PMC-592

Cost Effective Solution for Multi-Circuit Power Monitoring

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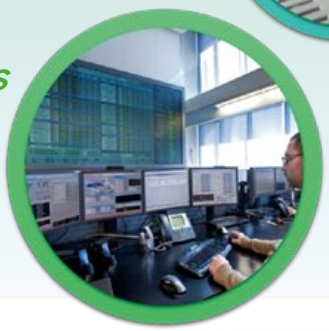
Typical Applications

High-Density Branch Circuits Monitoring

BEMS Building Energy Management Systems



Cost Allocation by Virtual & Sub-Metering for Commercial Buildings

PDU Monitoring for Internet, Financial & Telecom Data Centers

LV Distribution Board Monitoring for High-Tech Manufacturing

Power Quality Monitoring

Pad-Mount Substation Demand Monitoring for Asset Management

Features Summary

- Monitor **2 Mains Circuits** and up to **84 Branch Circuits**
- Optional support **Solid-Core** & **Split-Core CTs** for up to Max. 1600A branch current monitoring
- **5A Solid-Core CT Strip** for interfacing with external CTs with 5A secondary for LVDB/Load Center applications
- **1-Ø, 2-Ø and 3-Ø Sub-Metering**
- **Flexible configuration for 2-Ø and 3-Ø Sub-Metering Grouping**
- Support **Branch Power Calculation & Interval Energy Recording** for all Virtual & Sub-Meters
- **Programmable Data Recording**
- **1GB Non-Volatile Log Memory**
- Perform basic measurements at **1-second update rate**
- **Dips/Swells Detection** with Waveform Recording
- Configurable Waveform Resolution, up to **Maximum 64 samples/cycle**
- THD and individual harmonics up to **31st order**
- 2 DIs and 2 DOs for **Monitoring and Control**
- RTD Inputs for Hot and Cold Aisle **Temperature Monitoring**
- **Modbus** RTU/TCP and **HTTP, SMTP, SNTP, SNMP Protocol** Support
- **Embedded Web Interface** for complete data access and configuration
- Optional support for up to two **7" Touch-Screen HMIs** per PMC-592
- **A single PMC-592 can be used to monitor two PDUs**, each with one Mains and 42 Branch Circuits

PMC-592 At-A-Glance

Base Unit

2xMains Inputs, each with 3-phase Voltages and 4-phase Currents
Up to 4 CT Branches with a maximum 21 CTs per Branch
2xDI, 2xDO, 2xRTD Inputs
1xRS-422/485 & 1xRS-485 with Modbus RTU
1x100BaseT with Modbus TCP and SNMP
Power Supply: 95-277VAC/VDC ± 10%, 47-440 Hz
Burden: <6W

Optional HMI

7" Color Touch-Screen TFT LCD with LED Backlight
Power Supply: 24VDC ± 20%
Burden: <10W

CT Strip

Up to 4 Branch Circuits with 3/4" or 1" CT spacing

Option I:
- 12x100A or 21x100A Solid-Core
- 100A maximum
- Starting Current: 200mA
- Overload: 500A for 1s
- Burden: < 0.5VA per phase

Option II:
- 12x5A or 21x5A Solid-Core CTs
- 5A nominal, 10A maximum
- Programmable CT Ratio
- Starting Current: 20mA
- Overload: 100A for 1s
- Burden: < 0.5VA per phase

Branch Split-Core CT

100A, 200A, 400A, 800A and 1600A CTs
Imax: 120% In
Starting Current: 0.2% Imax
Burden: <0.05VA per phase

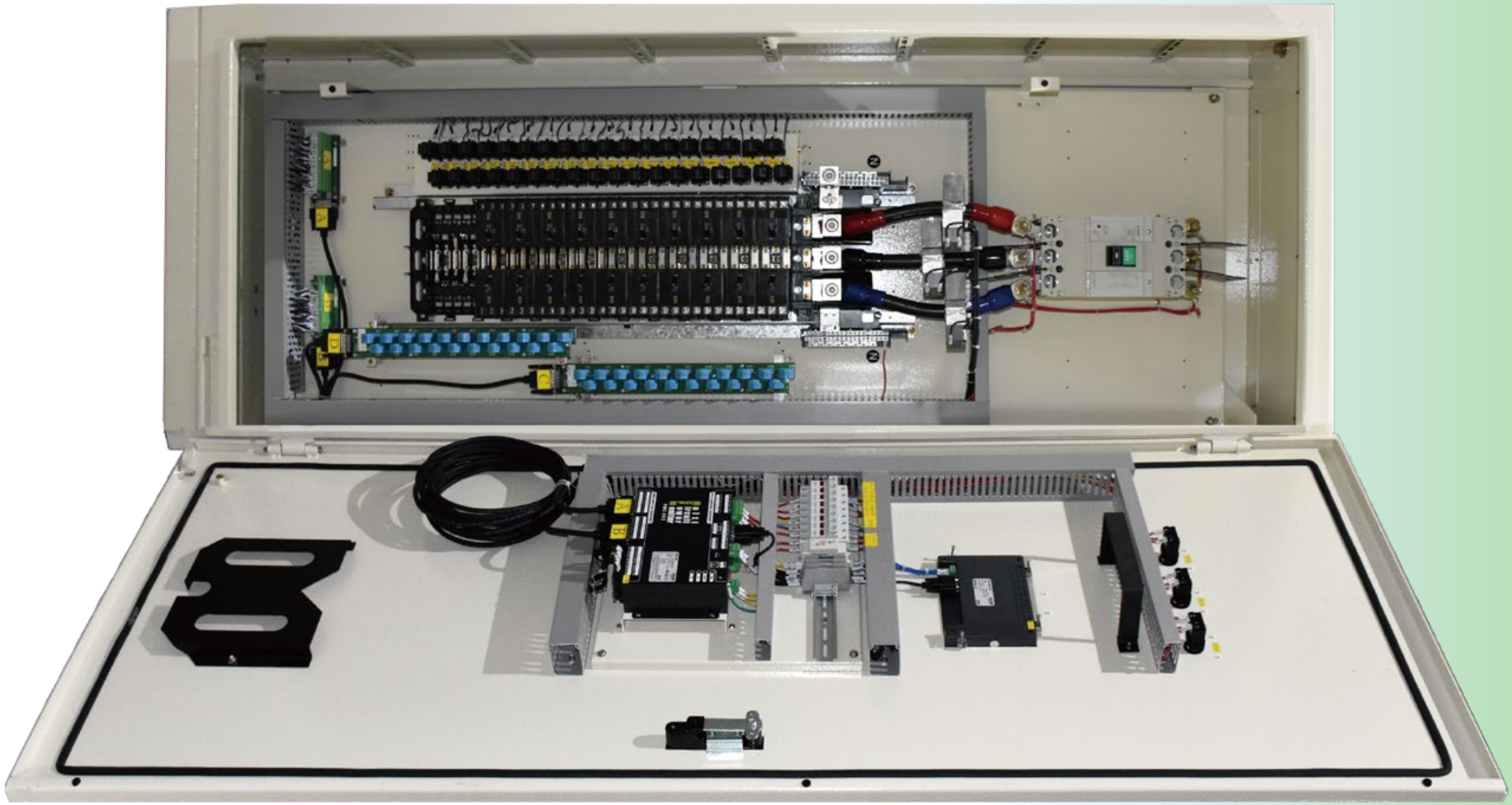
Branch Circuit Cable

High Quality, Rugged and Reliable
Cable Length: 0.4m, 1m, 1.8m, 3m, 6m, 10m

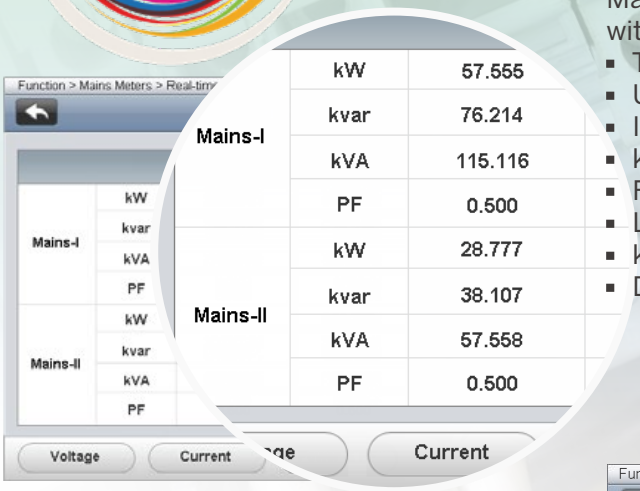
Adapter Board

Split-Core CT Adapter Board to simplify wiring termination

PMC-592 in a typical PDU Panel with one Mains and 42 Branch Circuits



Features



Mains Measurements

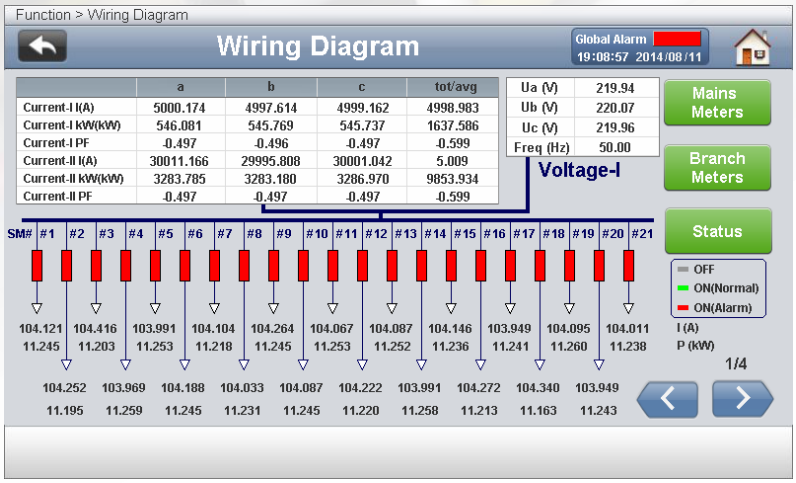
The PMC-592 features high-accuracy measurements for two Mains Inputs, each supporting 3 Voltage and 4 Current Inputs with the following measurements

- True RMS measurements
- ULN and ULL per Phase and Average
- I per Phase and Average, measured Neutral Current
- kW, kvar, kVA, PF per Phase and Total
- Frequency
- Loading Factor per Phase and Average
- kWh Import/Export, kvarh Import/Export, kVAh Total
- Dual Tariff energy accumulation

Branch Measurements

Each Branch Current Input provides the following measurements:

- I, kW, kvar, kVA, PF, Loading Factor, kWh, kvarh, kVAh and Maximum Demand with timestamp



Billing and Cost Allocation

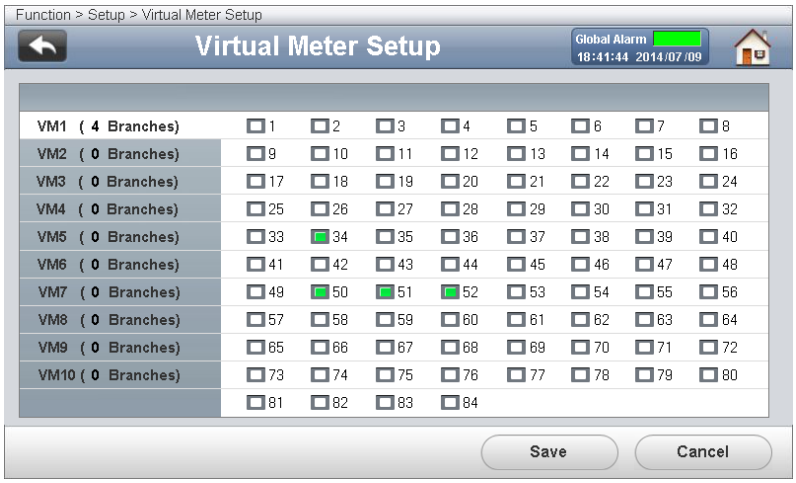
PMC-592 can be used to monitor energy usage for individual tenants, departments, pieces of equipment or other loads to account for their actual energy usage

Sub-Meters

- Demand Values for I Average, kW, kvar and kVA
- Max. Demands with Timestamp for This Month and Last Month (or Since Last Reset and Before Last Reset)
- Support configurable 1-Ø, 2-Ø and 3-Ø SM
- I Average, Loading Factor, kW, kvar, kVA, PF Total, kWh/kvarh Import and kVAh Total

Virtual Meters

- 10 configurable Virtual Meters for arbitrary aggregation of energy consumption from Mains and any of the (84) 1-Ø SMs.
- Support both Addition and Subtraction.
- kW, kWh/kvarh Import and kVAh per VM
- Dual-Tariff energy accumulation



Power Quality

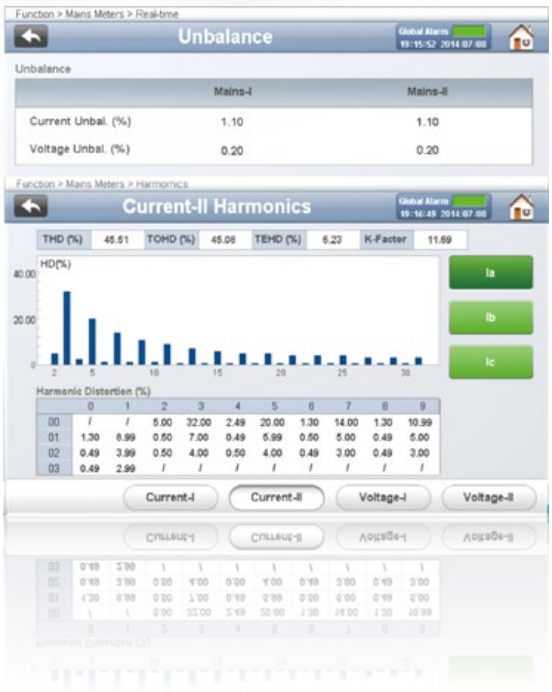
The growing use of switch-mode power supplies, VSDs/VFDs, electronic ballasts, LED lightings and Inverter AC has made us aware of the effects of harmonics, which in turn cause control mal-function, capacitor failure, motor overheating and the overloading of neutral conductor.

Equipment and machinery can be damaged or even fail when sub-jected to power quality anomalies. Short-duration voltage dips or surges can bring businesses down for hours or days.

Not only can the PMC-592 help detect voltage dips/swells, as well as recording high-resolution waveforms on the Mains Inputs, it can also perform 64 samples/cycle (3200Hz@50Hz, 3840Hz@60Hz) on both Mains and Branch Circuits to measure THD up to 31st order.

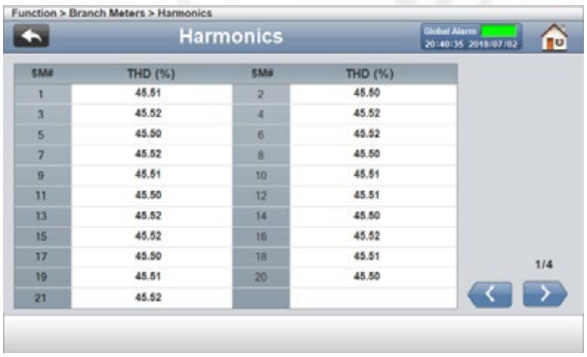
Mains Inputs

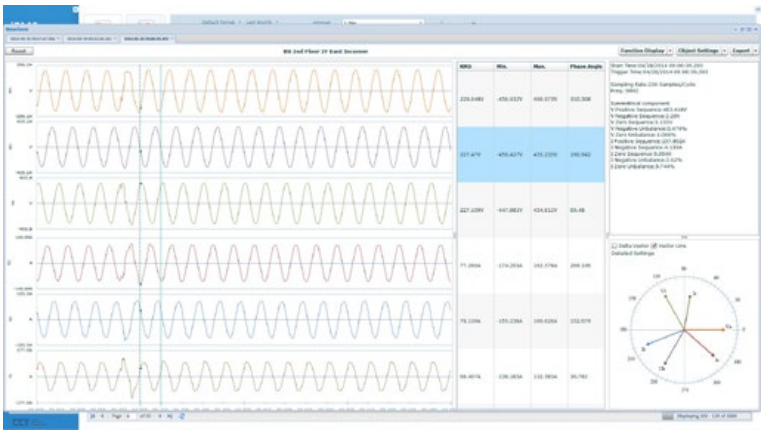
- U and I Unbalance based on Sequence Components
- U and I THD, TOHD, TEHD and Individual harmonics to 31st
- Current TDD, K-Factor and Crest Factor
- Dips/Swells and Interruptions detection with Waveform Recording



Branch Inputs

- Current THD per Branch Circuit





Waveform Recorder for Mains Inputs

- Support up to 16 WFR Log entries
- Record U1-U3 and I1-I3 for both Mains-I and Mains-II
- Programmable resolution (samples/cycle x # of cycles) at 64x150, 64x75, 32x300, 32x150, 16x600 and 16x300
- Triggered by Dips/Swells and Interruptions

Monitoring and Control

The PMC-592 provides Digital I/Os for status monitoring, control, alarming as well as temperature monitoring. These signals can also be integrated into BAS for building automation.

Temperature Monitoring

- 2 Channels for PT100 sensor (sensor not included)
- Range from -40 °C to 200 °C
- Hot and Cold Aisle monitoring

Digital Inputs

- 2 Channels, volt free dry contact, 24VDC internally wetted
- External status monitoring with programmable debounce
- 1000Hz sampling
- Tariff Switching based on DI Status for Main and GenSet accumulation

Digital Outputs

- 2 Channels for external control and alarm
- 5A @ 250VAC/30VDC
- Facilitates Setpoint Control

Interval Energy and Programmable Data Recording

Collect actionable energy information for pattern analysis, process control, load shifting to avoid demand charges, building performance optimization as well as efficiency management.

1GB Non-Volatile Log Memory

Interval Energy Recorder

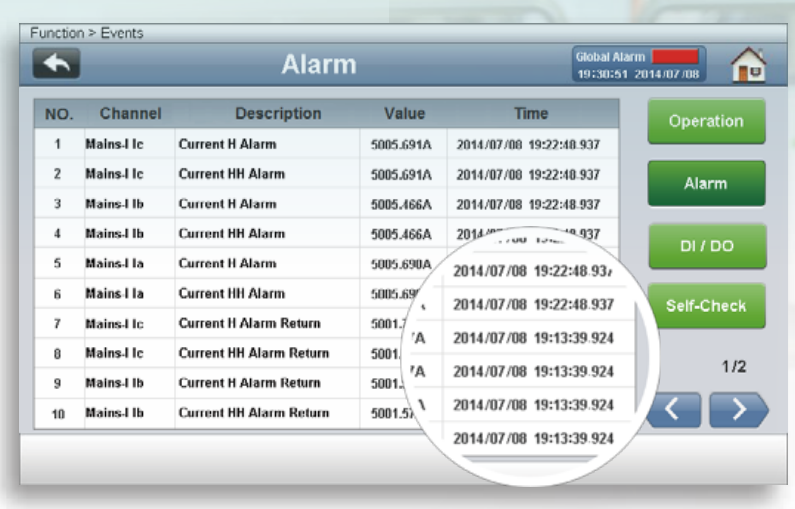
- Complete energy profiling of Mains-I/II, 1-Ø, 2-Ø and 3-Ø SMs, VMs as well as the Mains-I/II and VMs for Tariffs T1 and T2.
- Programmable Interval at 5, 10, 15, 30 or 60-minute intervals
- Fixed Log Depth at 10,000 entries, capable of recording:
  a. 1 month @ 5-min interval
  b. 2 months @ 10-min interval
  c. 3 months @ 15-min interval
  d. 6 months @ 30-min interval
  e. 12 months @ 60-min interval

Programmable Data Recorders

- 1GB On-board log memory
- 10 Data Recorders of 64 parameters each for a total of 640 Real-time parameters
- Programmable Log Depth (65535 max.) and Recording Interval (60-345600s)

SOE Log & Alarm Monitoring

The PMC-592 provides powerful alarming functions for the Mains and Branch Inputs as well as for different parameters. It supports 4 Alarm Levels (High-High, High, Low and Low-Low) to raise awareness and help differentiate critical conditions.



- All alarms are recorded in the SOE Log
- 1000 events time-stamped to ±1ms resolution

Communications and Protocols

Port 1 - HMI-DB9 Connector

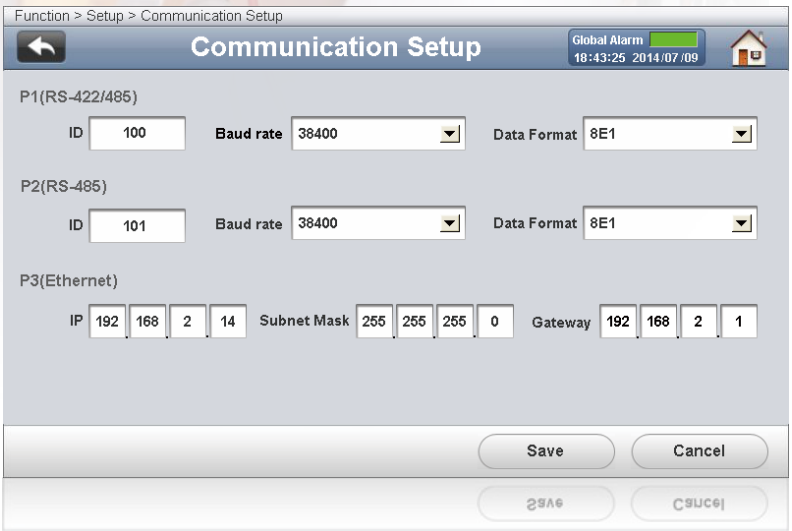
- Modbus RTU
- Compatible with RS-232/422/485
- 1,200 to 38,400 bps

Port 2 - RS-485

- Optically isolated
- 1,200 to 38,400 bps
- Modbus RTU
- Optional connection with up to 4 external DI Modules

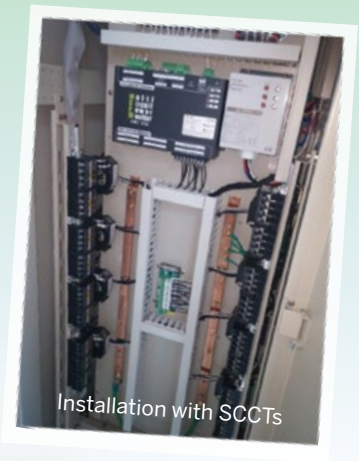
Port 3 - Ethernet

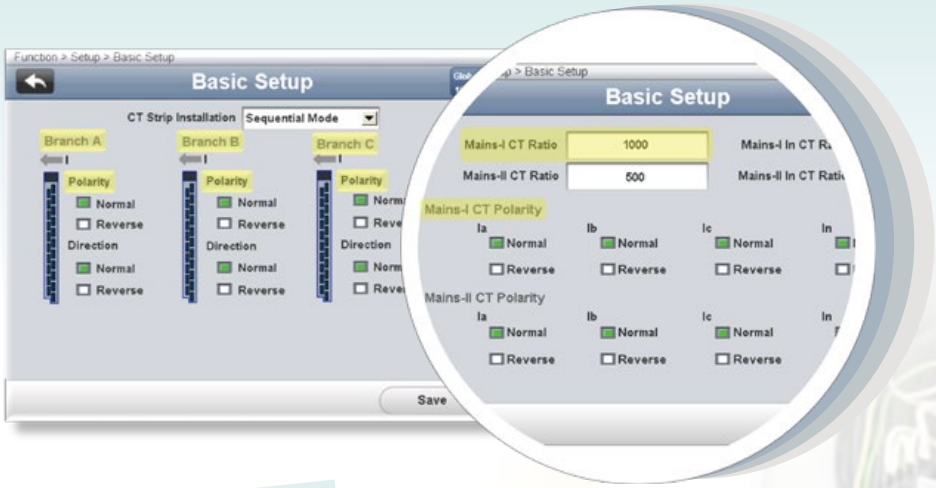
- 10/100BaseT, HTTP, SMTP, SNTP, SNMP
- Modbus TCP and Modbus RTU over TCP protocols
- Firmware upgrade via Ethernet port
- Configurable IP Port Number for Modbus TCP and HTTP



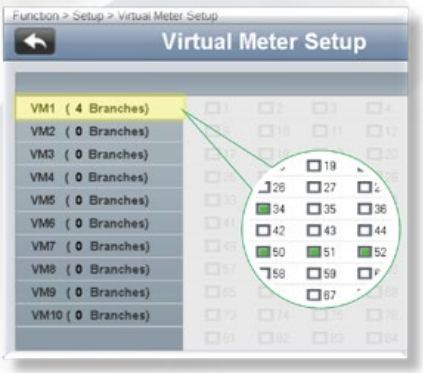
Flexible Configuration

PMC-592 is designed to facilitate flexible installation in a compact and high-density environment with programmable CT Ratio and Polarity, Phase or Line Reference Voltage, 2-Ø and 3-Ø Sub-Meter Grouping, CT Strip Installation Mode and Orientation as well as the following features to make site installation a breeze.





- Flexible Configuration of CT Ratio and Polarity Facilitates Site Installation
- Support common panel arrangements such as Single Panel Mode, Dual Panel Mode and 1-Phase 3-Wire configuration
- A single PMC-592 can be used to monitor two PDUs, each with one Mains and 42 Branch Circuits



- Any Branch Current Input can be paired with any Phase or Line Voltage
- Flexible configuration for 2-Ø and 3-Ø Sub-Meter Grouping to eliminate wiring mistakes at site that would cause the complete breakdown of sub-meter calculations due to rigid ordering for 2-Ø and 3-Ø Sub-Meter wiring offered by other competitors.

System Integration

Not only can the PMC-592 be used as a stand-alone piece of intelligent equipment with its on-board Web Interface, optional Touch-Screen Color HMI and the free Log Viewer software for the Interval Energy and Data Recorders, it can also be easily integrated with CET's PecStar® iEMS and iEEM as well as other EMS, BMS, SCADA or Management systems via Modbus RTU/TCP and SNMP.

Accuracy

Parameters	Accuracy	Resolution
Mains Voltage	±0.2%	0.01V
Mains I1-I4	±0.2%	0.001A
kW, kVA	IEC62053-22 Class 0.5S for Mains IEC62053-21 Class 1 for Branches	0.001kX
kWh, kVAh		0.1kXh
kvar, kvarh	IEC62053-23 Class 2	0.001kvar 0.1kvarh
PF	1%	0.001
Frequency	±0.02Hz	0.01Hz
Harmonics	IEC61000-4-7 Class B	0.01%
K-Factor	IEC61000-4-7 Class B	0.01
RTD	±1.0°	0.1°

Technical Specifications

Main Voltage Inputs (V1, V2, V3, VN)

Standard (Un)		277ULN/480ULL
Range		10% to 120% Un
PT Ratio	Mains I/II-Primary	1-1,000,000V
	Mains I/II-Secondary	1-480V
Overload		2xUn continuous, 4xUn for 1s
Burden		<0.05VA@277ULN per phase
Frequency		45-65Hz

Mains Current Inputs

I Nominal (In)	5A/1A (CT rated Input)
Range	1% to 120%
Starting Current	0.3% of In
CT Ratio	6000 max. for 5A, 30000 max. for 1A
Overload	1.2xIn continuous, 10xIn for 1s
Burden	<0.3VA per phase

Branch Inputs

CT Ratio		400 Maximum
Burden		<0.05VA per phase
Starting Current		0.2% Imax
Solid-Core CT Strip	100A	In=100A, Imax=100A, Range= 0.2%-100%
	5A	In=5A, Imax=10A, Range= 1%-100%
Split-Core CT	100A	In=100A, Imax=120A, Range= 5%-120%
	200A	In=200A, Imax=240A, Range= 5%-120%
	400A	In=400A, Imax=480A, Range= 5%-120%
	800A	In=800A, Imax=960A, Range= 5%-120%
	1600A	In=1.6kA, Imax=1.92kA, Range= 5%-120%
Solid-Core CT	400A	In=400A, Imax=480A, Range= 5%-120%
	800A	In=800A, Imax=960A, Range= 5%-120%

Power Supply for Main Unit (L+, N-)

Standard	95-277VAC/DC, ±10%, 47-440Hz
Burden	<6W

Digital Inputs (DI1, DI2, DIC)

Type	Dry contact, 24VDC internally wetted
Sampling	1000Hz
Debounce	1-9999 ms programmable

Digital Outputs (DO11, DO12, DO21, DO22)

Type	Form A Mechanical Relay
Loading	5A@250VAC/30VDC

RTD Inputs (TC11, TC12, TC21, TC22)

Type	PT100
Range	-40 °C to 200 °C

Time Synchronization

Real-time clock	6ppm battery-backed Real-Time Clock (<0.5s per day)

Electromagnetic Compatibility

EMC Directive 2014 / 30 / EU (EN61326: 2013)

Immunity Tests

Electrostatic Discharge	EN61000-4-2: 2009
Radiated Fields	EN61000-4-3: 2006 +A1: 2008 +A2: 2010
Fast Transients	EN61000-4-4: 2012
Surges	EN61000-4-5: 2014+A1: 2017
Conducted Disturbances	EN61000-4-6: 2014
Magnetic Fields	EN61000-4-8: 2010
Voltage Dips and Interruptions	EN61000-4-11: 2004+A1: 2017
Oscillatory Waves	EN61000-4-12: 2017

Emission Tests

Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	EN55011: 2016
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	EN55032: 2015
Limits for Harmonic Current Emissions for Equipment with Rated Current ⩽16 A	EN61000-3-2: 2014
Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ⩽16 A	EN61000-3-3: 2013
Emission Standard for Industrial Environments	EN61000-6-4: 2007 +A1: 2011

Mechanical Tests

Spring Hammer Test	IEC62052-11: 2003
Vibration Test	IEC62052-11: 2003
Shock Test	IEC62052-11: 2003

Standards of Compliance

Safety Requirements	
LVD Directive 2014/35/EU	EN61010-1: 2010 EN61010-2-030: 2010
Electrical Safety in Low Voltage Distribution Systems up to 1000Vac and 1500 Vdc	IEC61557-12: 2018 (PMD)
Insulation AC Voltage Insulation Resistance Impulse Voltage	3.5kV @ 1 minute >100MΩ 6kV, 1.2/50μs

Mechanical Specification

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 106 kPa
Pollution Degree	2
Installation Category	CAT III

Mechanical Characteristics	
Enclosure	Galvanized Steel
Unit Dimensions	260.5x154x55.5mm
IP Rating	50

Ordering Information

Product Code									Description
PMC- 592 Multi Circuit Power Meter									
Functionality		A							The PMC-592 Base Unit comes with 2xMains Inputs, each with 3-phase Voltages and 4-phase Currents, 2xRTD Inputs, 2xDI, 2xDO, 1xRS-422/485 Port (HMI Interface), 1xRS-485 Port and 1x100BaseT Port. It supports up to 4 CT Branches with a maximum 21 CTs per Branch.
Current Rating for the 2 Mains Feeders			5						5A: Standard
			1						1A
Voltage Rating for the 2 Mains Feeders				3					277VLN/480VLL
Control Power Ratings					2				95-277 VAC/DC, 47-440Hz
Power System Frequency						5			50Hz
						6			60Hz
Current Rating for Branch Feeders							100		100A Branch Current Inputs * Select this option for use with 100A Fixed Core CT Strip or with CT Adapter Board and 100A-1600A Branch SCCTs
							010		10(5)A CT Inputs * This option cannot be used with Branch SCCTs
Langue Version for Front Plate								E	English: Standard for International
PMC-592	-	A	5	3	2	5	100	E	PMC-592-A5325100E (Standard Model)

* The PT100 sensor for the RTD Input is an optional item.
* The PMC-592's HMI is an optional item.
* Please consult CET for selecting suitable PMC-592 Accessories to suit your applications.

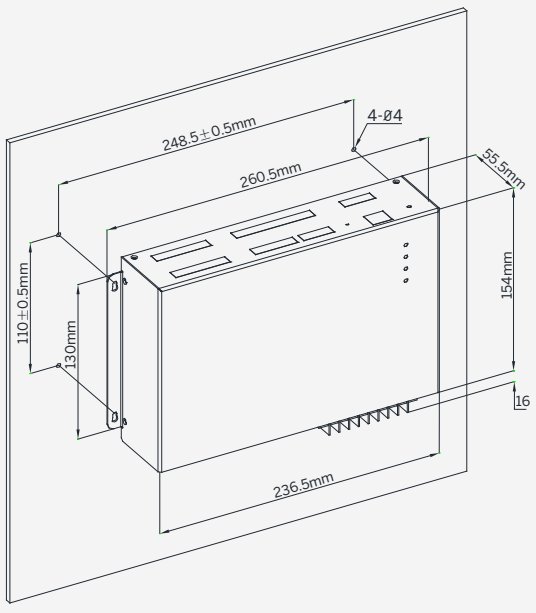
HMI Ordering Information

Product Code				Description
PMC-592-HMI				
Basic Function		A		7" TFT LCD, 800x480, 1xRS-422/485 port, a RS-422 cable and an external 24VDC Switching Power Supply
		C		Same as 'A' but supports two PMC-592 (168 feeders)
		D		Same as 'A' but supports four PMC-592 (336 feeders)
Interface Language			E	English
PMC-592-HMI	-	A	E	PMC-592-HMI-AE (Standard Model)

* The standard cable length for connecting the HMI to the PMC-592 Main Unit is 3.0m. Please contact the factory in advance for special requirements.

Dimensions

Main Unit



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Your Local Representative

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