

PMC-592

Cost Engelly: Solution for High-Density Multi-Circuit Power Monitoring

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High-Density Branch Circuits Monitoring

BEMS Building Energy Management Systems

PDU Monitoring for Internet, Financial & Telecom Data Centers Cost Allocation by Virtual & Sub-Metering for Commercial Buildings



ALC: NO.

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
- Support **Solid-Core** & **Split-Core CTs** for up to 800A branch current monitoring
- Support 5A Solid-Core Branch CTs for LVDB applications
- I-Ø, 2-Ø and 3-Ø Sub-Metering
- Flexible configuration for 2-Ø and 3-Ø Sub-Metering Grouping
- Support Branch Power calculation based on Phase or Line Voltages
- Interval Energy Recording for all Virtual & Sub-Meters
- Programmable Data Recording for Real-time
 Parameters
- 1GB Non-Volatile Log Memory
- Perform basic measurements at 1-second update rate

- Dip/Swell Monitoring based on IEC61000-4-30
- Configurable Waveform Resolution, up to maximum
 64 samples/cycle
- THD and individual harmonics up to **31**st order
- 2 DIs and 2 DOs for **Monitoring and Control**
- RTD Inputs for Hot and Cold Isle Temperature
 Monitoring
- Modbus RTU/TCP and 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



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Base Unit

100A/40mA Inss0.1 10() 1317

2xMains Inputs, each with 3-phase Voltages and 4-phase Currents Up to 4 CT Branches with a maximum 21 CTs per Branch 2xDI, 2xRO, 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: <5W

Optional HM

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 Circuit Cable

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

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

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





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

- ULN and ULL per phase and average
- I per phase and average, measured Neutral Current
- kW, kvar, kVA, PF per phase and total н.
- Frequency

5

- Loading Factor per phase and average .
- kWh Import/Export, kvarh Import/Export, kVAh Total .
- Dual Tariff energy accumulation



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Power & PF

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Consul Allows



Branch Measurements

Each Branch Current Input provides the following measurements:

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

Billing and Cost Allocation

cy usage an 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

Each Sub-Meter (1-Ø, 2-Ø and 3-Ø) provides the following information

6.904 6.904 6.904 6.904

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I-Phase PR

Loar

Save

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17,175 17,175 0,000 0,000 0,000 0,000 0,000 0,000 0,000

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RVE

- I Average, Loading Factor, kW, kvar, kVA, PF Total, and their respective Max/Min values
- kWh Import, kvarh Import and kVAh
- Demand values for I Average, kW, kvar and kVA
- Peak Demands with timestamp for This Month and Last Month (or Before Last Reset and Since Last Reset)

Function > Setup > Virtual Meter Setup

Historical Peak Demands

	Meter Meter	r Setu	р		Global o		
VM1 (4 Branches) VM2 (0 Branches) VM3 (0 Branches) VM4 (0 Branches) VM5 (0 Branches) VM6 (0 Branches) VM6 (0 Branches) VM7 (0 Branches) VM8 (0 Branches) VM9 (0 Branches) VM0 (0 Branches)	1 22 9 10 117 16 225 26 33 33 411 44 449 55 557 556 665 666 73 74 81 66	3 11 3 11 3 19 3 2 4 35 2 4 35 5 5 5 6 7 4 7 5 6 7 4 7 5 6 7 6 7 7 7 8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 <tr< th=""><th>4 12 20 28 38 44 52 60 60 60 60 88 276 84</th><th>5 13 21 29 37 45 53 61 61 69 77</th><th>18:11: 14 22 30 38 46 54 62 70 70</th><th>4 2011/07 15 23 31 39 47 55 63 71 79</th><th>00 00 00 00 00 00 00 00 00 00 00 00 00</th></tr<>	4 12 20 28 38 44 52 60 60 60 60 88 276 84	5 13 21 29 37 45 53 61 61 69 77	18:11: 14 22 30 38 46 54 62 70 70	4 2011/07 15 23 31 39 47 55 63 71 79	00 00 00 00 00 00 00 00 00 00 00 00 00

Virtual Meters

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- 10 Virtual Meters are available for the arbitrary aggregation of energy consumption from Mains and any of 84 1-Ø Sub-Meters
- Each Virtual Meter provides aggregated values for kW, kWh, kvarh and kVAh

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 malfunction, capacitor failure, motor overheating and the overloading of neutral conductor.

Equipment and machinery can be damaged or even fail when subjected 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

Branch Circuits

Current THD per Branch Circuit

- U and I Unbalance based on Sequence Components
- THD. TOHD. TEHD and Individual harmonics to 31st

1.10

TDD. Crest Factor and K-Factor

Unbalance

1.10

n > Mains Meters > Real-tir

Unbalance

Current Unbal. (%)

Waveform Recorder for **Mains Inputs**

- Programmable resolutions (samples/ cycle x # of cycles) at 64x150, 64x75, 32x300, 32x150, 16x600 and 16x300
- Triggered by the following alarms: Dips, Swells and Interruptions



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.

Interval Energy Recorder

- Complete energy profiling of two Mains, 1-Ø, 2-Ø and 3-Ø Sub-Meters and Virtual Meters for Tariffs T1 and T2
- Mains: kWh Import/Export, kvarh Import/Export and kVAh
- Sub-Meters and Virtual Meters: kWh Import, kvarh Import and kVAh
- Sub-Meters and Virtual Meters: kWh Import, kvarh Import and kVA
 Programmable Interval at 5, 10, 15, 30 or 60 minute intervals
 Fixed Log Depth at 10,000 entries, enough to record:

 a. 1 month @ 5-minute
 b. 2 months @ 10-minute
 c. 3 months @ 15-minute
 d. 6 months @ 30-minute
 e. 12 months @ 60-minute

 Programmable Data Recorders

 10 Recorders of 64 parameters each
 Real-time parameter recording for trend analysis

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- Programmable Log Depth: 65535 max.





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

- External status monitoring with programmable debounce
- 2 Channels, volt free dry contact, 24VDC internally wetted

Digital Outputs

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

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.





 Configurable Threshold and Time Delay for each circuit

Functio	n > Events				
		Alarm Global Ali 19:30:51		Global Aları 19:30:51 (n 1990 2014/07/08
NO.	Channel	Description	Value	Time	Operation
1	Mains-I Ic	Current H Alarm	5005.691A	2014/07/08 19:22:48.937	
2	Mains-I Ic	Current HH Alarm	5005.691A	2014/07/08 19:22:48.937	Alarm
3	Mains-I lb	Current H Alarm	5005.466A	2014/07/00 00:02:48.937	, durin
4	Mains-I lb	Current HH Alarm	5005.466A	2014/07/08 10:22:48 02.	DI (DO
5	Mains-I la	Current H Alarm	5005.690	2014/07/00 19:22:40:537	BIT DO
6	Mains-I la	Current HH Alarm	5005.6	2014/07/08 19:22:48.937	Solf Cheek
7	Mains-I Ic	Current H Alarm Return	5001. ^{'A}	2014/07/08 19:13:39.924	Sell-Check
8	Mains-I Ic	Current HH Alarm Return	5001. ⁷ A	2014/07/08 19:13:39.924	4/0
9	Mains-I lb	Current H Alarm Return	5001.5	2014/07/08 19:13:39.924	1/2
10	Mains-I lb	Current HH Alarm Return	5001.576A	2014/07/08 19:13:39.924	$\langle \langle \rangle \rangle$





Global Alarm

19:04:53 2014/08/11

Global Alarm Output

- 4 Alarm Levels: HH, H, L and LL
- All alarms are recorded in the SOE Log
- 1000 events time-stamped to ± 1 ms 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
- 1200 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

1	Basic Se	etup	0
Panel Mode	Single Panel Mode I	*	
Wiring Mode	WYE	-	
Nominal Uln	230	-	٧
Nominal Frequency	50Hz	-	
tage-II Wiring Mode	WYE	•	
Demand Period	1min	•	
Sliding Windows	1	-	
Convention	IEC	10	1

 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	0.001kX
kWh, kVAh	(IEC61557-12 Compliance)	0.1kXh
kvar, kvarh	IEC62053-23 Class 2 (IEC61557-12 Compliance)	0.01kvar/kvarh
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°	0.1°

Electromagnetic Compatibility EMC Directive 2004/108/EC (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 Electro- Magnetic 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 Fluctua- Tions 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

Safety and Environmental

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

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 Specification

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

Mechanical Characteristics		
Enclosure	Galvanized Steel	
Unit Dimensions	260.5*154*55.5	
IP Rating	50	

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Your Local Representative

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