

EM133-AR

TOU ADVANCED RESIDENTIAL SMART ENERGY METER

SATEC EM133-AR is a Smart DIN Rail TOU Energy Meter designed for complete in-house energy management. The EM133-AR provides the functionality of the EM133 plus direct connection to pulse output meters, such as cold water, hot water, gas and steam.

Main Features

Multifunctional 3-Phase Smart Meter

- True RMS, volts, amps, power, power factor, neutral current, voltage and current unbalance, frequency
- Ampere/Volt demand meter
- 25, 50, 60 and 400 Hz measurements
- 128 samples per cycle

Billing/TOU Energy Meter

- Accuracy Class 0.5S
- Four-quadrant active and reactive energy poly-phase static meter
- Three-phase total and per phase energy measurements; active, reactive and apparent energy counters
- Time-of-Use, 8 totalization and tariff energy/demand registers x 8 tariffs, 4 seasons x 4 types of days, 8 tariff changes per day
- One-time easy programmable tariff calendar schedule
- Automatic daily energy and maximum demand profile log for total and tariff registers



- Display and communicate this period, last period and previous period for daily, weekly, monthly and quarterly consumption
- Cost calculation
- CO2

Water and Gas measurement

- Direct connection to pulse output water and gas meters
- Setting of multiplication factors and units
- Display of consumption in real values

Harmonic Analyzer

- Voltage and current THD, TDD and K-Factor, up to 40th order harmonic
- Voltage and current harmonic spectrum and angles

Real-time Waveform Capture (via PC)

- Real-time "scope mode" waveform monitoring capability
- Simultaneous 6-channel 8-cycle waveform capture at a rate of 64 samples per cycle

Programmable Logical Controller

- Embedded programmable controller
- 16 control set points; programmable thresholds and delays
- Relay output control
- 1-cycle response time

Event and Data Recording

- Non-volatile memory for long-term event and data recording for at least 45 days history storage capabilities in 15 minute intervals
- Event recorder for logging internal diagnostic events and setup changes
- Two data recorders; programmable data logs on a periodic basis; automatic daily energy and maximum demand profile log

Display

- Easy to read 2 x 16 Characters LCD display, adjustable update time
- Auto-scroll option with adjustable page exposition time; auto-return to a default page

Real-time Clock

- With backup battery

Inputs/Outputs

- Built-in 2 Digital Inputs and 1 form A solid state digital output
- Optional module 4 Digital Inputs and 2 digital outputs (Solid State or Electro Mechanical)
- Optional module 4 Analog Outputs
- Optional module 12 Digital Inputs and 4 digital outputs (+ Ethernet or RS485)

Communications

- Standard 2-wire RS-485 communication port
- Built-in IR communication port
- Optional multipurpose RS-232/422/485 port
- Optional 10/100Base T port
- Optional PROFIBUS port
- Optional RF module (available in certain regions only)
- Optional GPRS modem

Communication protocols

- Modbus RTU
- SATEC ASCII
- DNP 3.0
- IEC 60870-5-101 (option)
- IEC 60870-5-104 (option)

Meter Security

- 3 levels Password security for protecting meter setups and accumulated data from unauthorized changes

Upgradeable Firmware

- Easy upgrading device firmware through a serial or Ethernet port.

Software Support

- Includes comprehensive Power Analysis Software (PAS) for configuration and data acquisition
- Optional ExpertPower™ client for communicating with the SATEC proprietary ExpertPower™ Internet services

Specifications

VOLTAGE INPUTS

Voltage Connections	3 phases, 1 Neutral
Voltage Ratings	Direct voltage connection: • 220 to 400V (L-N) • 380 to 690V (L-L) • Range 0-800VAC Via PT (Power Transformer): • 57.7 to 120V (L-N) • 100 to 207V (L-L) • Range 0-250VAC
Starting Voltage	0.2% U_N
Input Impedance	$\geq 1M\Omega$
Burden with Aux. Power supply	$\leq 0.2VA/\text{phase}$
Overload withstand	4000 VAC (L-G) for 1 min.
Impulse Voltage	6kV
Terminal Blocks	4 Sealed, pitch 7-10mm 2.5 to 4 mm ²

CURRENT INPUTS

Current Connections	3 galvanic isolated inputs
Current Ratings	Choice of 4 options: • .. /5A CT connection • .. /1A CT connection • Direct up to 100A • Remote CT (40mA)
Starting Current	0.2% I_N
Burden per phase	$< 0.2 VA$ (.. /5A) $< 0.05 VA$ (.. /1A)
Overload (continuous)	$2 \times I_N$ ($1.2 \times I_N$ for 100A model)
Over current	$50 \times I_N$ (for 1 second)
Galvanic isolation	4000 VAC (L-G) for 1 min.
Terminal Blocks	6 Sealed, pitch 7-10mm 4 to 16 mm ²

AUXILIARY POWER SUPPLY

Rated Input	40-300 V AC/DC
Insulation Dielectric withstand	4000 VAC for 1 min.
Output power	4W
Terminal Blocks	2 Sealed, pitch 7-10mm 2.5 to 4 mm ²

BUILT IN COMMUNICATION

Communication Type	RS-485
Max. Baud Rate	115.2 kb/s
Isolation	4000 VAC (L-G) for 1 min.
Max. Cable Length	1000 m
Protocols	MODBUS RTU/ASCII DNP 3.0 IEC 60870 -5-101 (option) IEC 60870 -5-104 (option)
Terminal Blocks	3 Sealed, pitch 7-10mm 2.5 to 4 mm ²

INFRA RED COMMUNICATION

Baud rate	Up to 19.200 kb/s
Protocols	MODBUS RTU/ASCII

ADD-ON MODULES

Max. # of Modules	1
Available Modules	RS-232; PROFIBUS; ETHERNET; Digital I/O; Analog Outputs

FRONT PANEL

Display type	2x16 Characters Transflective LCD with backlight
Character size	3.2x1.85 mm
Viewing area	46x11 mm
LEDs	Total 6 LEDs: • 1 Pulse calibration output • 3 voltage indication • 2 RX/TX activity
Keypad	2 buttons
Nameplate	According to IEC 60688 and IEC 62052-11

MECHANICAL

Enclosure	DIN Rail mount Complies with EN50022
Dimensions [WxHxD]	125 x 90 x 75mm
Enclosure Material	Reinforced Polycarbonate

TEMPERATURE

Operational	-25°C to 60°C
Storage	-30°C to 85°C

Standards Compliance specifications

EMC per IEC 60688 and IEC 62052-11

Immunity:

- 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 4KV 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

Emission (radiated/conducted):

- EN55022: 2010 Class A (CISPR 22)
- FCC p.15 Class A mandatory

Safety

- UL/IEC 61010-1

Insulation

- IEC 62052-11: Insulation impulse 6KV/500Ω @ 1.2/50 μs
- IEC 62053-22: AC voltage tests related to ground, 4 kV AC @ 1mn, for power and signal ports (above 40V)
- 2.5KVAC r.m.s. @ 1mn, for other ports (below 40V)

Atmospheric Environment

- Operational ambient temperature range: -25°C to +60° C
- Long-term damp heat withstand according to IEC 68-2-3 <95% (non-condensing), +40° C
- Transport and storage temperature range: – 30°C to +85° C
- 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/s² (1g), f > 60Hz
- Additional Transport vibration and shocks:
- Longitudinal acceleration: 2.0 g
- Vertical acceleration: 1.2 g
- Transversal acceleration: 1.2 g
- Enclosure protection: IP20

Accuracy according to:

- IEC 62053-22, class 0.5S – active energy
- IEC 62053-21, class 0.5 – reactive energy
- IEC 60688, class 0.5S – active energy
- IEC 60688, class 1 – reactive energy

Order String

OPTIONS		EM133-AR							
Current Inputs									
5 Ampere	5								
1 Ampere	1								
Direct current measurement up to 100A	100								
High Accuracy Current Sensors (HACS). Requires ordering of 3 HACS - please refer to SATEC's HACS Datasheet .	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									
40-300V AC/DC	ACDC								
Communication Protocol									
Modbus and DNP 3.0	-								
Modbus and IEC 60870-101/104	870								
Expansion Module (Max. 1 module per instrument, can be ordered separately)									
Analog Output: ± 1 mA	AO1								
Analog Output: 0-20mA	AO2								
Analog Output: 0-1mA	AO3								
Analog Output: 4-20mA	AO4								
Analog Output: 0-3mA	AO5								
Analog Output: ± 3 mA	AO6								
Analog Output: 0-5mA	AO7								
Analog Output: ± 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								
Digital Input (Dry Contact) / Relay Output 250V / 5A AC	DIOR								
Digital Input (Dry Contact) / SSR Output 250V / 0.1A AC	DIOS								
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								
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								

Note: The RF module and accessories are available in certain regions only. Please consult your local supplier.



Energía Verde RMS

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