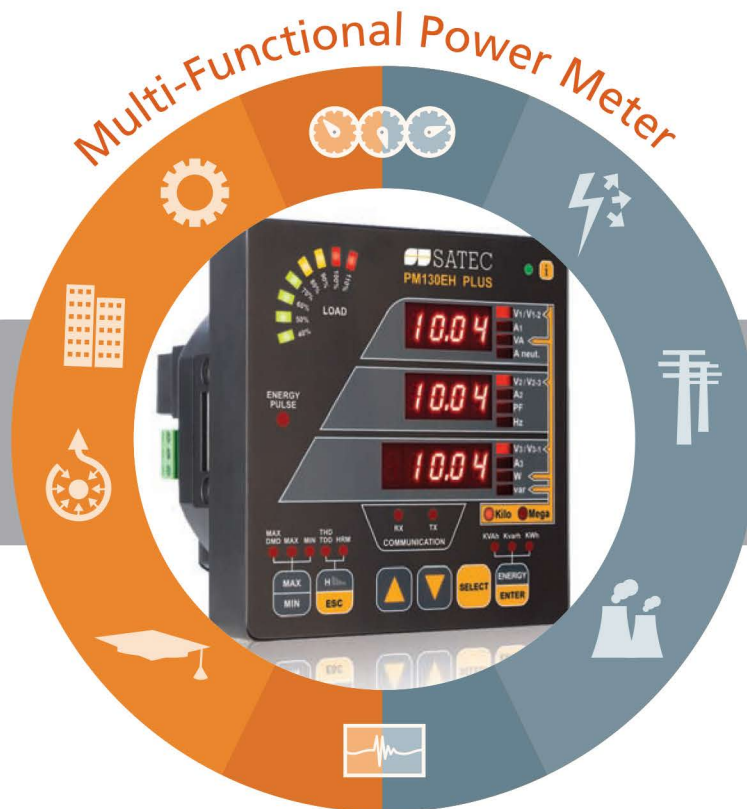


PM130EH PLUS

Multi-Functional Power Meter

 **SATEC**
Powerful Solutions



Innovative Electronics For You
Providing Industrial Automation
solutions since 1983

HIGH ACCURACY (0.5S & 0.2S)

SIMULTANEOUS PHASE PARAMETER DISPLAY

REDUCED INSTALLATION, WIRING & TERMINATION COSTS

HIGH SPEED COMMUNICATION

Multi-Functional Power Meter

The PM130EH PLUS is a multi-functional 3-phase power meter with basic revenue metering, power quality and harmonics analysis.

The PM130EH PLUS is widely integrated in panel boards and SCADA systems, with integral RS-485 communication port and a wide range of protocols, such as Modbus, DNP 3.0 and IEC 60870. With the addition of the unique TOU module, this device answers the needs of revenue metering applications. It is also suitable for utility substation automation with its support of the industry standard DNP 3.0, Modbus RTU and IEC 60870-5-101/104 protocols, as well as its I/O capabilities (using the Digital Input/Output modules).

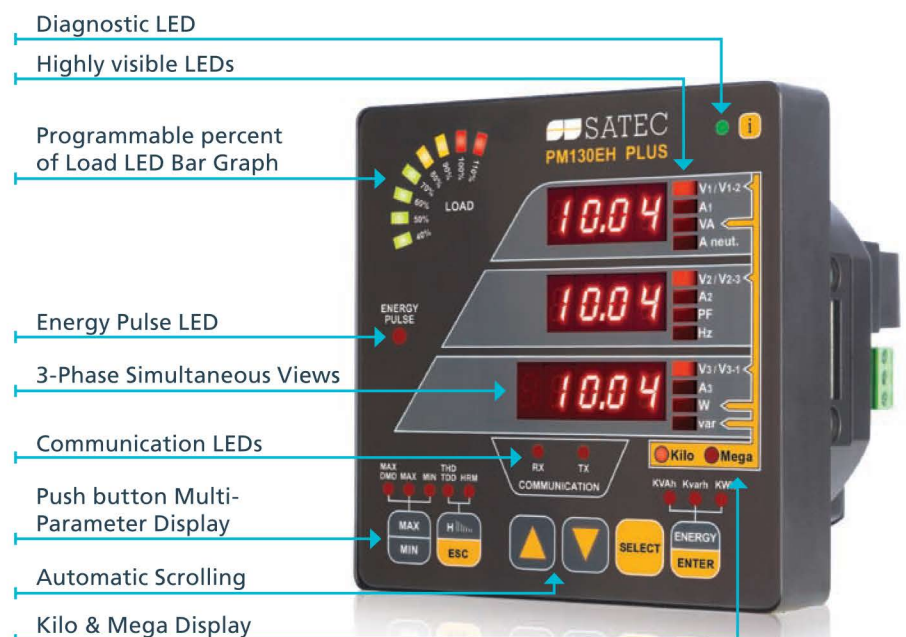
The PM130EH PLUS provides digital measurements of more than 80 electrical parameters locally, and more than 100 electrical parameters via communication: from basic frequency, voltages and currents, to four quadrants power parameters (active, reactive and apparent). The PM130EH PLUS also measures harmonics, energies (active, reactive and apparent) and time of use (TOU).

The PM130EH PLUS expansion module allows connection of a second communication port, including Ethernet, Profibus, RF or GPRS, as well as second RS-485 and RS-232 ports.

Front Panel Multi-Parameter Local Display

MENU-DRIVEN LOCAL SETUP

- ▣ Wiring & Configuration
- ▣ PT & CT Settings
- ▣ Programmable Communications
- ▣ Local Max Demands & Energy Reset
- ▣ Disable/Enable Local Reset
- ▣ Password Protection
- ▣ Alarm/Event Setpoints
- ▣ Display Update Time, Scroll Enable



Standard Features

Measurements

- ▣ Direct Display of Parameters
- ▣ 128 samples per cycle true RMS measurements
- ▣ Fast Real-time measurements averaging values of 8, 16, 32 or 64 cycles, selectable from the front panel
- ▣ Over 100 Electrical Parameters via Communications
- ▣ 4-Quadrant Measurements
- ▣ Min/Max Values (Instantaneous & Demands)

Wiring Configurations

- ▣ Each Model accepts all wiring configurations, selectable via the Front Panel
- ▣ Supports up to 10 different configurations including 2-element and 2½-element
- ▣ Delta, 3-element Wye and Delta, etc.

Setpoints

- ▣ 16 programmable setpoints for Alarm-ing & Control
- ▣ Independent Operate & Release Limits
- ▣ Independent Operate & Release Time Delays
- ▣ Fast 150ms Response Time
- ▣ Increment/Clear Counters

Optional Relay Output

- ▣ Form A Relay
- ▣ Energy Pulsing Output -Wh, varh, VAh (Pulse or KYZ)

Setpoint Triggers

- ▣ Manual Control via Communication Command

Communications

- ▣ Optically isolated RS-485 communications port
- ▣ Supports industry standard Modbus RTU, ASCII, and DNP 3.0 and Profibus DP protocols, selectable via Front Panel
- ▣ Unique "Assignable Register Map"

allows users to assigned registers from different ranges into a single contiguous Modbus address space or DNP Class 0, 1 or 3 poll, limiting the amount of data passed over the communications line and therefore making efficient use of the available bandwidth

- ▣ Optional high speed Profibus DP (12 Mbps)
- ▣ Optional Ethernet Port for MODBUS over IP, DNP/TCP and 870-5-104
- ▣ Optional Second RS-485/RS-232 Port

Front Panel Display

- ▣ 3 lines high-visibility LED display, fully visible under bright sunlight
- ▣ Simultaneous display of 3 phase parameters for quick phase balance assessment
- ▣ Adjustable display update time from 0.1 to 10 seconds
- ▣ 9-digit Energy Readings
- ▣ Configurable 8-segment LED % Load Bar mimics analog meter needle
- ▣ Menu driven and password protected device configuration via Front Panel
- ▣ Automatic scrolling with adjustable scroll time or fixed display
- ▣ User configurable, simple two-button Demand RESET operation

Demand

- ▣ Configurable Demand Calculation to match Utility settings
- ▣ Demand period from 1 to 60 minutes
- ▣ Number of demand period from 1-15
- ▣ Predicted sliding and block demands

Power Quality Measurements

- ▣ Measures up to 40th harmonic THD & TDD
- ▣ Individual and % THD Volts per phase
- ▣ Individual and % THD Ampere per phase
- ▣ Displacement PF per phase
- ▣ Fundamental kW per phase
- ▣ Min/Max logging

Installation & Connections

- ▣ Each Model accepts all wiring configurations, selectable via front panel
- ▣ Mounting standard to both ANSI C 39.1 4-inch round and DIN 92 x 92 mm cutouts
- ▣ Direct connection up to 690V or via PT
- ▣ Unique, low burden "Pass Thru" CT inputs eliminate the possibility of CT opening in a protection circuit during a fault
- ▣ Configurable PT & CT ratios via front panel
- ▣ Optional remote split core CT

System Integration

- ▣ Easy integration with Energy Management or SCADA systems - Modbus RTU, ASCII, DNP 3.0
- ▣ Remote display and logging of all measured parameters
- ▣ Automatic / Remote Alarm & Control
- ▣ Remote Configuration
- ▣ User defined Registers (120)
- ▣ On board data logging memory

PAS Software

- ▣ Provided with every PM130EH PLUS
- ▣ Easy to use Remote Configuration Software
- ▣ Supports offline programming to allow downloading of a standard configuration to multiple meters
- ▣ Supports scheduled polling, viewing of real-time data
- ▣ Real-time wave forms monitoring
- ▣ Communications diagnostic tools for online troubleshooting

Special Features

- ▣ Optional TOU module with 4 digital inputs, 4 TOU registers, 8 tariffs and 4 seasons
- ▣ Selectable kWh or mWh display
- ▣ Frequency selection: 25, 50, 60 or 400 Hz
- ▣ Remote GPRS communication via external modem
- ▣ Front panel IP-54 protected

Optional Plug-In Modules



The PM130EH PLUS modular approach enables users to assemble a system that meets their specific needs.

Dimensions (HxWxD):

Small form: 2.8x1.8x1.3" / 72x46x34 mm

Large form: 3.7x3x1.7" / 95x77x45 mm

The wide choice of plug-in modules includes:



2nd Comm. port

Small form

One of the following:

- ▣ Ethernet (TCP/IP)
- ▣ PROFIBUS
- ▣ RS-232/422/485
- ▣ GPRS
- ▣ RF *

* Module & accessories available in certain regions only



Analog Outputs

Small form

4 analog outputs, selection of ranges upon order:

- ▣ $\pm 1\text{mA}$
- ▣ 0-20mA
- ▣ 0-1mA
- ▣ 4-20mA
- ▣ 0-3mA
- ▣ $\pm 3\text{mA}$
- ▣ 0-5mA
- ▣ $\pm 5\text{mA}$



Digital I/O

Small form

- ▣ 4 Digital Inputs (Dry Contact) / 2 Relay Outputs 250V / 5A AC
- ▣ 4 Digital Inputs (Dry Contact) / 2 SSR Outputs 250V / 0.1A AC
- ▣ 4 Digital Inputs (Dry contact) with RTC battery backup for TOU



Digital I/O

Large form

Comprehensive expansion module that includes:

- ▣ 12 Digital Inputs (Dry Contact or 250V DC)
- ▣ 4 Relay Outputs 250V/5A AC
- ▣ Optional selection of Ethernet or RS-485

Measured Parameters

	Display	Comm.	Analog	Pulse	Alarm
1-CYCLE REAL-TIME MEASUREMENTS					
RMS Voltage per Phase		■	■		■
RMS Current per Phase		■	■		■
kW per Phase		■			■
kvar per Phase		■			■
kVA per Phase		■			■
Power Factor per Phase		■			
Total kW		■			■
Total kvar		■	■		■
Total kVA		■	■		■
Frequency		■	■		■
Neutral Current		■	■		■
Total Power Factor		■	■		■
Voltage & Current Imbalance		■	■		■
1-SEC AVERAGE MEASUREMENTS					
RMS Voltage per Phase	■	■	■		■
RMS Current per Phase	■	■	■		■
kW per Phase	■	■			■
kvar per Phase	■	■			■
kVA per Phase	■	■			■
Power Factor per Phase	■	■			■
Total kW	■	■	■		■
Total kvar	■	■	■		■
Total kVA	■	■	■		■
Frequency	■	■	■		■
Neutral Current	■	■	■		■
Total Power Factor	■	■			■
Voltage & Current Imbalance	■	■			■
AMPERE & VOLT DEMANDS					
Ampere & Volt Demand per Phase		■			■
Ampere Maximum Demand per Phase					
Voltage Maximum Demand per Phase		■			■
POWER DEMANDS					
kW Accumulated Demand Import & Export		■			■
kvar Accumulated Demand Import & Export		■	■		■
kVA Accumulated Demand		■	■		■
kW Demand Import & Export		■	■		■
kvar Demand Import & Export		■			■
kVA Demand		■			■
kW Sliding Demand Import & Export		■			■
kvar Sliding Demand Import & Export		■			■
kVA Sliding Demand		■			■
kW Predicted Demand Import & Export		■			■
kvar Predicted Demand Import & Export		■			■
kVA Predicted Demand		■			■
kW Maximum Demand Import	■	■			

	Display	Comm.	Analog	Pulse	Alarm
kW Maximum Demand Export		■			
kvar Maximum Demand Import	■	■			
kvar Maximum Demand Export		■			
kVA Maximum Demand	■	■			
TOTAL ENERGY					
Total kWh/MWh Import & Export	■	■		■	
Total kvarh/MWh Import & Export	■	■		■	
Total kvarh/MWh Net		■			
Total kVAh/MWh	■	■		■	
ENERGY PER PHASE					
kWh/MWh Import per Phase	■	■			
kvarh/MWh Import per Phase		■			
kVAh/MWh per Phase	■	■			
TOU REGISTERS					
4 TOU Energy Registers (kWh/MWh & kvarh import & export, kVAh/MWh, 4 pulse sources)	■	■			
4 TOU Maximum Demand Registers		■			
4 Tariffs, 4 Seasons x4 Types of Day		■			
HARMONIC MEASUREMENTS					
Voltage THD per Phase	■	■	■		■
Current THD per Phase	■	■	■		■
Current TDD per Phase	■	■	■		■
K-Factor per Phase	■	■	■		■
Voltage Harmonics per Phase (up to order 40)	■	■			
Current Harmonics per Phase (up to order 40)	■	■			
Voltage Harmonics Angles (up to order 40)		■			
Current Harmonics Angles (up to order 40)		■			
FUNDAMENTAL COMPONENTS					
Voltage & Current per Phase		■			
kW, PF per Phase	■	■			
kvar, KVA per Phase		■			
Total kW, PF	■	■			
Total kvar, KVA		■			
MIN/MAX LOGGING					
Min/Max A, V, Total kW, kvar, kVA, PF	■	■			
Min/Max Frequency, Neutral Current	■	■			
PHASE ROTATION	■	■			■
VOLTAGE & CURRENT PHASE ANGLES	■	■			
DAY AND TIME	■	■			
DIGITAL INPUTS (OPTIONAL)	■	■			■
RELAY OUTPUTS (OPTIONAL)	■	■			■
REMOTE RELAY CONTROL (OPTIONAL)		■			
PULSE COUNTERS	■	■			■
ALARM TRIGGERS / SETPOINTS		■			■
SELF DIAGNOSTICS	■	■			

Measurement Specifications

PARAMETERS	FULL SCALE @ INPUT RANGE	ACCURACY		RANGE
		% READING	% FS	
Voltage Over voltage 1000V continuous 2000V AC for 1 sec	120VxPT@120V 400VxPT@690V	0.2	0.01	0 to 1,150,000V Starting voltage: 1.5-5.0% FS (selectable)
Line Current Over load 3 times / Continuous 80 times for 1 sec	CT	0.2	0.02	0 to 50,000 A Starting current: 0.1% FS
Active Power	0.36 x PT x CT @ 120V 1.2 x PT x CT @ 690V	0.2	0.02	-10,000,000 kW to +10,000,000 kW
Reactive Power	0.36 x PT x CT @ 120V 1.2 x PT x CT @ 690V	0.3	0.04	-10,000,000 kvar to +10,000,000 kvar
Apparent Power	0.36 x PT x CT @ 120V	0.2	0.02	0 to 10,000,000 kVA
Power Factor	1.000		0.2	-0.999 to +1.000
Frequency		0.02	-	15 Hz up to 70 Hz
Total Harmonic Distortion THD V&I, % V&I	999.9	1.5	0.1	0 to 999.9
Total Demand Distortion TDD, %	100		1.5	0-100
Active Energy Import/Export		Class 0.5S under conditions* as per IEC 62053-22:2003		0 to 999,999,999 kWh
Reactive Energy Import/Export		Class 0.5S under conditions as per IEC 62053-22:2003		0 to 999,999,999 kvarh
Apparent Energy		Class 0.5S under conditions as per IEC 62053-22:2003		0 to 999,999,999 kVAh

* Also available in Class 0.2S as per IEC 62053-22:2003

Standards Compliance

ACCURACY

- Complies IEC62053-22, class 0.5S
- Meets ANSI C12.20 –1998, class 10 0.5%

ELECTROMAGNETIC IMMUNITY

- Comply with 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
- Meets ANSI/IEEE C37.90.1: Fast Transient SWC

ELECTROMAGNETIC EMISSION

- Comply with IEC 61000-6-4: Radiated/Conducted class A
- Comply with IEC CISPR 22: Radiated/Conducted class A

SAFETY / CONSTRUCTION

- UL File no. E236895
- Meets IEC 61010-1: 2006

AC AND IMPULSE INSULATION

- Comply with IEC 62052-11: 2500 VAC during 1 minute
- 6KV/500Ω @ 1.2/50 μs impulse

PM130EH PLUS ORDER STRING

Current Inputs

5 Ampere	5
1 Ampere	1
5A split core remote high accuracy current sensor (HACS)	RS5
High Accuracy Current Sensors (HACS). Requires ordering of 3 HACS (see HACS Order String on next page)	HACS

Calibration at Frequency

25 Hz	25HZ
50 Hz	50HZ
60 Hz	60HZ
400 Hz	400HZ

Resolution

Low Resolution 1A, 1V	-
High Resolution 0.01A, 0.1V	H

Power Supply

85-265V AC and 85-290V DC	ACDC
9.5-18V DC	1DC
18.5-58V DC (24VDC, 48VDC)	23DC

Communication Protocols

Modbus and DNP 3.0	-
Modbus and IEC 60870-101/104	870

Mounting

Panel Mount (standard)	-
DIN Rail Mounting	DIN

Expansion Module

(Max. 1 module per instrument, can be ordered separately)

4 Analog Outputs: ± 1 mA	AO1
4 Analog Outputs: 0-20mA	AO2
4 Analog Outputs: 0-1mA	AO3
4 Analog Outputs: 4-20mA	AO4
4 Analog Outputs: 0-3mA	AO5
4 Analog Outputs: ± 3 mA	AO6
4 Analog Outputs: 0-5mA	AO7
4 Analog Outputs: ± 5 mA	AO8
Communication: Ethernet (TCP/IP)	ETH
Communication: PROFIBUS	PRO
Communication: RS232/422/485	RS232
Communication: GPRS	GPRS
Communication: RF (see note)*	RF-x
4 Digital Inputs (Dry Contact) / 2 Relay Outputs 250V / 5A AC	DIOR
4 Digital Inputs (Dry Contact) / 2 SSR Outputs 250V / 0.1A AC	DIOS
Communication: TOU + 4DI	TOD
12 Digital Inputs (Dry Contact) / 4 Relay Outputs 250V/5A AC	12DIOR-DRC
12 Digital Inputs (250VDC) / 4 Relay Outputs 250V/5A AC	12DIOR-250V
12DIOR-DRC with Ethernet	12DIOR-DRC-ETH
12DIOR-250V with Ethernet	12DIOR-250V-ETH
12DIOR-DRC with RS-485	12DIOR-DRC-485
12DIOR-250V with RS-485	12DIOR-250V-485

RF Accessories (see note)

Concentrator - ROW	CON-ROW
Concentrator External for 2 x ETC2002	CON-EXT
Repeater	REP
Antenna 1: without cable (module or concentrator)	AN-1
Antenna 2: with 2M cable (module or concentrator)	AN-2
Antenna 3: external for concentrator only	AN-3
Antenna 4: external for module or concentrator	AN-4

PM130EH PLUS

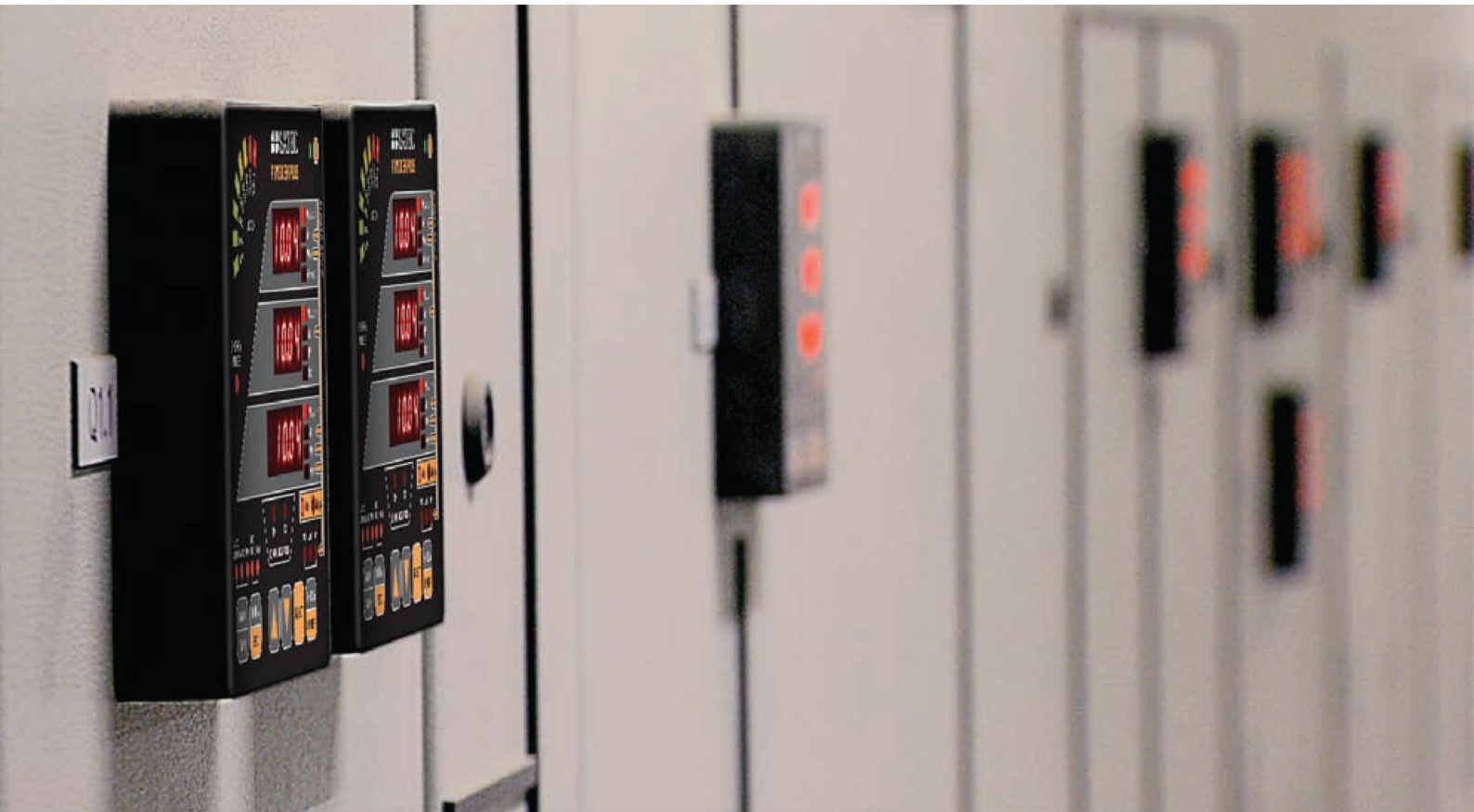
High Accuracy Current Sensors

SATEC Proprietary High Accuracy Current Sensors (HACS) designed to be used with our HACS-ready meters and analyzers.

SATEC current sensors have several benefits over CTs:

1. High accuracy
2. Wide bandwidth (for harmonics measurement)
3. Safe to use - no need for shorting bars
4. Longer cable - up to 200m without performance reduction

100A	Solid Core HACS	$\Phi 12$ mm hole	CS1
100A	Solid Core HACS	$\Phi 23$ mm hole	CS1L
100A	Split Core HACS	$\Phi 16$ mm hole	CS1S
200A	Split Core HACS	26x23.8mm hole	CS2S
200A	Split Core HACS	23x33mm hole	CS2SL
400A	Solid Core HACS	$\Phi 26$ mm hole	CS4
400A	Split Core HACS	23x33mm hole	CS4S
800A	Solid Core HACS	100x32mm / $\Phi 62$ mm hole	CS8
800A	Split Core HACS	80x50mm hole	CS8S
1200A	Split Core HACS	80x121mm hole	CS12S



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