

# BFM-II

## BRANCH FEEDER MONITOR



### THE PERFECT SOLUTION FOR MULTI-CIRCUIT METERING

- **Modular Design:**

- Up to 54 current channels

- Up to 72 I/O

- **Digital Fault Recorder (optional):**

- Recording waveforms up to  $40 \times I_n$

- **Individual Harmonics Analysis**

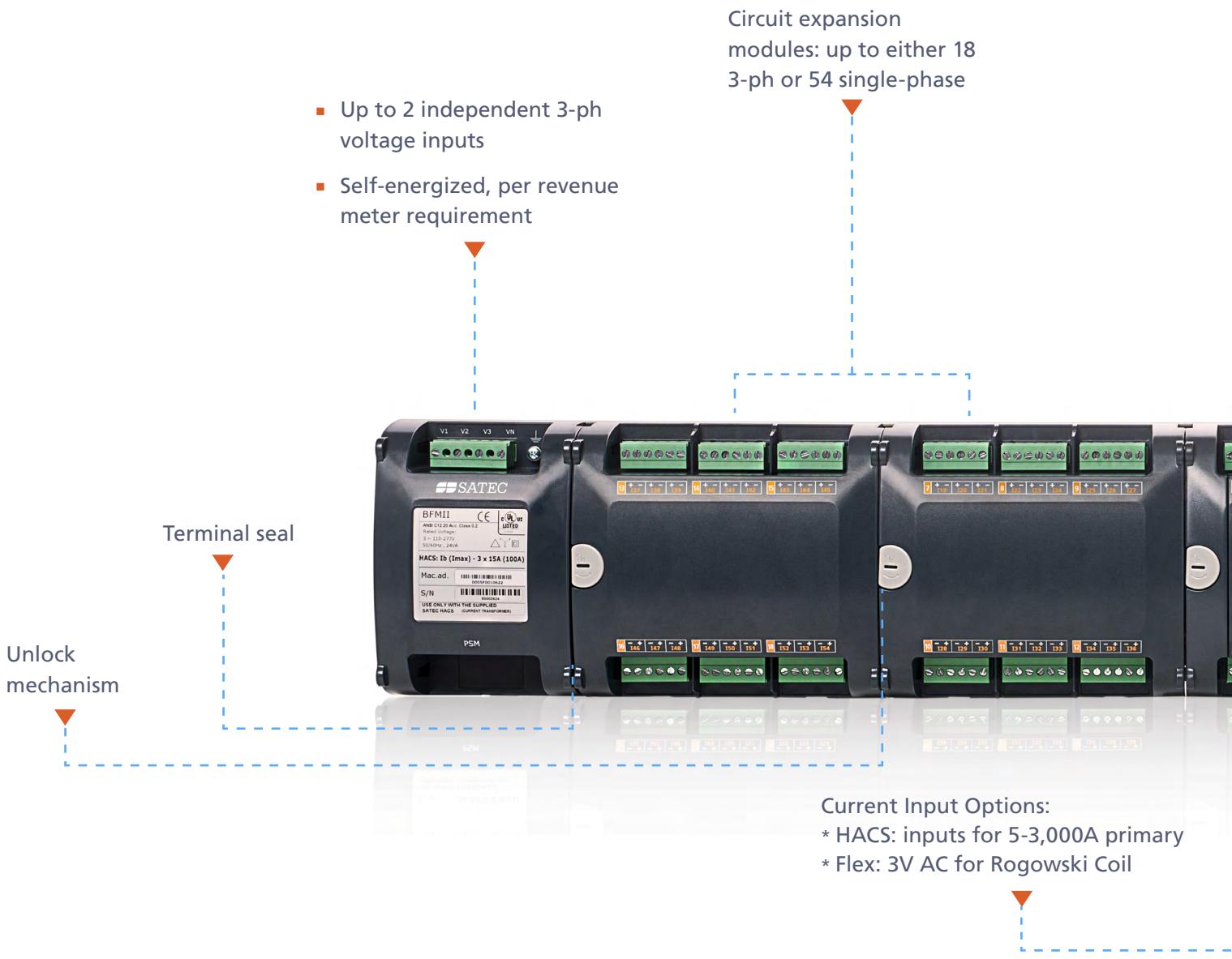
- **Billing Meter:**

- Anti-tamper design

- Time-Of Use (ToU) metering

- **Simultaneously Metering**

- 2 Independent Power Sources



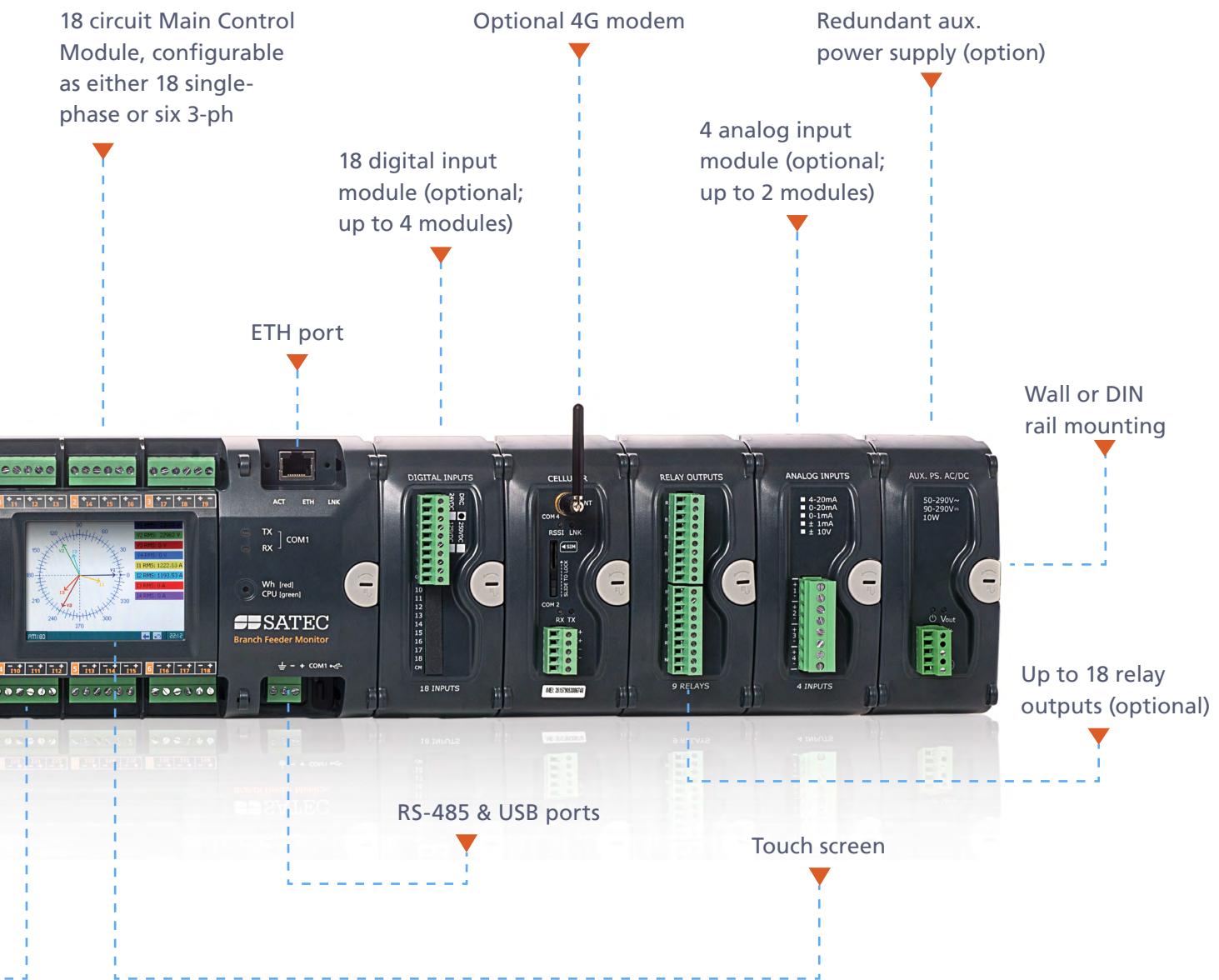
## A Revolutionary Approach to Multi-circuit Metering

The Branch Feeder Monitor™ multi-circuit meter is ideal for both new and retrofit projects. It displays and logs parameter readings of energy, power and demand, along with multi-tariff (ToU) capabilities.

The BFM-II monitors up to 18 three-phase circuits, 54 single-phase circuits, or any combination of single, two-phase or three-phase circuits. This flexibility makes the BFM-II perfect for multi-tenant facilities

such as residential projects, office buildings and shopping malls.

The BFM's modular design enables it to meet any requirement and to fit easily into existing panel boards or be flush mounted nearby. In effect, the BFM II is a whole metering room crammed into one compact device, significantly reducing costs.



## Safe Remote Installation

The BFM II utilizes High Accuracy Current Sensors (HACS).

These SATEC branded CTs act as a primary CT, with a product range of up to 3000A. These CTs feature low-burden milliamp outputs, feeding directly into the meter, making it a "One-CT" system, thus considerably increasing accuracy.

Equipped with an internal electronic switch, providing an automatic protection circuit, these CTs prevent fire hazards regularly associated with disconnected CT

outputs, rendering shorting bars unnecessary. Due to the low output burden, it is possible to run wiring to loads up to 200m away, without any compromise to accuracy.

For billing purposes, single or multiple circuits can be defined for each customer. This flexibility allows simple reassignment of circuit groups without wiring changes, and easy changes when tenants move in and out.

# Highlights & Features

- Multi-channel sub-metering: up to 54 single-phase, 27 two-phase or 18 three-phase meters in a single device. Any combination of single, two, and three-phase consumers can be chosen, up to a total of 54 current inputs
- Automatic totalization of energy consumption of selected consumers
- Modular design allows the selection of 18, 24, 30, 36, 42 or 54 sub-meters
- Compatible with high accuracy, Class 0.5S rated, current transformers
- 3-phase/2-phase/single-phase meters (true RMS, voltage, current, power, power factor, neutral current)
- Current/voltage demand meter:  
Min/Max with time stamp of current demands
- Time-of-Use, 8 energy/demand registers x 8 tariffs, 4 seasons x 4 types of days, 8 tariff changes per day, easy programmable tariff schedule
- Automatic 120-day daily profile for energy and maximum demand readings (total and tariff registers) for each sub-meter
- Power quality monitoring including voltage and current harmonics (up to the 25<sup>th</sup>), voltage sags,
- voltage swells and interruptions (contact SATEC for availability)
- Event recorder for logging internal diagnostic events and setpoint operations
- Data recorders: programmable periodic data logs for each sub-meter
- Embedded programmable controller (4 control setpoints, programmable thresholds and delays) for each sub-meter
- Optional 3.5" 320x240 pixel touch screen display with backlight
- Internal clock, keeping the clock running for years, independent of an external power supply
- Standard RS-485, Ethernet and USB ports
- Optional cellular communication port plug-in module
- Optional 9/18 digital inputs or 4 analog inputs module
- Modbus RTU, Modbus TCP, DNP3.0 and DNP/TCP communication protocols
- Easy field upgrade of device firmware



# HACS

## High Accuracy Current Sensors

The BFM-II should be ordered with dedicated High Accuracy Current Sensors (HACS).

All HACS have a built-in automatic protection circuit for maximum safety, eliminating the need to use shorting bars.

### Accuracy:

#### Solid Core:

0.1% / Split Core: 0.5%

All HACS are supplied with 8ft / 2.5m cable.

Maximum cable length:  
650ft / 200m.

P/N	Rating	Core	Opening inch	mm	P/N	Rating	Core	Opening inch	mm
CS05S*	10A	Split	Ø 0.6	Ø 16	CS4	400A	Solid	Ø 1	Ø 26
CS1	100A	Solid	Ø 0.5	Ø 12	CS4L	400A	Solid	Ø 1.77	Ø 45
CS1L	100A	Solid	Ø 0.9	Ø 23	CS4S	400A	Split	1.7x1.3	43x33
CS1S	100A	Split	Ø 0.6	Ø 16	CS8	800A	Solid	4x1.3	32x100
CS1H	100A	Split	Ø 0.5	Ø 13	CS8L	800A	Solid	Ø 2.36	Ø 60
CS2	200A	Solid	Ø 0.9	Ø 23	CS8S	800A	Split	1.9x3.1	50x80
CS2S	200A	Split	0.96x0.925x23		CS12S	1200A	Split	3.1x4.7	80x120
CS2SL	200A	Split	1.7x1.3	43x33	CS20S	2000A	Split	3.1x6.3	80x160
CS2.5S	250A	Split	0.96x0.925x23		CS30S	3000A	Split	3.1x6.3	80x160

### \* Note:

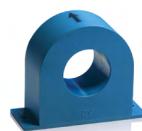
CS05S is compatible with the RS5 version only.  
All other HACS are compatible with the non-RS5 version.



CS05S



CS1



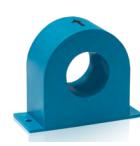
CS1L



CS1S



CS1H



CS2



CS2S



CS2SL



CS4



CS4S



CS4L



CS8L



CS8



CS12S



CS20S



CS30S

# Tenant Billing & Monitoring



Large and medium facilities, such as commercial buildings, residential complexes, shopping centers, malls, data centers and universities are facing an increasingly competitive environment in which tenants expect to receive better service for less cost. Tenant billing and monitoring is an ideal solution for guaranteeing, and increasing, a permanent revenue stream for facility owners, while providing improved service for tenants.

## Value Proposition

Tenant billing by the facility manager is an ideal solution, as it provides a win-win result for tenants and facility owner (or energy retailer). In other words, instead of being billed for electricity directly by the utility provider, energy is retailed to tenants by the facility owner, who in turn, purchases the electricity directly from the utility provider.

## Advantages for Owners

**Electricity Retail:** Large-scale consumers have access to better rates and more tariff schemes, as well as the option for a markup on the electricity they supply, by buying MV electricity (low rate), then retailing this to consumers at LV (higher rate). The resulting revenue from this markup **can reach 40%**.

**Quantity & proportional fee:** when electricity is

subject to additional, progressive charges, such as transmission fee, service fee or taxes, the owner profits from the economy of scale.

**Penalties and demand:** when bills include surcharges such as low power factor (PF) or peak demand charges, charging collectively may reduce the total amount (e.g., one tenant has peak demands in the morning and another in the afternoon).

**Fixed charges per tenant:** electric bills contain a fixed amount that covers the cost of the meter, cost of reading etc. Since monitoring with the BFM-II is centralized, the per tenant cost is significantly lower, allowing extra budget for technology (meters, communication) and management (issuing bills, maintenance), as well as extra revenue in the property owner's account.

**Time Of Use (TOU):** SATEC billing system allows charging tenants by TOU, avoiding the risk of subsidizing tenants (in cases where the facility itself is charged according to a TOU scheme and, in turn, charges a flat rate).

**Additional services:** tenant billing is regarded as added value by the tenant, increasing customer satisfaction.

**Energy savings:** efficient energy management provides a typical **12% saving** on the electric energy consumption, by saving on energy consumption in common/public spaces, as well as in the offices of facility management.



**Preventing utility errors:** metering electricity independently of the utility provider, along with generating an energy balance within the site, allows facility managers to easily detect utility errors and prevent overcharges.

**Identifying tenant undercharge:** an energy balance procedure ensures that no tenant can use electricity without being charged.

**Accurate forecasting:** in conjunction with Expertpower's (see below) consumption forecasting algorithm, it is possible to negotiate utilities for better pricing, using short and long term forecasting.

**Saving on space and cost:** in a reality in which every square foot of real-estate costs a fortune, the advantage of the BFM II occupying up to 80% less space is significant, leaving more area for the main designation of the facility.

**Full automation:** using the Expertpower SaaS platform, all tasks are performed automatically, from data collection through client billing and exporting the data to existing accounting software.

## Advantages for Tenants

**No change in cost:** the charges by the facility owner are the same, or lower, than those of the utility provider. This means tenants can't lose.

**Energy bills actually mirror consumption:** compared to facilities that charge based on floor area, monitoring is accurate and reflects precisely the real consumption, doing away with crude estimate-based billing and cross-charges between tenants.

**Accuracy:** SATEC energy monitors are more accurate than utility meters. The periodic energy balancing ensures correct measurement at all times.

**Monitoring of energy expenses:** real time energy monitoring allows energy saving, reducing energy costs and increasing profit.

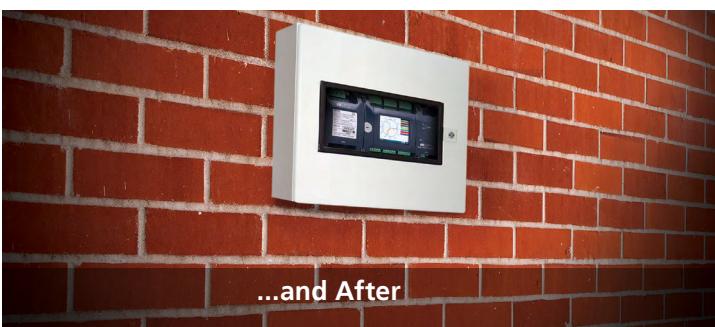
**Improved services:** the tenant's energy provider is local, which means any request can be answered by the local team on site, providing better service than the utility provider, which only has a help-desk and a characteristically delayed response time.

**One Bill:** a single bill includes rental and electricity, as well as the possibility to add other energies (e.g., water, air conditioning and gas), making it easier to monitor expenses.

## BFM-II VS. 3-Phase Meters

In comparison with 3-phase meters, the BFM-II offers a great saving of cost, time and space, compared with typical installation:

- A single BFM-II device replaces up to 18 three-phase meters.
- Saves 75% on installation cost, time, and panel space for 3-phase meters or 90% for single-phase meters.
- The BFM-II uses only 1 TCP/IP address for all submeters, compared with up to 54 addresses when using separate meters, thus making better use of IP Addresses.



# Substation Enhancement



The BFM-II is designed to upgrade legacy substations featuring electro-mechanical (EM) relays, to provide real-time information and control over these highly reliable, yet limited, devices.

Many distribution substations utilize old EM protection relays with limited or no remote communication access. Normally, upgrading such substations is too costly and time consuming.

The revolutionary BFM-II **makes the upgrade process simple and low-cost**, providing very quick Return On Investment (ROI). Installation of the BFM-II upgrades the entire substation, without power-down, providing full load monitoring and control, using the optional digital and analog I/Os (Breaker Status).

## Digitalize your analog substation by lunch!

One BFM-II monitors up to 18 three-phase circuits located up to 200m/650ft away from the device. The BFM II utilizes unique split-core High Accuracy Current Sensors (HACS) that simply clamp around the secondary wiring of the existing 5A secondary of the protection CTs. This eliminates the need to interfere with the protection circuit, eliminating the need for a full shutdown or interruption of the substation.

Utilizing our clip-on CTs cuts installation time by more than half of that needed for a traditional meter, thus an analog substation can be digitalized in just a few hours.



Installation no longer requires a "Trip Test", thus saving on time and equipment. The BFM-II can be powered from

either AC or DC, and programming and monitoring of each circuit is possible via the display, or the built-in USB port, using SATEC's free PAS software. The information monitored is sent to the substation SCADA over serial communication or LAN.

## Digital Fault Recorder

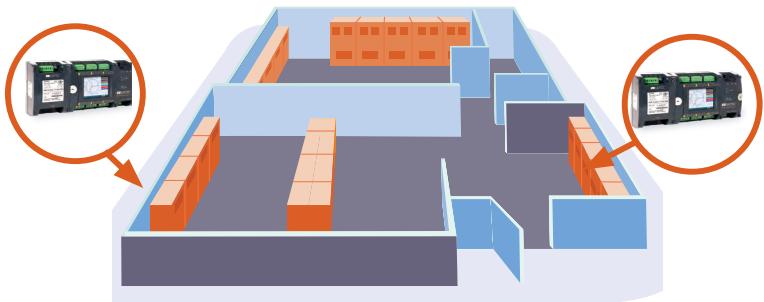
The BFM II is also available as a fault recorder version, capturing waveforms as high as  $40 \times I_n$ . Providing fault recording on up to 36 current channels, this instrument truly revolutionizes distributed fault recording and substation digitalization, making it go literally from zero to sixty in half a day!

## Advantages

- Ultra-rapid cost-effective substation upgrade without interruption of service
- Local and remote monitoring of relay & breaker operation, via digital inputs
- Digital Fault Recording with pre / post fault waveform capture on 36 current channels and 4 voltage channels
- Time-tagged fault events included in fault event report
- Triggered externally through device digital inputs, or internally from embedded fault detector
- Automatic detection of fault category using the sub-cycle measurements
- Fault triggers include programmable thresholds and hysteresis, adjustable for specific substation conditions
- Advance alert of possible trips trips, increasing network reliability
- Individual harmonics up to the 25th harmonic
- Substation communication protocols IEC 60870-5-101/104 and DNP 3.0



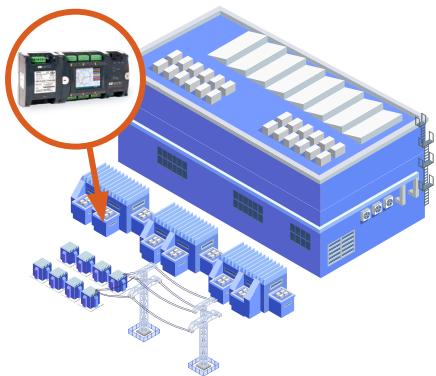
# Data Centers



Energy consumption of data centers is constantly rising, following the increase in computing performance. Monitoring the PUE (Power Usage Effectiveness = total facility energy divided by the IT equipment energy) is essential. According to the US DoE (Department of Energy), data centers can achieve energy **savings of 20-50%** by utilizing today's best practices, including "continuously monitor energy" and "monitor energy at all levels."

The practice of monitoring energy is becoming prevalent and modern data centers now include rack level monitoring at the design stage. The BFM-II monitors up to 54 single-phase loads and is ideal for PDU branch circuit monitoring, allowing for energy saving and offering high reliability. In addition to the above benefits, colocation centers can benefit substantially from tenant billing (see pages 6-7).

# Industrial Plants



Typically, industrial plants have many loads that are fed from the same MCC. It has been proven that online monitoring of the consumption down to a single load level results in energy saving of up to 30%. Utilizing the BFM-II is the most compact and efficient method for monitoring several loads located up to 200m from

» For more information on SATEC's solutions per segment, visit our website: [www.satec-global.com](http://www.satec-global.com)



the device, with incomparable accuracy. The use of a single device rather than separate meters makes it easy to install and provides fully integrated communication, channeled through one single port, simplifying maintenance.

# Web-based Viewing

## expertpower

For automated monitoring, comprehensive billing service, and highly advanced analysis options, SATEC offers Expertpower, the web-based energy management system. This service provides automatic monitoring, billing and analysis for electric power systems.

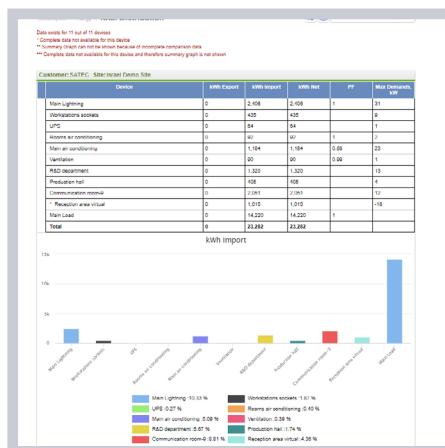
Expertpower delivers total visibility for entire power systems over the internet, providing alarms, power diagrams, power profiles and demands, event logging, history and graphs.

» For more information on this service, see the Expertpower product page



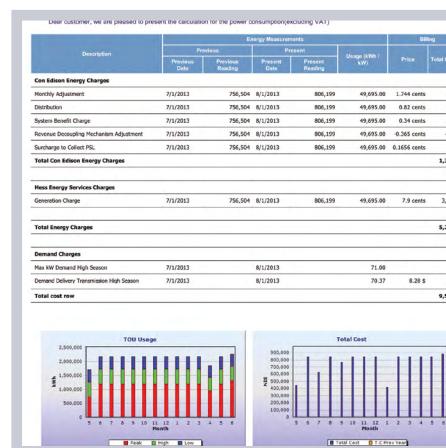
## Summary ToU

The summary ToU (Time of Use) page displays energy and cost values for each metered point for a selected site. Graphic presentation enables visual comparison of the profiles of each measured point.



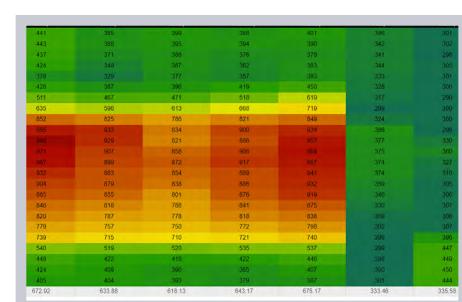
## Energy Billing

Among other capabilities, Expertpower serves as a versatile billing platform. The bills it generates are based on tariff definitions. Energy and cost indicator graphs are also available.



## Energy Intelligence

SATEC's unique Energy Intelligence (EI) module is the ultimate tool for retrieving insight on energy usage. It performs comparisons between various sites, parameters, periods and, most importantly, parameters from external systems. Using the EI module allows understanding the energy usage, thus enabling its reduction.



# Remote Viewing & Configuration

## POWER ANALYSIS SOFTWARE

For remote reading and control, the BFM-II is supported by SATEC PAS software, designed for remote setup, data viewing and analysis. PAS provides real-time access to data, downloading

scheduler and automatic export to .mdb files for MS Access, MS Excel and database integration. The BFM-II operates as up to 54 separate modbus slaves for simple integration.



## Third-Party Software Integration

In addition to SATEC software solutions (ExpertPower™ and PAS), the BFM-II is designed to easily integrate with any third-party software. It supports Modbus/RTU, Modbus/TCP, DNP 3.0 and DNP/TCP, which allows easy connection to Building Management Systems (BMS) and Supervision, Control and Data Acquisition (SCADA) systems, as well as any Energy Management Systems (EMS).

All accumulated data, including the various logs, are available to the user via communication. Unique technologies have been implemented to make it easier for the system integrator. For example, from a communications point of view, each measurement channel is designated as a separate device, which means no special design is required. SATEC proprietary address mapping patent allows access to any set of

120 parameters in a single read cycle, which provides outstandingly fast and reliable communication. The special 16 bit encoding reduces the communication bandwidth by 50% and data compression enables even lower bandwidth usage.



Measurement Parameters*		Display	Comm.		Display	Comm.
<b>Energy Measurements (per submeter)</b>						
Import/export active energy total		■	■			
Import/export reactive energy total		■	■			
Apparent energy total		■	■			
Active, reactive, apparent energy TOU system (6 tariffs)		■	■			
Individual Harmonics TDD, THD			■			
<b>Average Measured Values (per feeder)</b>						
Neutral current for 3-phase feeders			■			
L-N voltage per phase		■	■			
L-L per line		■	■			
Current per phase		■	■			
Voltage & current angles per phase		■	■			
kW per phase			■			
kW total per submeter		■	■			
kvar per phase			■			
kvar total per submeter		■	■			
Power factor per phase			■			
Power factor total per submeter		■	■			
kVA per phase			■			
kVA total per submeter		■	■			
Frequency		■	■			
Neutral current for 3-phase submeter			■			
<b>Present Demand</b>						
Volts per phase					■	
Amperes per phase					■	
Total kW per submeter					■	
Total kvar per submeter					■	
Total kVA per submeter					■	
<b>Maximum Demand</b>						
Volts per phase					■	■
Amperes per phase					■	■
Total kW per submeter					■	■
Total kvar per submeter					■	■
Total kVA per submeter					■	■
kW, kvar, kVA per tariff (6 tariffs) per submeter					■	■
<b>Service</b>						
Self-diagnostic test					■	■
Password per meter					■	■
Device serial no.					■	■
Software version					■	■
COM1 & COM2 info					■	■
Current direction					■	

\* More measured parameters available.  
Contact SATEC Sales for more information

## Measurement Specifications

Parameter	Full Scale@ Input Range	Accuracy <sup>(1)</sup>		Conditions	Range
		% Reading	% FS		
Voltage	$V_L = 120/230V$ AC	0.1	0.005	100 to 300V	0 to $V_{max} = 600$ V
Line current	Instrument HACS $I_L = 100\%$	0.2	0.005	1 to 100% FS	0 to $I_{max} = 10,000$ A (HACS primary current) Starting current: 0.1% FS
Active power	$2 \times V_{max} \times I_L / 1000$ , kW	1	0.02	$ PF  \geq 0.5$	-120,000 to 120,000 kW
Reactive power	$2 \times V_{max} \times I_L / 1000$ , kvar	1	0.02	$ PF  \leq 0.9$	-120,000 to 120,000 kvar
Apparent power	$2 \times V_{max} \times I_L / 1000$ , kVA	1	0.02	$ PF  \geq 0.5$	0 to 120,000 kVA
Power factor	1.0	-	1.0	$ PF  \geq 0.5$ , $I \geq 2\%$ FSI	-0.999 to +1.00
Active energy		Class 0.5/0.5S per ANSI C12 / IEC 62053-22 / IEC 61557-12			0 to 99,999,999.9 kWh
Reactive energy		Class 0.5 per IEC 62053-24, $ PF  \leq 0.9$			0 to 99,999,999.9 kvar
Apparent energy		Class 1 per IEC 61557-12			0 to 99,999,999.9 kVAh

FS: full scale (Voltage or Current)

### Notes

- Accuracy is expressed as (percentage of reading + percentage of full scale)  $\pm 1$  digit. This does not include inaccuracies introduced by the user's potential and current transformers. Accuracy is calculated at a 1-second average.
- Measurement error is typically less than the maximum error indicated here.
- Specifications assume: voltage and current waveforms with  $THD \leq 5\%$  for kvar, kVA and PF; reference operating temperature: 20°C-24°C.
- Accuracy of the device complies with IEC 62053-22 class 0.5S standard using solid-core HACS, and Class 1 when using split-core HACS

# Technical Specifications

## Environmental Conditions

Operating	-30°C to +70°C ( 22°F to 158°F)
Storage	-40°C to +85°C ( 40°F to 185°F)
Humidity	0 to 95% non condensing
Altitude	≤ 2000m

## Construction

### Overall Dimensions

Width	278 mm/10.94" (18 channels) 554 mm/21.81" (54 channels)
Height	128 mm/5.04"
Depth	72.5 mm/2.85"
Weight	1.6kg (36 channels)

### Materials

Enclosure & Panels	Polycarbonate
PCB	FR4 (UL94-V0)
Terminals	PBT (UL94-V0)
Plug-in connectors	Polyamide PA6.6 (UL94-V0)
Packaging case	Carton and Stratocell (Polyethylene Foam) Brackets
Labels	Polyester film (UL94-V0)

## Power Supply

Spec for Voltage Input Module (VIM) is identical

Withstanding Insulation: 4kV AC @ 1min

3-phase power supply (1, 2 or 3-phase operation)

3 X120/208 – 277/480V AC ±20%

Burden for 277V                    < 17 VA

Wire Size                            28-12 AWG (0.1-3 mm<sup>2</sup>)

Terminal pitch                    10 mm, 4 pins + ground stud

## Input Ratings

### Ac Voltage Inputs: V1, V2, V3, Vn

Measuring range	3 x 120/208 – 277/480V AC ±20%
Impedance Input	10MΩ
Burden for 277V	≈ 0.08 VA
Burden for 120V	≈ 0.02 VA
Galvanic Isolation, withstanding insulation	4kV AC @ 1min
Connector Type	Removable, 4 terminals
Wire Size	28-12 AWG (0.1-3 mm <sup>2</sup> )
Terminal pitch	10 mm

### Ac Current Inputs

Connector Type	Removable, 6 terminals for 3 current inputs
Wire Size	28-12 AWG (0.1-3 mm <sup>2</sup> )
Terminal pitch	5 mm
<b>I1 – I54 – HACS Input via SATEC HACS 100A to 3000A</b>	
Operating range	Maximum continuous 120% I max, i.e 120A for HACS 100A
Nominal measured Current	50A RMS (HACS 100A)
Burden	< 0.15 VA
Overload Withstand	100A RMS continuous
<b>I1 – I54 – RS5 Input via SATEC HACS CS05S</b>	
Operating range	Maximum continuous: 10A (primary current)
Nominal measured Current	5A RMS (primary current)
Burden	< 0.15 VA
Overload Withstand	12A RMS continuous

## Communication Ports

### COM1 – STANDARD (MCM)

Serial EIA RS-485 optically isolated port	
Withstanding Insulation	4kV AC @ 1 min
Connector Type	Removable, 3 terminals
Terminal pitch	5 mm
Wire Size	28-16 AWG (0.1-1.5 mm <sup>2</sup> )
Baud Rate	up to 115,200 bps
Supported Protocols	MODBUS RTU/ASCII, DNP 3.0

### COM3 – Standard

Serial TTL RS-232 non-isolated port for the GDM	
Baud Rate	up to 460,800 bps
Supported Protocols	MODBUS RTU

### USB Port – Standard

Isolated USB 1.1 port	
Withstanding Insulation	4kV AC @ 1 min
Connector Type	A male, standard USB cable, max. length 2 meters
Supported protocols	MODBUS RTU

### Ethernet Port – Standard

Transformer-isolated	10/100Base-T port
Withstanding Insulation	4kV AC @ 1 min
Connector Type	RJ45 modular

## General

### Real-Time Clock

Accuracy	better than 5 sec/month @ 25°C
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### Memory Log

Standard onboard memory	256 Mbytes
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### Graphical Display Module – Option

3.5 Inch Touch-Panel LCD graphic TFT display

Resolution	320 x 240
Operating temperature	-20°C - +70°C
Communication	Serial TTL RS-232 non-isolated port

# Add-On Modules



### 9 or 18 Digital Inputs

- Optically isolated input, dry contact sensing (voltage-free)
- Internal power supply 5V DC
- Sensitivity:  
Open @ input resistance >16kOhm, Closed @ input resistance <10kOhm
- Scan time: 1 cycle
- Withstanding insulation: 4kVAC@ 1min
- Wire: 28-16 AWG (0.1-1.5 mm<sup>2</sup>), 600V isolation
- Terminal pitch: 3.81mm

### Relay Outputs

- 9 relays - SPST Form A
- Contact rating:  
5A @ 250V AC, 5A @ 30V DC

- Update time: 1 cycle
- Recommended Wire Size:  
18 AWG (1 mm<sup>2</sup>), 600V isolation
- Terminal pitch: 3.81 mm

### 4 Analog Inputs

- Ranges (upon order):
  - ±1 mA (100% overload)
  - 0-20 mA
  - 4-20 mA
  - 0-1 mA (100% overload)
- Accuracy: 0.5% FS
- Scan time: 2 cycles
- Withstanding Insulation: 4kVAC@ 1min
- Wire: 28-16 AWG (0.1-1.5 mm<sup>2</sup>), 600V isolation
- Terminal pitch: 3.81mm

### Cellular Communication

- Cellular Modem
- Technologies (upon order):
  - GSM

- CDMA
- Withstanding Insulation: 4kVAC@ 1min
- Connector type: SMA
- Supported Protocols:  
MODBUS TCP (Port 502), DNP 3.0/TCP (Port 20000)

### Auxiliary Power Supply

- Withstanding Insulation: 4kVAC@ 1min
- AC/DC Power Supply: L+, N- and GND
- Rated input: 50-290V AC 50/60Hz, 40-290V DC (between -20°C to 60°C. In other temperatures from 90V DC), max. 10W
- Wire: 28-16 AWG (0.1-1.5 mm<sup>2</sup>), 600V isolation
- Terminal pitch 7.5mm, three pins

# Standards Specifications

## EMC

- IEC 62052-11, IEC 62053-22, ANSI C12.1 and ANSI C12.20
- IEC61000-4-2: Electrostatic discharge, 15/- air/ contact
- IEC61000-4-3: Electromagnetic RF Fields, 10V/m @ 80MHz – 1000MHz
- IEC61000-4-4: Fast Transients burst, 4KV on current and voltage circuits and 2 KV for auxiliary circuits
- IEC61000-4-5: Surge 6KV on current and voltage circuits and 1 KV for auxiliary circuits
- IEC61000-4-6: Conducted Radio-frequency, 10V @ 0.15MHz – 80MHz
- IEC61000-4-8: Power Frequency Magnetic Field
- IEC61000-4-12: Damped oscillatory waves, 2.5kV CM and 1kV DM
- ANSI C12.1 – 4.7.3.3.1: 100kHz Ring Wave surge, 6kV @ 0.5kA (per IEEE C62.41.2-2002)
- ANSI C12.1 – 4.7.3.3.2: line surge, 1.2/50 $\mu$ s – 8/20 $\mu$ s, 6kV @ 3kA (per IEEE C62.41.2-2002)
- ANSI C12.1 – 4.7.3.11: SWC 2.5kV (per IEEE 37.90.1)
- CISPR 22 – class B

## Insulation

- IEC 62052-11 (per NMI M6-1): Insulation impulse 12 kV/50 $\Omega$  @ 1.2/50  $\mu$ s
- IEC 62053-22: AC voltage tests related to ground, 4 kV AC @ 1mn, for power and signal ports (above 40V), or according to UL 61010-1/916 for basic and/or double insulation and Installation Category III

## Safety

- UL 916
- NMI M6-1

## Accuracy

- IEC/AS 62053-22, class 0.5S
- ANSI C12.20-2010, Class 100, 400, accuracy 0.5%

## Atmospheric Environment

- Accuracy Operational ambient temperature range: -25°C to +60°C
- Operational ambient temperature range: -40°C to +70°C
- Long-term damp heat withstand according to IEC 68-2-3 <95% (non-condensing), +40°C
- Transport and storage temperature range: -40°C to +85°C
- IEC 62052-11 (ref. IEC 60068-2-6): Vibration
  - Frequency range: 10Hz to 150Hz
  - Transition frequency: 60Hz
  - Constant movement amplitude 0.075mm, f < 60Hz
  - Constant acceleration 9.8 m/s<sup>2</sup> (1g), f > 60Hz
- IEC 62052-11(ref. IEC 60068-2-27): Shock
  - Half sine pulse
  - Peak acceleration: 30gn (300 m/s<sup>2</sup>)
  - Additional Transport vibration and shocks:
    - Longitudinal acceleration: 2.0 g
    - Vertical acceleration: 1.2 g
    - Transversal acceleration: 1.2 g
- IEC 60529: IP50



# BFM-II ORDER STRING

**BFM-II**



## Options

### Current (For Standard 18 Channels)

100A to 3,000A High Accuracy Current Sensors (HACS)<sup>a</sup> HACS

5A split core Remote High Accuracy Current Sensor (HACS)<sup>b</sup> RS5

Use of 3V AC current clamps (should be purchased locally) FLEX

### Calibration at Frequency

50 Hz	50HZ
60 Hz	60HZ

### Display Options

Detachable Graphic Display Module	G
Blank Panel	X

### Testing and Certificate

Full functional test, calibration at various work loads & detailed test report	-
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Same as above, plus ISO 17025 and ILAC certified calibration certificate	CC
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### Optional modules (ordered separately)

#### Current Input Module (CIM) (up to 2 CIM MODULES per device)

6 current input module (CIM 6) - HACS version*	C6H-BFM II
6 current input module (CIM 6) - RS5 version**	C6R-BFM II
18 current input module (CIM 18) - HACS version*	C18H-BFM II
18 current input module (CIM 18) - RS5 version**	C18R-BFM II

#### Voltage Input Module (VIM) (1 module per device)

Additional 3-phase Voltage Input Module - 50Hz	VIM50Hz
Additional 3-phase Voltage Input Module - 60Hz	VIM60Hz

### Calibration at frequency

50 Hz	50HZ
60 Hz	60HZ

### Testing and Certificate

Full functional test, calibration at various work loads & detailed test report	-
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Same as above, plus ISO 17025 and ILAC certified calibration certificate	CC
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### Extension

Set of two modules and a cable to separate between the measurement modules and add-on modules

EXT-BFM II

### Cellular Communication

4G modem	T4G-BFM II
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### I/O Options

9 Digital Inputs Module - Dry Contact	DI9-DRC-BFM II
9 Digital Inputs Module - 24VDC	DI9-24V-BFM II
9 Digital Inputs Module - 125VDC	DI9-125V-BFM II
9 Digital Inputs Module - 250VDC	DI9-250V-BFM II
18 Digital Inputs Module - Dry Contact	DI18-DRC-BFM II
18 Digital Inputs Module - 24VDC	DI18-24V-BFM II
18 Digital Inputs Module - 125VDC	DI18-125V-BFM II
18 Digital Inputs Module - 250VDC	DI18-250V-BFM II
9 Form A Relay Outputs Module (max. 2 modules per device)	RLY9-BFM II
4 Analog Inputs Module - ±1mA	AI1-BFM II
4 Analog Inputs Module - 0-20mA	AI2-BFM II
4 Analog Inputs Module - 0-1mA	AI3-BFM II
4 Analog Inputs Module - 4-20mA	AI4-BFM II

### Auxiliary power supply

(Max 1 Module per device)

Auxiliary Power Supply AC/DC 50-290V AC / 40*-290V DC	AUX-ACDC-BFM II
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\* Above 60°C - minimum 90V DC

### Notes

a Requires order of up to 18 HACS

b Requires order of up to 18 CS05S

c Supplied with bendable antenna

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