I
Shock Test	Response	IEC 60255-21-2: 1988 Level I
	Endurance	IEC 60255-21-2: 1988 Level I
Bump Test		IEC 60255-21-2: 1988 Level I

**SCCP Ordering Guide**

Model No.	Specification	Output Voltage	Accuracy	Diameter	Cable Length	Appearance
PMC-SCCP-50A-500mV-B-A-B	5A (50A I <sub>max</sub> )	AC 10mV/A	±0.3%rdg.±0.02%f.s.	Φ15mm	3m	
PMC-SCCP-130A-500mV-B-A-A	100A (130A I <sub>max</sub> )	AC 1mV/A	±0.3%rdg.±0.02%f.s.	Φ15mm	3m	
PMC-SCCP-9661	500A (550A I <sub>max</sub> )	AC 1mV/A	±0.3%rdg.±0.01%f.s.	Φ46mm	3m	
PMC-SCCP-9667	500A/5000A (5500A I <sub>max</sub> )	AC 500mV f. s.	±2.0%rdg.±1.5mV	Φ254mm	3m	

**CET Electric Technology Inc.**

A: 8/F WestSide, Building 201, Terra Industrial & Tradepark  
Che Gong Miao, Shenzhen, Guangdong, P.R. China 518040  
T: +86.755.8341.5187  
F: +86.755.8341.0291  
E: [sales@cet-global.com](mailto:sales@cet-global.com)  
W: [www.cet-global.com](http://www.cet-global.com)


**Your Local Representative**

Preliminary Revision Date: August 29, 2018