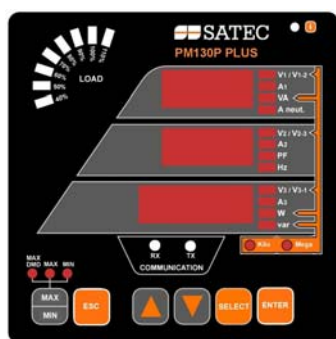


The latest generation of the PM130 PLUS POWER METER Series offer the best price/performance ratio for the power instrumentation in the market today. It is a cost effective means for analog instrument replacement, eliminating the need of the selector switches and allowing simultaneous viewing of all phases at once. The PM130 PLUS POWER METER series is an "all measurements in one" digital design thus reducing installation, switch, wiring, termination, and signal conditioning costs. The PM130 PLUS POWER METER series are widely accepted for its superior quality and construction.



PM130P PLUS Power Meter

The PM130's PLUS compact design, high accuracy for revenue measurements and low cost makes it perfectly suited for applications such as industrial and commercial panel metering, sub-metering and cost allocation. It is also ideal for utility substation automation because of its support of the industry standard DNP V3.0 and Modbus RTU protocols and its I/O capabilities. No other manufacturer provides native DNP support for a power meter in this class. Standard features such as Assignable Register Map, 16 programmable setpoints with 10 ms update time, and optional programmable relay outputs (2) for alarming and control, cannot be found in other similarly priced power instruments.

The PM130 PLUS Series utilizes a modular approach to "ADD-On" features with a choice of adding I/O, analog outputs or a second communication port such as 10/100 Base T Ethernet with TCP/IP stack. Thus meeting your needs of today or the future by selecting a plug in option.

### STANDARD FEATURES

#### Measurements

- 128 samples per cycle true RMS measurements

- Fast, real-time, cycle by cycle measurements, averaging values of 8, 16, 32, or 64 cycles, selectable from the front panel
- Choice of models ranging from basic voltage, current, frequency, and power to up to over 100 electrical parameters locally and over 100 electrical parameters over communications.
- Four-Quadrant measurements
- Min/Max values (instantaneous & demands)
- RS485 Communication port
- Revenue Grade Accuracy

### Wiring configurations

- Single model accepts all wiring, PT & CT configurations selectable via front panel
- Supports up to 10 different configurations such as 2-element and 2½-element Delta, 3-element Wye and Delta, etc



### Unique "Pass-Thru" design

#### Installation & Connections

- Mounting standard to both ANSI C39.1 4-inch round and DIN 92x92 mm<sup>2</sup> cutouts
- Direct connection up to 690V or via PT
- Unique, low burden "Pass Thru" CT inputs eliminates the possibility of CT opening in a protection circuit during a fault
- Configurable PT and CT ratios via front panel
- Optional FT drawout case for retrofit situations

#### Information LED Indicator

- Indicates when a complete loss of power has occurred and the RTC needs to be adjusted

#### Communications LED (TX, RX)

- Indication of communication via RS485

#### Energy Pulse LED (EH Model Only)

Programmable LED for pulsing energy quantities

### Demands (P and EH Models)

- Configurable demand calculation to match utility settings
- Demand period from 1-60 minutes



PM130EH PLUS Energy/Harmonics Meter

### Energy Measurements (EH Model only)

The Model PM130EH PLUS Series adds to the PM130P PLUS model energy quantities for revenue billing.

- Active Energy (kWh) Import/Export
- Reactive Energy (kVARh) Import/Export
- Apparent Energy (kVAh)
- Power Demands (kW, kVAR, kVA)
- Sliding, Fix and Predicted Demands
- Max Power Demands per phase
- Energy Pulse LED indicator

### Power Quality Measurements (EH Model only)

- %THD Volts per phase
- % THD Amps per phase
- %TDD Amps per phase
- Displacement PF per phase
- Fundamental kW per phase
- Up to 63<sup>rd</sup> Individual harmonic via PAS™ (up to 39<sup>th</sup> via front panel)

### System Integration

- Easy integration with Energy Management or SCADA systems – Modbus RTU, ASCII, DNP3.0
- Remote display and logging of all measured parameters
- Automatic/Remote Alarm & Control
- Remote configuration



Choice of Optional Plug-in modules



Field installable Plug-in modules

### Optional Plug In Digital I/O Module

#### Digital Inputs (4 Channels)

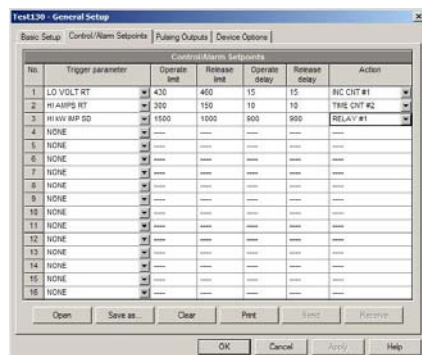
- Four (4) Breaker Status Inputs
- Dry contacts, internally wetted @ 24VDC
- Response 1ms

#### Relay Outputs (2 FORM A)

- Two (2) SPST Form A, dry contacts or SS relays
- Energy pulsing output (Wh, VARh, VAh) (EH model)
- Alarming application from programmable setpoint triggers
- Manual control via communication command

#### Setpoints

- 16 programmable setpoints for alarming & control
- Independent Operate & Release Limits
- Operate & Release Time Delays
- Choice of actions:
  - Close / Open relays
  - Increment / Clear counters



### Communications

#### Com 1 – RS485

- Optically isolated RS-485 communications port
- Supports industry standard Modbus RTU & ASCII and DNP V3.0 protocols, selectable via front panel
- Unique "Assignable Register Map" allows users to assign registers from different ranges into a single contiguous Modbus address space or a DNP Class 0 poll, limiting the amount of data passed over the

SATEC PM130 PLUS Rev. Dec. 2007

communications line and therefore making efficient use of the available bandwidth

#### Com 2 – Optional Plug In Ethernet Module

- Transformer isolated 10/100 BaseT
- Connector type RJ45
- Modbus/TCP & DNP3/TCP
- PROFIBUS – separate plug in module

#### Optional Plug In Four (4) Analog Outputs

- Choice of 4-20ma,  $\pm 1$ ma and 0-20ma
- Update rate 1 cycle

#### Front Panel Display

- 3 lines high-visibility LED display, fully visible under bright sunlight
- Simultaneous display of 3 phase parameters at once
- Three level adjustable brightness
- Adjustable display update time from 0.1 to 10 seconds
- 5-digit Energy readings (EH models)
- Configurable 8-segment LED % Load Bar mimics analog meter needle
- Menu driven and password protected
- Automatic scrolling with adjustable scroll time
- User configurable, simple two-button Demand RESET operation

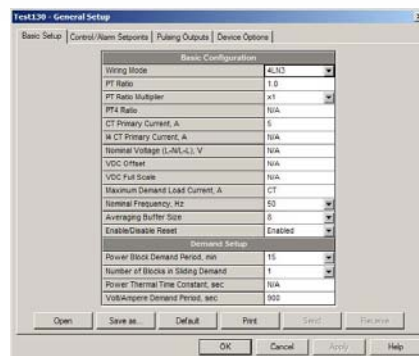
#### Choice of Power Supply options

- Standard Universal Power Supply AC/DC
- 12 VDC option
- 24/48 VDC Option
- 480 VAC line power option
- This is especially useful when 120VAC is not easily provided.

#### PAS Software

- Provided free of charge with every PM130 PLUS
- Easy to use remote configuration software
- Supports off-line programming to allow downloading of a standard configuration to multiple meters
- Supports scheduled polling, viewing of real-time data, and automatic uploading of historical logs
- Communications diagnostic tools for on-line trouble-shooting

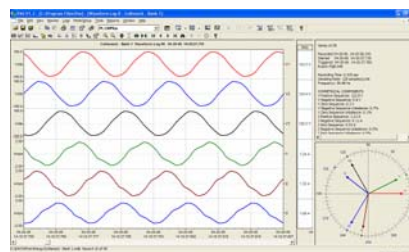
FT-21 Draw out Assembly  
Call factory for details



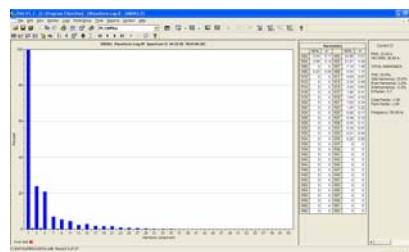
Configuration Setup via PAS™

data Data Monitor Set #0 BASE MEASUREMENT PARAMETERS 06/06/02 14:43:23					
#	Parameter	Value	#	Parameter	Value
1	V L1 L2 AVR	231	21	VVA TOT AVR	629
2	V L2 L3 AVR	231	22	FF TOT AVR	1
3	V L3 L1 AVR	231	23	A NEUT AVR	2714
4	A L1 AVR	905	24	FREQ AVR	50
5	A L2 AVR	905	25	WVMP BO MAX	661
6	A L3 AVR	905	26	WVMP ACC DMD	15
7	WV L1 AVR	210	27	VVA BO MAX	661
8	WV L2 AVR	209	28	VVA ACC DMD	0
9	WV L3 AVR	210	29	A DMD L1 MAX	941
10	WV L1 AVR	0	30	A DMD L2 MAX	940
11	WV L2 AVR	0	31	A DMD L3 MAX	940
12	WV L3 AVR	0	32	WVH IMPORT	1251600
13	VVA L1 AVR	210	33	WVH EXPORT	0
14	VVA L2 AVR	209	34	WVH NET	134
15	VVA L3 AVR	210	35	THO U L1 AVR	3.7
16	FF L1 AVR	1	36	THO U L2 AVR	3.7
17	FF L2 AVR	1	37	THO U L3 AVR	3.8
18	FF L3 AVR	1	38	THO L1 AVR	3.8
19	WV TOT AVR	629	39	THO L2 AVR	3.7
20	WV TOT AVR	1	40	THO L3 AVR	3.7

Real Time Data via PAS™



Real Time "Scope Mode" Waveforms and Phasor verification via PAS™



Spectrum Analysis via PAS™ (EH Model)



### Accuracy

Voltage: 0.2% reading (0.01 %FS / 690V AC)  
 Current: 0.2% reading (0.02 % FS / 10A)  
 I Neutral: 0.2% F.S. (2% to 200% Nominal)  
 Frequency: 0.02% reading (15 to 480 Hz)  
 PF: 0.2% FS ( $|PF| \geq 0.5$ )  
 Watts: 0.2% reading (0.02% FS  $|PF| \geq 0.5$ )  
           -10,000,000 to +10,000,000 kW  
 Vars: 0.3% reading (0.04% FS  $|PF| \leq 0.9$ )  
           -10,000,000 to +10,000,000 kVar  
 VA: 0.2% reading (0.02% FS  $|PF| \geq 0.5$ )  
           0 to +10,000,000 kVA  
 MWh 0.5% F.S. ( $|PF| \geq 0.5$ )  
           0 to 999,999,999 kWh  
 MVarh 0.5% F.S. ( $|PF| \leq 0.9$ )  
           0 to 999,999,999 kVarh  
 MVAh 0.5% F.S. ( $|PF| \geq 0.5$ )  
           0 to 999,999,999 kVAh

### INPUT SPECIFICATIONS

#### Voltage:

Direct Input: Up to 400V-LN / 690V-LL  
 PT Ratio: 1.0-6500  
 Range: 1-999,000V  
 Burden: <0.04VA via PT  
           <0.4VA direct connect

#### Current:

Rating: 5A or 1A  
 CT Ratio: 1-50,000A  
 Range: 0-60,000A  
 Burden: <0.15VA per phase  
 Operating:  
   5A: continuous 10A RMS Burden: < 0.1 VA  
   1A: continuous 2A RMS Burden: < 0.02 VA  
 Overload:  
   5A: 15A continuous, 300A for 1 sec.  
   1A: 3A continuous, 80A for 1 sec.  
 Starting current 0.1% FS

#### Universal Power Supply AC/DC: (standard)

- 85-265V AC
- 88-290V DC
- Burden 10VA
- Isolation: 3000 VAC

#### Optional DC Power Supply

- 12VDC (9.5 - 18VDC)
- 24/48VDC (18.5 – 72 VDC)
- 480V Phase Powered +/- 10 Nominal

### Modular I/O Specifications

#### 4 Digital Inputs & 2 Relay Outputs

##### Digital Input

- 4 Dry inputs
- Galvanic Isolation 3750 VAC
- Internal Wetted 24VDC
- Response 1 ms
- Wire size 14 AWG

##### Relay Output

- Two SPST Form A DRY
  - Rated at 5A/250 VAC; 5A/30 VDC
  - Operate time: 10 ms max
  - Galvanic isolation: 3000 VAC 1 min
  - Wire size: 14 AWG (up to 1.5 mm<sup>2</sup>)
- Solid State relay option
- 2 Form A relays rated at 0.15A
  - 250VAC/400VDC
  - Operate time: 1 ms max
  - Galvanic isolation: 3750 VAC
  - Wire size: 14 AWG (up to 1.5 mm<sup>2</sup>)

##### Analog Output Module

- 4 Analog Outputs (optically isolated)
- Ranges (upon order):  
 $\pm 1$  mA, maximum load 5 k $\Omega$  (100% overload)  
 0-20 mA, maximum load 510  $\Omega$   
 4-20 mA, maximum load 510  $\Omega$   
 0-1 mA, maximum load 5 k  $\Omega$  (100% overload)
- Isolation: 2500 VAC
- Power supply: internal
- Accuracy: 0.5% FS
- Update time: 1 cycle
- Wire size: 14 AWG (up to 1.5 mm<sup>2</sup>)

##### Communication: COM1 (standard)

- Serial RS-485 port (optically isolated)
- Baud rate selectable to max. 115,200
- 7/8 bit even parity or 8 bit no parity
- Supports Modbus RTU, ASCII, and DNP3.0
- Isolation: 3000 VAC
- Wire size: 14 AWG (up to 1.5 mm<sup>2</sup>)

##### Optional COM2 Ethernet Module

- Transformer-isolated 10/100BaseT Ethernet port
- Connector type: RJ45 modular
- Supported protocols: Modbus/TCP (Port 502), DNP3/TCP (Port 20000).
- Number of simultaneous connections: 4 (2 Modbus/TCP + 2 DNP3/TCP).

### MISCELLANEOUS

#### Warranty:

3 Years limited warranty

#### Real Time Clock (RTC)

- Standard Meter Clock
- Non-backed clock
- Accuracy: typical 15 seconds per month @ 25°C

#### Environmental Conditions

Operating Temp.: -20 to +60°C (-4 to 140°F)  
 Storage Temp.: -25 to +80°C (-13 to 176°F)  
 Humidity: 0 to 95% non-condensing

#### Construction

Case: Flame resistant ABS & Polycarbonate blend  
 Dimensions: 114.3x114.3x109mm (4.5x4.5x4.29")  
 Mounting: ANSI 4" round or DIN 92x92mm cutout  
 Weight: 0.70kg (1.54 lb.)

#### Standards of Compliance:

UL Recognized – E236895 (US & Canada UL3111-1) UL61010B  
 CE EMC: 89/336/EEC as amended by 92/31/EEC and 93/68/EEC  
 LVD: 72/23/EEC as amended by 93/68/EEC and 93/465/EEC  
 Safety/Construction: IEC 61010-1: 2006  
 Accuracy: Per IEC62053-22, class 0.5S  
 Per ANSI C12.20 –1998, class 10 0.5%  
 Electromagnetic Immunity: IEC 61000-6-2:  
 IEC 61000-4-2 level 3: Electrostatic Discharge  
 IEC 61000-4-3 level 3: Radiated Electromagnetic RF Fields  
 IEC 61000-4-4 level 3: Electric Fast Transient  
 IEC 61000-4-5 level 3: Surge  
 IEC 61000-4-6 level 3: Conducted Radio Frequency  
 IEC 61000-4-8: Power Frequency Magnetic Field  
 ANSI/IEEE C37.90.1: Fast Transient SWC  
 Electromagnetic Emission: IEC 61000-6-4: Radiated/Conducted class A  
 IEC CISPR 22: Radiated/Conducted class A



## MODELS AND MEASUREMENTS

Measurements	PM130 Plus	
	P	EH
Voltage L- L per Phase	n	n
Voltage L- N per Phase	n	n
Current per Phase	n	n
Neutral Current	n	n
Frequency	n	n
Phase Rotation	n	n
Min/Max volts per Phase	n	n
Max Amp Demand per Phase	n	n
Relay Status	n	n
Counters	n	n
TxD, RxD Comm Status	n	n
Alarm Trigger Code	n	n
PF per Phase & Total	n	n
kW per Phase & Total	n	n
kVAR per Phase & Total	n	n
kVA per Phase & Total	n	n
Voltage Unbalance	n	n
Current Unbalance	n	n
Min/Max Amps Per Phase	n	n
Min/Max Neutral Current	n	n
Min/Max Frequency	n	n
Min/Max kW, KVAR, kVA	n	n
Max Volt/Amp Demand Per Phase	n	n
Max kW/kVAR/kVA Demand	n	n
Import/Export kWh, kVARh & kVAh		n
% THD per Phase Volts		n
% THD per Phase Amps		n
% TDD per Phase		n
Individual Harmonic up to 50th		n
Displacement PF		n
Fundamental kW		n



Custom cabinets for outdoor applications  
Consult factory for details

## PM-130 PLUS TrueMeter Series

PM130P - Plus -  
PM130EH - Plus -



### CALIBRATION AT

**25Hz** Calibration at 25 Hz  
**50Hz** Calibration at 50 Hz  
**60Hz** Calibration at 60 Hz  
**400Hz** Calibration at 400 Hz

### CURRENT INPUT

**5** Amperes  
**1** Amperes

### POWER SUPPLY

**ACDC** Universal (standard) 85-285V AC / 85-290V DC  
**1DC** 12 VDC (9.5-18V DC)  
**23DC** 24/48 VDC (18.5-72v DC)  
**4AC** 480V AC Line powered +/- 10%

I/O or COM2 MODULES - Maximum 1 module per meter

### ANALOG OUTPUT MODULE (4CH)

**A01** +/- 1mA  
**A02** 0-20 mA  
**A03** 0-1 mA  
**A04** 4-20 mA

OR

### INPUT/OUTPUT MODULE (4DI & 2RO)

**R** Relay Output (2 Form A) 250VAC/5A  
**S** Solid State (2 Form A) 250VAC/400VDC 0.15A

OR

### COM2 COMMUNICATION

**ETH** Ethernet (TCP/IP) RJ45  
**PRO** PROFIBUS

EXAMPLE PM130PPlus-60Hz-5-ACDC-A01

OR

PM130EH+Plus-50Hz-5-ACDC-ETH



**SATEC Inc.**  
**10 Milltown Court**  
**Union, NJ 07083**



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