SATEC

EM132

DATASHEET

MULTI-FUNCTION POWER METER & SMART TRANSDUCER

SATEC EM132 is a multi-function power meter, ideal for a wide range of applications such as energy management metering, industrial power monitoring and for interfacing SCADA in utility substations.

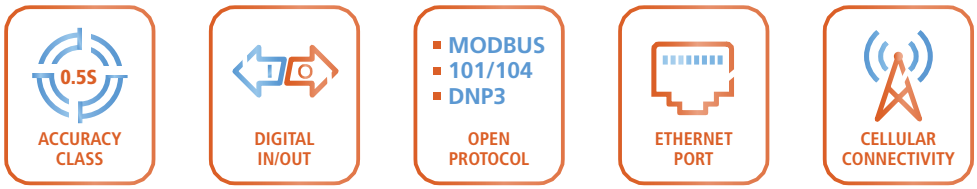
Based on SATEC PM13X family functionality, this version is designed as DIN-rail mount, equipped with a built-in communication port and anti-tamper enclosures.

HIGHLIGHTS

- Energy Meter: Class 0.5S/0.5 accuracy per IEC62053-22/ANSI
- Smart Transducer: 4 analogue outputs for selectable power parameters plus load-shedding and alerting of irregularities
- Communication
  - Built-in ports: 1×RS485. Optional: additional built-in RS485
  - Optional ports: Ethernet; WiFi; Modem;
  - Profibus (optional)
  - Open protocol: Modbus RTU; DNP3.0; IEC 60870-5-101/104
- Digital & Analogue
- I/O
  Modular I/O: up to 16 I/O
- Broad-range frequency measurement: 25-400 Hz

MODULAR VERSATILITY

FEATURES



MULTI-FUNCTIONAL 3-PHASE SMART METER

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

ENERGY METER

- Accuracy Class 0.5S per IEC 62053-22 / ANSI
- Four-quadrant active and reactive energy poly-phase static meter
- Three-phase total and per phase energy measurements; active, reactive and apparent energy counters
- Automatic logging of daily energy and maximum demand profiles

REAL-TIME WAVEFORM CAPTURE (VIA PC)

Real-time "scope mode" waveform monitoring via PAS software

PROGRAMMABLE LOGICAL CONTROLLER

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

MODELS

EM132	Standard model
EM132-TP	Includes a second built-in RS485 port (with AUX. power supply model only)

EVENT AND DATA RECORDING

- Non-volatile memory for timestamped event and data recording: over 90 days of 2 half-hourly writing of 4 parameters and recording more than 200 events during the entire period
- Event recorder for logging internal diagnostic events and setup changes
- Two data recorders; programmable data logs on a periodic basis; automatic daily energy log and maximum demand profile

VOLTAGE INPUTS

Direct measurement 0-690V AC

CURRENT INPUT OPTIONS

- 1A or 5A inputs from CT secondary
- 40mA input designed for SATEC HACS CTs (100-3000A options)
- 63A or 100A Direct connection
- RS: unique input for 5A rated split-core HACS CTs, ideal for retrofit installation

DIGITAL AND ANALOGUE I/O

- Built-in: 2 Digital Inputs and 1 form A SSR
- Available I/O modules
  - 4DIO: four digital inputs and two relay outputs (as SSR or EM relay). 1-cycle update time; unlatched, latched, pulse and KYZ operation; energy pulses
  - 12DIO: twelve digital inputs, 4 relay outputs (incl. optional port: ETH or additional RS485)
  - 4AO: four analogue outputs (internal power supply); selection of 0-20mA, 4-20mA, 1-1mA, 0-3mA, 0-5mA, ±1mA and ±5mA output; 1 cycle update time
  - 8DI: eight digital inputs with 1-ms scan time
  - 2AI: 2 analogue inputs (4-20mA. available with T3G-y-2AI cellular module)

COMMUNICATION

- On-board interfaces
  - Standard 2-wire RS-485
  - Optional: additional built-in RS485 port
- Optional interfaces
  - Multipurpose RS-232/422/485
  - 10/100Base T
  - Profibus
  - 4G cellular modem
- Client (Modbus/TCP over Ethernet or 4G)
  - TCP notification client for communicating events or periodic reports to remote server
  - Expertpower client on subscription basis
- Communication protocols
  - Modbus RTU
  - SATEC ASCII
  - DNP 3.0
  - IEC 60870-5-101 (optional)
  - IEC 60870-5-104 (optional)

DISPLAY

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

METER SECURITY

3-level password access to meter setups and data

UPGRADEABLE FIRMWARE

- Easy upgrading via serial or ETH ports

SOFTWARE SUPPORT

- Includes comprehensive Power Analysis Software (PAS) for configuration and data acquisition
- SATEC's Expertpower web-based energy management platform (subscription)
- Any 3rd party software supporting open-protocol

TECHNICAL SPECIFICATIONS

INPUT RATINGS

VOLTAGE INPUTS

Installation	Category III
Over-voltage withstand	1000V AC continuous, 2000V AC for 1 second
Input impedance	1 MΩ
Wire size	up to 12 AWG (up to 2.5mm^2)

MODEL WITH AUX. POWER SUPPLY

Nominal voltage	400/690V AC (L-N/L-L)
Measurement range	15-480/828V AC (L-N/L-L)
Frequency range measurement	25-400 Hz
Burden for 400V	< 0.4 VA
Burden for 120V	< 0.04 VA

MODEL SELF ENERGISED FROM VOLTAGE INPUTS*

Nominal voltage HACS model: 1A/5A/RS5 models	120/207V AC to 230/400V AC (L-N/L-L) 120/207V AC to 277/480V AC (L-N/L-L)
Frequency range measurement	50/60 Hz
Burden for 277V	< 1.5 VA
Burden for 120V	< 2 VA

CURRENT INPUTS

Current Connections	3 galvanic isolated inputs
Current Ratings	Choice of 4 options: » ../5A CT connection » ../1A CT connection » Direct up to 63A ** » Remote CT (40mA)
Starting Current	0.2% I_n
Burden per phase	<0.2 VA (../5A) <0.05 VA (../1A)
Overload (continuous)	2×I_n (1.2×I_n for 100A model)
Over current	50×I_n (for 1 second)
Galvanic isolation	4000V AC (L-G) for 1 min.
Terminal Blocks	6 Sealed, pitch 7-10mm 4 to 16 mm^2

AUXILIARY POWER SUPPLY

Rated Input	57.7-277V AC; 48-290V DC
Tolerance	@V AC = ±15%; @V DC = ±10%
Insulation dielectric withstand	4000V AC for 1 min.
Burden	5VA
Terminal Blocks	2 Sealed, pitch 7-10mm 2.5 to 4mm^2

OPTIONAL POWER SUPPLY

Rated input	12-24V DC
Tolerance	±20%

OPTIONAL MODULAR I/O

ELECTROMECHANICAL RELAY

Dry Contact	1 contact (SPST Form A)
Rating	5A/250V AC; 5A/30V DC
Galvanic isolation	» Between contacts and coil: 3000V AC 1 min » Between open contacts: 750V AC
Operate time	10 ms max
Release time	5 ms max
Update time	1 cycle
Wire size	14 AWG (up to 1.5 mm^2)

SOLID STATE RELAY

Dry Contact	1 contact (SPST Form A)
Rating	0.15A/250V AC/DC
Galvanic isolation	3750V AC 1 min
Operate time	1 ms max
Release time	0.25 ms max
Update time	1 cycle
Connector type	Removable, 4 pins
Wire size	14 AWG (up to 1.5 mm^2)

DIGITAL INPUTS

Dry Contacts, internally wetted @ 24V DC or Wet contact @ 250V DC (12DI/4DO only)	
Sensitivity	Open @ input resistance >100 kΩ, Closed @ Input resistance < 100 Ω

* Not available with EM132-TP model
** Connecting up to 100A is possible under certain conditions

Galvanic isolation	3750V AC 1 min
Internal power supply	24V DC, 4DI/2DO or 12DI/4DO
External power supply	250V DC (12DI/4DO only supply)
Scan time	1 ms
Connector type	Removable, 5 pins
Wire size	14 AWG (up to 1.5 mm^2)

ANALOGUE OUTPUTS

Ranges (upon order)	» ±1 mA, max. load 5 kΩ (100% overload) » 0-20 mA, max. load 510 Ω » 4-20 mA, max. load 510 Ω » 0-1 mA, max. load 5 kΩ (100% overload)
Isolation	2500V AC 1 min
Power supply	Internal
Accuracy	0.5% FS
Update time	1 cycle
Connector type	Removable, 5 pins
Wire size	14 AWG (up to 1.5 mm^2)

BUILT-IN COMMUNICATION

SERIAL COMMUNICATION (RS-485)

Max. Baud Rate	115.2 kb/s
Optical Isolation	3000V AC (L-G) for 1 min.
Max. Cable Length	1000 m
Protocols	» MODBUS RTU/ASCII » DNP 3.0 » IEC 60870 -5-101 (option)
Terminal Blocks	3 Sealed, pitch 7-10mm 2.5 to 4 mm^2

COM2 (OPTIONAL MODULE)

ETHERNET PORT

(as independent module OR add-on to 12DIOR module)

Available as: plug-in, DIN-rail mount: 73x90x32mm plug-in, no mount	
Transformer-isolated 10/100BaseT Ethernet port	
Supported protocols	Modbus/TCP (Port 502), IEC 60870-5-104 DNP3/ TCP (Port 20000)
Num. of simultaneous connections	4 (2 Modbus/TCP + 2 DNP3/TCP)
Connector type	RJ45 modular
Isolation	1,500V DC @ 1min

CELLULAR PORT

Supported protocols	Modbus/TCP (Port 502), DNP3/TCP (Port 20000)
Connector type	SMA

PROFIBUS DP (IEC 61158)

RS-485 optically isolated Profibus interface	
Connector type	Removable, 5 pins
Baud rate	9600 bit/s – 12 Mbit/s (auto detection)
32 bytes input, 32 bytes output	
Supported protocols	PROFIBUS DP

RS-232/422-485 PORT

RS-232 or RS-422/485 optically isolated port	
Isolation	3000V AC 1 min
Baud rate	Up to 115.2 kbps
Supported protocols	Modbus RTU, DNP3, SATEC ASCII, IEC 60870-5-101
Connector type	Removable, 5 pins for RS422/485 and DB9 for RS232
Wire size	4 AWG (up to 1.5 mm^2)

OTHER CHARACTERISTICS

FRONT PANEL

Display type	2×16 Characters Transflective LCD with backlight
Character size	3.2×1.85 mm
Viewing area	46×11 mm
LEDs	Total 6 LEDs: » 1 Pulse calibration output » 3 voltage indication » 2 RX/TX activity
Keypad	2 buttons
Nameplate	According to IEC 60688 & IEC 62052-11

CONSTRUCTION

Enclosure	DIN Rail mount Complies with EN50022
Dimensions [W×H×D]	125 × 90 × 75mm
Enclosure Material	Reinforced Polycarbonate
Enclosure protection	IP20

ENVIRONMENTAL CONDITIONS

Operational	-25°C to 60°C / -13°F to 140°F
Storage	-30°C to 85°C / -22°F to 185°F

STANDARDS COMPLIANCE

EMC PER IEC 60688 AND IEC 62052-11

IMMUNITY

- IEC61000-4-2:
  Electrostatic discharge, 15/8kV 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 2kV for auxiliary circuits
- IEC61000-4-5:
  Surge 4kV on current and voltage circuits and 1kV 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
- UL 916

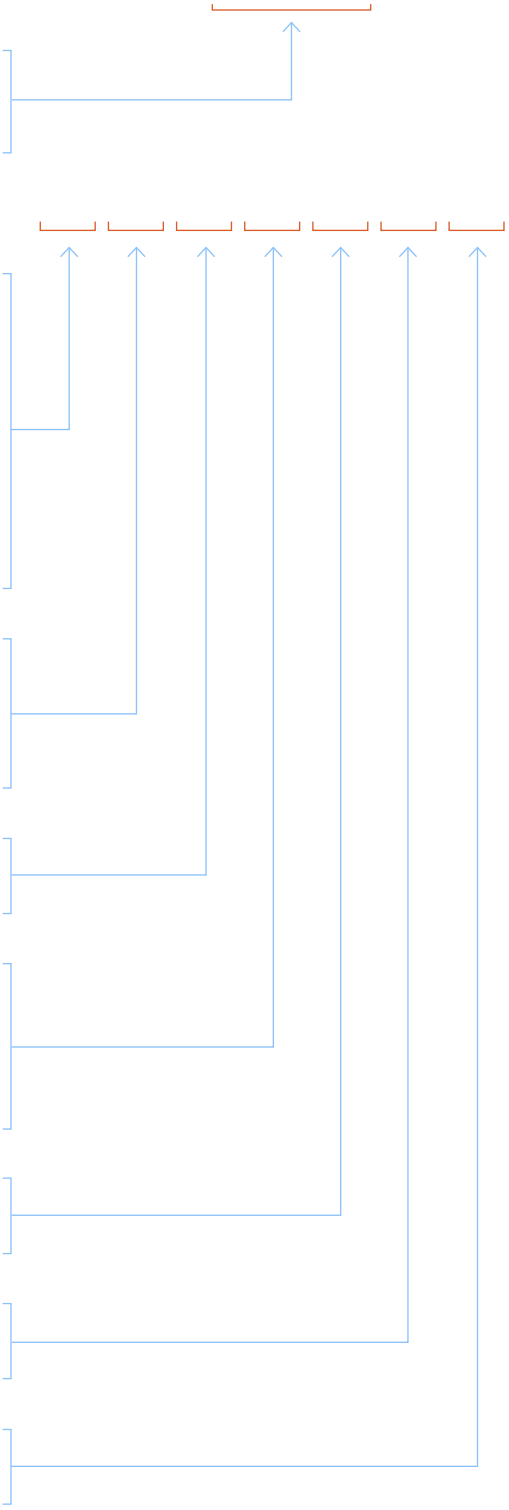
INSULATION

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

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
- ANSI C12.20, Class 0.5

ORDER STRING



MODELS

EM132: Multi-function transducer	**EM132**
EM132-TP: EM132 with two integral RS-485 ports (ACDC power supply only)	**EM132-TP**

OPTIONS

CURRENT INPUTS

5 Ampere	**5**
1 Ampere	**1**
Direct current measurement up to 63A *	**63**
Direct current measurement up to 100A * (up to 55°C ambient temperature)	**100**
5A split core remote High Accuracy Current Sensor (HACS)*	**RS5**
High Accuracy Current Sensors (HACS) **	**HACS**
High Accuracy Current Sensors (HACS), with wires	**HACS-SPDR**

CALIBRATION AT FREQUENCY

25 Hz (supports 1A and 5A models only)	**25HZ**
50 Hz	**50HZ**
60 Hz	**60HZ**
400 Hz (supports 1A and 5A models only)	**400HZ**

RESOLUTION

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

POWER SUPPLY

40-300V AC/DC	**ACDC**
Self-energized: powered from measured voltages (120-277 V L-N), 50/60Hz models only. Not suitable for EM132-TP	**SE**
12V/24V DC power supply. Not suitable for EM132-TP	**21DC**

MECHANICAL SEAL

Standard seal	**-**
Special seal	**S**

ELECTRONIC SEAL

Energy register is accessible	**-**
Energy register is protected	**P**

COMMUNICATION PROTOCOL

Modbus and DNP 3.0	**-**
Modbus and IEC 60870-5-101/104 ***	**870**

NOTES
* For 50/60Hz only
** For 50/60Hz only, requires ordering of 3 HACS
*** -104 requires ETH; not compatible with AR version, does NOT work over cellular network

TESTING AND CERTIFICATE	
Full functional test, calibration at various work loads & detailed test report	-
All of the above, plus ISO 17025 & ILAC certified calibration certificate	**CC**

EXPANSION MODULE

Max. 1 module per instrument, can be ordered separately

ANALOGUE OUTPUTS	
4 Analogue Outputs: ±1mA	**AO1**
4 Analogue Outputs: 0-20mA	**AO2**
4 Analogue Outputs: 0-1mA	**AO3**
4 Analogue Outputs: 4-20mA	**AO4**
4 Analogue Outputs: 0-5mA	**AO7**
4 Analogue Outputs: ±5mA	**AO8**
COMMUNICATION	
Ethernet (TCP/IP) for DIN rail	**ETHD**
PROFIBUS	**PRO**
RS232 (for DIN rail enclosure)	**RS232D**
RS232/422/485	**RS232**
CAT-M / LTE Modem * x: G=Europe; V=Verizon (US); A=AT&T (US); T=Telstra (AUS). y: T=Top Antenna; F=Front Antenna	**LTEx-y**
DIGITAL INPUTS	
4 DI (Dry Contact) / 2 Relay Outputs 250V / 5A AC	**DIOR**
4 DI (Dry Contact) / 2 SSR Outputs 250V / 0.1A AC	**DIOS**
8 DI (Dry Contact)	**8DI**

12 DIOR MODULE	12DIOR-
12 Digital Inputs / 4 Relay Outputs 250V/5A AC	**12DIOR**
Digital Inputs Rating - Dry Contact (DRC), 48V, 125V or 250V	**DRC or 48V or 125V or 250V**
12 DIOR module communication port:	
None	-
RS-485	**485**
Ethernet	**ETH**

NOTES

* Does not support 870 protocol. Supplied with bendable antenna.