

# PMC-690

Hand-Held Power Quality Analyzer

All-In-One PQ Analyzer for  
Electrical System Diagnosis



# PMC-690 At-A-Glance

**PMC-690** is the most advanced and user-friendly Power Quality Analyzer for performing not only ad-hoc Real-time monitoring and accurate data recording but also sophisticated Power Quality diagnosis and investigation at site as it combines Class 0.1 accuracy and optimal PQ functions in a Portable, Lightweight and Handheld form factor with a 5.7" High-Resolution Color TFT LCD Display.

## Typical Applications

### Utility

- PQ Check-up at HV, MV & LV Utility Substations
- Site Investigation & Diagnosis for PQ Problems

### Industrial and Commercial

- Electrical Testing and Recording
- Fault Investigation and Identification
- No Load and Full Load Test
- Mains and Critical Feeder Dips, Swells, Transients, Flickers & Disturbance Monitoring



Light but **STURDY**

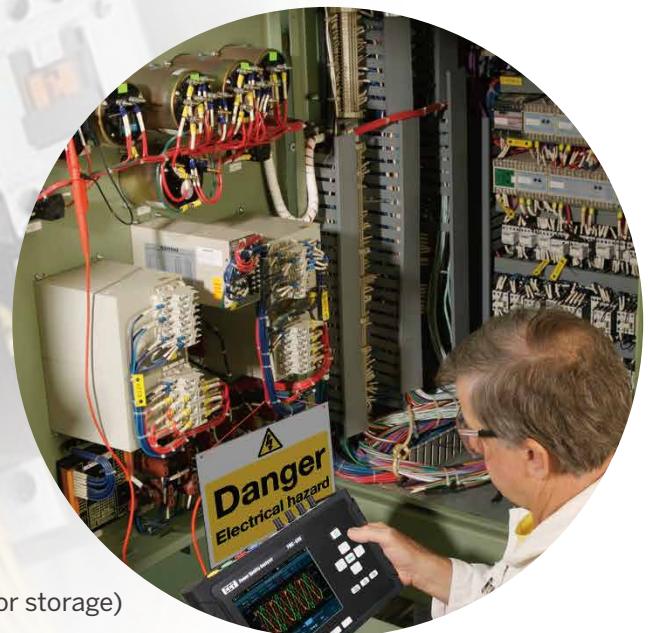
## Basic Features

- 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 & IEC61850
- Industrial Grade Components
- Standard Tropicalization
- Extended Temperature Range
- Extended Warranty
- Weatherproof Carrying Case (Optional)

Simple but **PROFESSIONAL**

## Key Measuring Features

- 3-phase U, I, Power, PF and Phase Angle
- Disturbance Detection - Transients, Dips, Swells, Interruptions, Rapid Voltage Changes
- Disturbance Waveform Recording - max. 512 samples/cycle
- Harmonic analysis up to 63<sup>rd</sup> order
- Statistical Data Recorders & Monitor Logs (16 GB Removable SD Card for storage)
- Inrush Current Monitoring
- Setpoints - PQ Setpoints, 24 Controls & 16 High-Speed Setpoints



# FAST SETUP

## for Ad-Hoc Measurement

### Metering

PMC-690 performs basic measurements at 1-second update rate and High-Speed measurements for event detection at 1/2 cycle update rate.

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

- 3-phase U & I, Power, PF, U4, I4, Frequency and Phase Angle
- kWh, kvarh Import/Export/Net/Total and kVAh Total

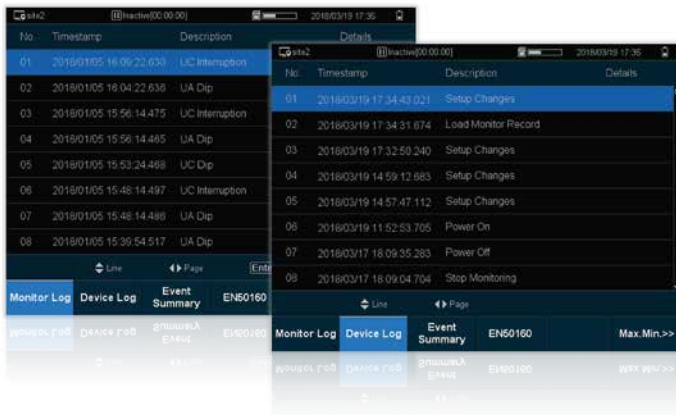
#### High-Speed Measurements (1/2 cycle update)

- 3-phase U & I, U4, I4 Power, PF, Frequency



### Data and Event Recorders

PMC-690 offers 5 Statistical Data Recorders, Monitor Log, Device Log and Max./Min. Log for comprehensive data and event logging. It is equipped with a 16GB Removable SD Card for non-volatile storage. Compact in size and easy to switch between different monitoring locations with its built-in Site Management system. Most importantly, SD Card storage is much more reliable than HDD because it has no moving parts and is immune from mechanical breakdown.



#### Statistical Data Recorder

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

#### Monitor Log

- 1024 FIFO entries time-stamped to ±1ms resolution
- Transients, Dips/Swells, Interruption, Rapid Voltage Changes, Inrush Current, Setpoint events

#### Device Log

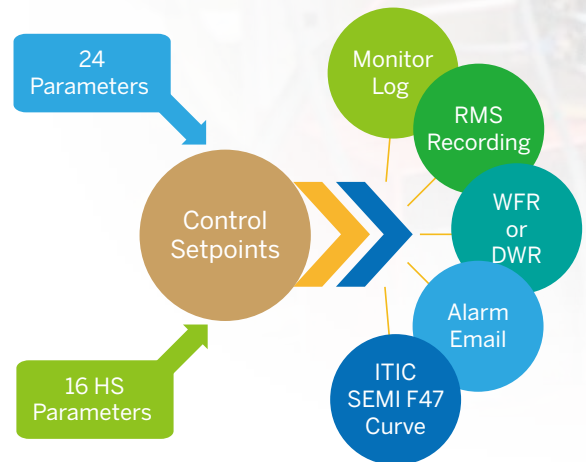
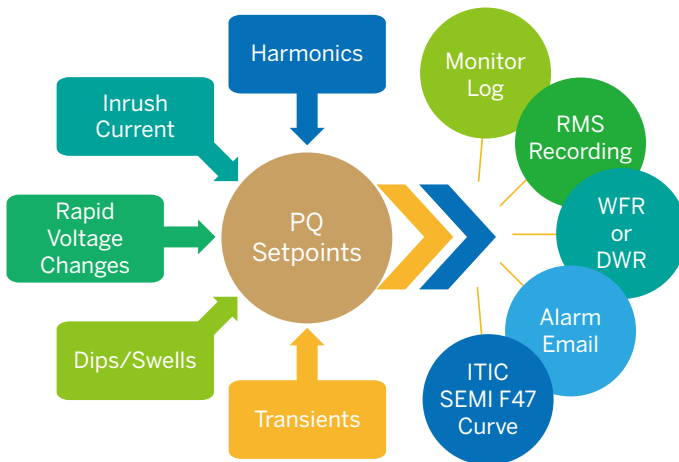
- 1024 FIFO events time-stamped to ±1ms resolution
- Record Setup Changes, System events

#### Max./Min. Log

- 4 Records (20 parameters/recorder) with Timestamp

### Setpoint Feature

Supports the comprehensive monitoring and alarming based on the condition of the measured parameters and provides trigger output for different actions such as Monitor Log, Waveform Recording and Alarm Email.



### Waveform Recorder

The PMC-690 offers 2 options for capturing event waveforms: **Disturbance Waveform Recorder (DWR)** and **Waveform Recorder (WFR)**. The DWR is designed for capturing long-duration fault events such as Interruptions and other unusual faults with extended period. The DWR adjusts the recording resolutions automatically to capture as much waveform details and for as long as possible. The WFR is designed for capturing High-Resolution waveforms for detailed analysis and is especially useful for short-duration events such as Transients, Dips and Swells.

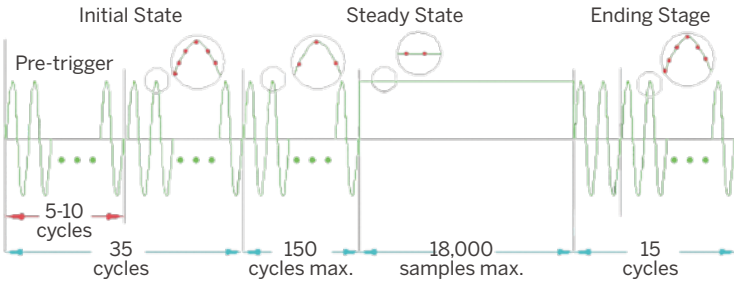


# PMC-690

## Hand-Held PQ Analyzer

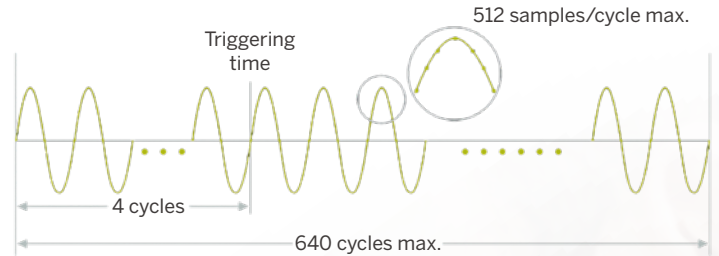
### Disturbance Waveform Recorder (DWR)

- Disturbance recording of all Voltages and Currents up to 500 entries
  - Initial State: Up to 35 cycles @ 512 samples/cycle
  - Steady State: Up to 150 cycles @ 16 samples/cycle  
Up to 18,000 cycles @ 1 sample/cycle (Stop When Full)
  - Ending Stage: Up to 15 cycles @ 512 samples/cycle



### 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
- Number of Cycles x Samples/Cycle with programmable No. of pre-fault cycles
  - 640x16, 320x32, 160x64
  - 80x128, 40x256, 20x512
- Extended recording for up to a maximum of 7 consecutive captures
- COMTRADE file format, downloadable via SD Card



## Power Quality (PQ) Features

The PMC-690 complies with IEC61000-4-30 Class A, IEC61000-4-7, IEC 61000-4-15 and EN50160. It is the ideal Portable Analyzer for Power Quality Monitoring. Not only does it offer accurate harmonic measurements up to the 63<sup>rd</sup> order but also captures all power disturbance events, such as Transients, Dips, Swells, Interruptions that are fully IEC61000-4-30 compliant. PMC-690's unique Disturbance Waveform Recorder feature is capable of recording fault events that span up to 600 seconds with a combination of waveform recording at different resolutions as well as RMS recording at 1-cycle interval during different stages of a particular event such as Initial Fault, Extended Fault, Steady State, Initial Recovery and Ending. These features likely make the PMC-690 one of the most advanced Portable PQ Analyzers in the market today.



- IEC61000-4-7 Compliance
- U & I THD, TOHD, TEHD, Harmonics & Interharmonics up to 63<sup>rd</sup>
- Harmonic kW, kvar, kVA and PF from Fundamental to 63<sup>rd</sup>
- Total harmonic kWh, kvarh Import/Export
- Individual harmonic kWh, kvarh Import/Export

- Frequency measurement according to IEC61000-4-30 Standard
- Accurate to  $\pm 0.005\text{Hz}$  or 0.01%

- U and I accurate to 0.1%
- K-Factor and Crest Factor
- Voltage Variation and Inrush Current Monitoring

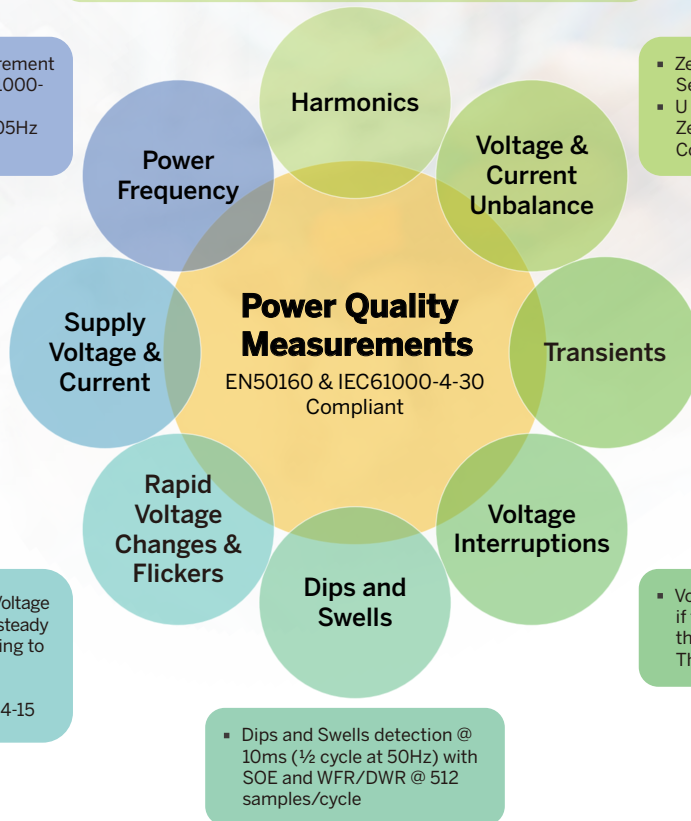
- Detection of quick RMS Voltage transitions between two steady state conditions according to IEC61000-4-30
- Flicker Measurements according to IEC61000-4-15

- Dips and Swells detection @ 10ms ( $\frac{1}{2}$  cycle at 50Hz) with SOE and WFR/DWR @ 512 samples/cycle

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

- Transient events capture as short as 40us with SOE and WFR/DWR @ 512 samples/cycle

- Voltage Interruption events if the residual voltage is less than the Interruption Threshold

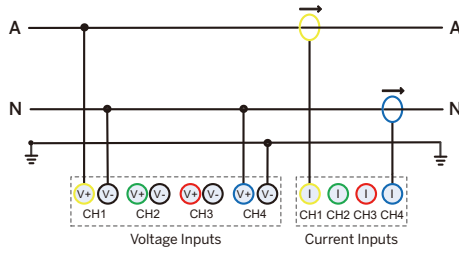


# FULL FEATURES

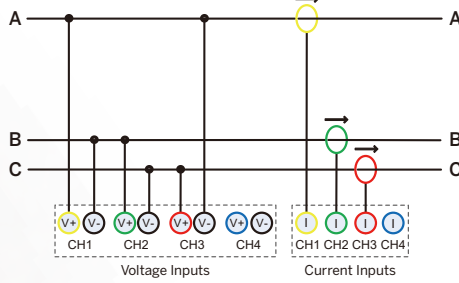
## for Advanced PQ Monitoring

### Wiring

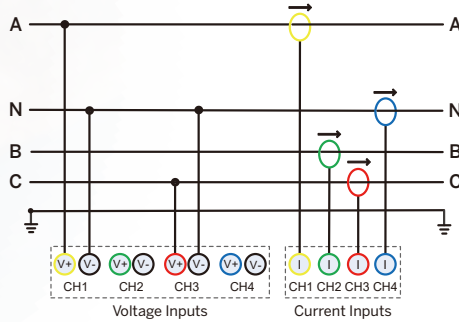
Single-Phase



3-Phase 3-Wire  
Delta



3-Phase 4-Wire  
2.5E-2PT



3-Phase 4-Wire  
Wye

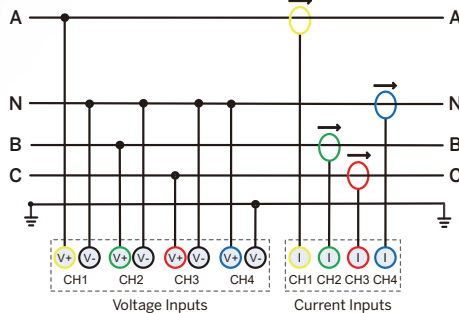
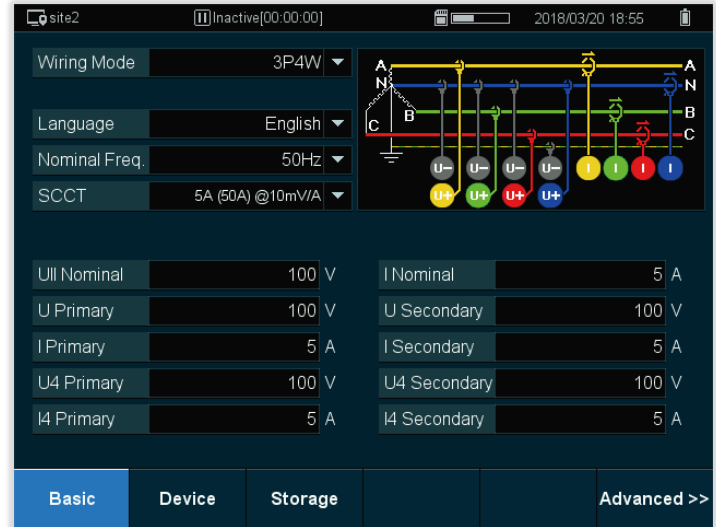


Fig.1 Wiring Configurations

The PMC-690 supports the following wiring configurations (**Fig. 1**): Single-Phase, 3-Phase 3-Wire (Delta), 3-Phase 4-Wire-2.5E-2PT (2PT, 3CT) and 3-Phase 4-Wire Wye (3PT, 3CT). It works with high quality CT Clamps (**Fig. 2**), well insulated Voltage Leads and other Accessories to help you perform your site measurements Faster, Easier and Safer.

Basic Configuration



### Communications and Time Sync.

#### SD Card

- 16GB removable SD Card for easy data transfer to PC

#### USB Port

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

#### Ethernet Port

- 100BaseT TCP/IP Ethernet Ports with RJ45 connector
- Support Modbus TCP & IEC61850 Protocols
- Simultaneous connections for 12xIEC61850 and 10xModbus TCP clients

#### Time Synchronization

- Battery-backed Real-time clock @ 6ppm ( $\leq 0.5s/day$ )
- Time Sync. via Modbus SNTP

### Optional SCCPs

				
Model No.	PMC-SCCP-50A-500mV-B-A-B	PMC-SCCP-200A-200mV-B-B-B	PMC-SCCP-500A-500mV-B-B-B	PMC-SCCP-5kA-500mV-B-C-C-371/254/150/100
Measurement Range	5A (50A I <sub>max</sub> )	20A/200A (200A I <sub>max</sub> )	500A (500A I <sub>max</sub> )	500A/5000A Rogowski Coil (5000A I <sub>max</sub> )
Max. Allowable Current	50A	260A	500A	10,000A
Output Voltage	AC 10mV/A (Max. 500mV)	AC 10mV/A @ 20A AC 1mV/A @ 200A (Max. 200mV)	AC 1mV/A (Max. 500mV)	AC 1mV/A @ 500A AC 0.1mV/A @ 5000A (Max. 500mV)
Accuracy	±0.3% rdg., ±0.02% f.s.	±0.3% rdg., ±0.02% f.s.	±0.5% rdg., ±0.02% f.s.	±2.0% rdg. ±1.5mV
Protection	CAT III 300V	CAT III 600V	CAT III 600V	CAT III 1000V, CAT IV 600V
Diameter	15mm	24mm	50mm	371/254/150/100mm
Cable Length	3m	3m	3m	3m
Termination	BNC	BNC	BNC	BNC

\*The Rogowski Coil SCCP comes with an external Universal Power Supply and an Integrator.

# 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	IEC62053-22 Class 0.5S	0.1kXh
kvarh	±0.2% + CT Clamps Accuracy	0.001kvar
kvarh	IEC62053-23 Class 2	0.1kvarh
PF	±0.5%	0.001
Frequency	±0.005Hz	0.001Hz
Harmonics	IEC61000-4-7 Class A	0.01%
K-Factor	IEC61000-4-7 Class A	0.01
Phase Angle	±0.2°	0.1°
Voltage Deviation	±0.1%	0.01%
Voltage Unbalance	±0.1%	0.01%
Current Unbalance	±0.5%	0.01%
Pst, Plt	±5%	0.001

# Technical Specifications

Voltage Inputs (CH1, CH2, CH3, CH4)		
Voltage Range		5V to 600V
Burden		<0.1VA/phase
PT Ratio	Primary	1-1,000,000V
	Secondary	1-690V
	U4 Primary	1-1,000,000V
	U4 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%, 47-63Hz
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	252x160x59mm
Unit Weight	1.16kg
IP Rating	51

# Standard of Compliance

Power Quality	
Voltage Characteristics of Electricity Supplied by Public Distribution Systems	EN50160
General Guide on Harmonics and Interharmonics Measurements and Instrumentation, for Power Supply Systems and Equipment Connected Thereto	IEC61000-4-7
Flicker Meter - Functional and Design Specifications	IEC61000-4-15
Testing and Measurement Techniques - Power Quality Measurement Methods	IEC61000-4-30

Safety Requirements	
Insulation	IEC60255-5: 2000
Dielectric Test	2kV @ 1 minute
Insulation Resistance	>100MΩ
Impulse Voltage	5kV, 1.2/50μs

Mechanical Tests		
Vibration Test	Response	IEC60255-21-1: 1988 Level I
	Endurance	IEC60255-21-1: 1988 Level I
Shock Test	Response	IEC60255-21-2: 1988 Level I
	Endurance	IEC60255-21-2: 1988 Level I
Bump Test		IEC60255-21-2: 1988 Level I

Electromagnetic Compatibility	
EMC Directive 2004/108/EC (EN61326: 2006)	
Immunity Tests	
Electrostatic Discharge	IEC61000-4-2: 2009 Level IV
Radiated Fields	IEC61000-4-3: 2008 Level III
Fast Transients	IEC61000-4-4: 2004 Level IV
Surges	IEC61000-4-5: 2005 Level IV
Conducted Disturbances	IEC61000-4-6: 2008 Level III
Magnetic Fields	IEC61000-4-8: 2009 Level IV
Oscillatory Waves	IEC61000-4-12: 2006 Level III
Voltage Dips and Interruptions	IEC61000-4-11: 2004
Ring Wave	IEC61000-4-12: 2017
Emission Tests	
Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	EN55011: 2009 (CISPR 11)
Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	EN55022: 2006+A1: 2007 (CISPR 22)
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤ 16A	EN61000-3-2: 2006+A1: 2009
Limitation of Voltage Fluctuations and Flicker In Low-Voltage Supply Systems for Equipment with Rated Current ≤ 16A	EN61000-3-3: 2008
Emission Standard for Residential, Commercial and Light-Industrial Environments	EN61000-6-3: 2007
Electromagnetic Emission Tests for Measuring Relays and Protection Equipment	IEC60255-25: 2000

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