

## EM132 DATASHEET



### Multi-Function Power Meter & Smart Transducer

SATEC EM132 is a power meter, ideal for a wide range of applications such as revenue 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 analog outputs for selectable power parameters plus load-shedding and alerting of irregularities
- ▶ **Communication**
  - ▶ Built-in ports: 1xRS485. Optional: additional built-in RS485
  - ▶ Optional ports: ETH; Wi-fi; cellular; Profibus
  - ▶ Open protocol: Modbus RTU; DNP3.0; IEC 60870-5-101/104
- ▶ **Digital & Analog I/O**
  - ▶ Modular I/O: up to 16 I/O
- ▶ **Broad-range frequency measurement:** 25-400 Hz

### MODULAR VERSATILITY



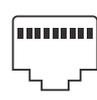
ACCURACY CLASS



DIGITAL IN/OUT

Modbus  
101/104  
DNP3

OPEN PROTOCOL



ETHERNET PORT



CELLULAR CONNECTIVITY

## FEATURES

### MULTIFUNCTIONAL 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

- |                 |   |
|-----------------|---|
| <b>EM132</b>    | Standard model  |
| <b>EM132-TP</b> | 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 Direct connection
- ▶ RS: unique input for 5A rated split-core HACs CTs, ideal for retrofit installation

## DIGITAL AND ANALOG 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 analog outputs (internal power supply); selection of 0-20mA, 4-20mA, 0-1mA, 0-3mA, 0-5mA,  $\pm 1$ mA and  $\pm 5$ mA output; 1 cycle update time
  - ▶ **8DI**: eight digital inputs with 1-ms scan time
  - ▶ **2AI**: 2 analog 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
  - ▶ RF (certain regions only)
  - ▶ 2G/3G/4G cellular modem
- ▶ Client (Modbus/TCP over ETH or 3G/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

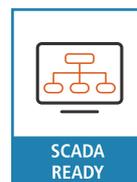
## UPGRADEABLE FIRMWARE

- ▶ 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 3<sup>rd</sup> party software supporting open-protocol

## APPLICATIONS



## TECHNICAL SPECIFICATIONS

### INPUT RATINGS

#### VOLTAGE INPUTS

Installation	Category III
Over-voltage withstand	1000V AC continuous, 2000V AC for 1 second
Input impedance	1 M $\Omega$
Wire size	up to 12 AWG (up to 2.5mm <sup>2</sup> )

#### 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 ENERGIZED FROM VOLTAGE INPUTS \*

Nominal voltage	
HACS model:	120/207V AC to 230/400V AC (L-N/L-L)
1A/5A/RS5 models:	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 <sub>n</sub>
Burden per phase	<0.2 VA (../5A) <0.05 VA (../1A)
Overload (continuous)	2xI <sub>n</sub> (1.2xI <sub>n</sub> for 100A model)
Over current	50xI <sub>n</sub> (for 1 second)
Galvanic isolation	4000V AC (L-G) for 1 min.
Terminal Blocks	6 Sealed, pitch 7-10mm 4 to 16 mm <sup>2</sup>

\* Not available with EM132-TP model

\*\* Connecting up to 100A is possible under certain conditions

### AUXILIARY POWER SUPPLY

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

#### OPTIONAL POWER SUPPLY

Rated input	12-24V DC
Tolerance	$\pm 20\%$

### 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 <sup>2</sup> )

#### 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 <sup>2</sup> )

#### DIGITAL INPUTS

Dry Contacts, internally wetted @ 24V DC or Wet contact @ 250V DC (12DI/4DO only)	
Sensitivity	Open @ input resistance >100 k $\Omega$ , Closed @ Input resistance < 100 $\Omega$
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 <sup>2</sup> )

## ANALOG OUTPUTS

Ranges (upon order)	<ul style="list-style-type: none"> <li>» ±1 mA, max. load 5 kΩ (100% overload)</li> <li>» 0-20 mA, max. load 510 Ω</li> <li>» 4-20 mA, max. load 510 Ω</li> <li>» 0-1 mA, max. load 5 kΩ (100% overload)</li> </ul>
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 <sup>2</sup> )

## 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	<ul style="list-style-type: none"> <li>» MODBUS RTU/ASCII</li> <li>» DNP 3.0</li> <li>» IEC 60870 -5-101 (option)</li> </ul>
Terminal Blocks	3 Sealed, pitch 7-10mm 2.5 to 4 mm <sup>2</sup>

## 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 RS-422/485 and DB9 for RS-232
Wire size	Up to 14 AWG (up to 1.5 mm <sup>2</sup> )

## OTHER CHARACTERISTICS

### FRONT PANEL

Display type	2x16 Characters Transflective LCD with backlight
Character size	3.2x1.85 mm
Viewing area	46x11 mm
LEDs	Total 6 LEDs: <ul style="list-style-type: none"> <li>» 1 Pulse calibration output</li> <li>» 3 voltage indication</li> <li>» 2 RX/TX activity</li> </ul>
Keypad	2 buttons
Nameplate	According to IEC 60688 & IEC 62052-11

### CONSTRUCTION

Enclosure	DIN Rail mount Complies with EN50022
Dimensions [WxHxD]	125 x 90 x 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: Multifunction transducer	<b>EM132</b>
EM132-TP: EM132 with two integral RS-485 ports (ACDC power supply only)	<b>EM132-TP</b>

### OPTIONS

#### CURRENT INPUTS

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

#### CALIBRATION AT FREQUENCY

25 Hz (supports 1A and 5A models only)	<b>25HZ</b>
50 Hz	<b>50HZ</b>
60 Hz	<b>60HZ</b>
400 Hz (supports 1A and 5A models only)	<b>400HZ</b>

#### RESOLUTION

Low Resolution 1A, 1V	<b>-</b>
High Resolution 0.01A, 0.1V	<b>H</b>

#### POWER SUPPLY

40-300V AC/DC	<b>ACDC</b>
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#### MECHANICAL SEAL

Standard seal	<b>-</b>
Special seal	<b>S</b>

#### ELECTRONIC SEAL

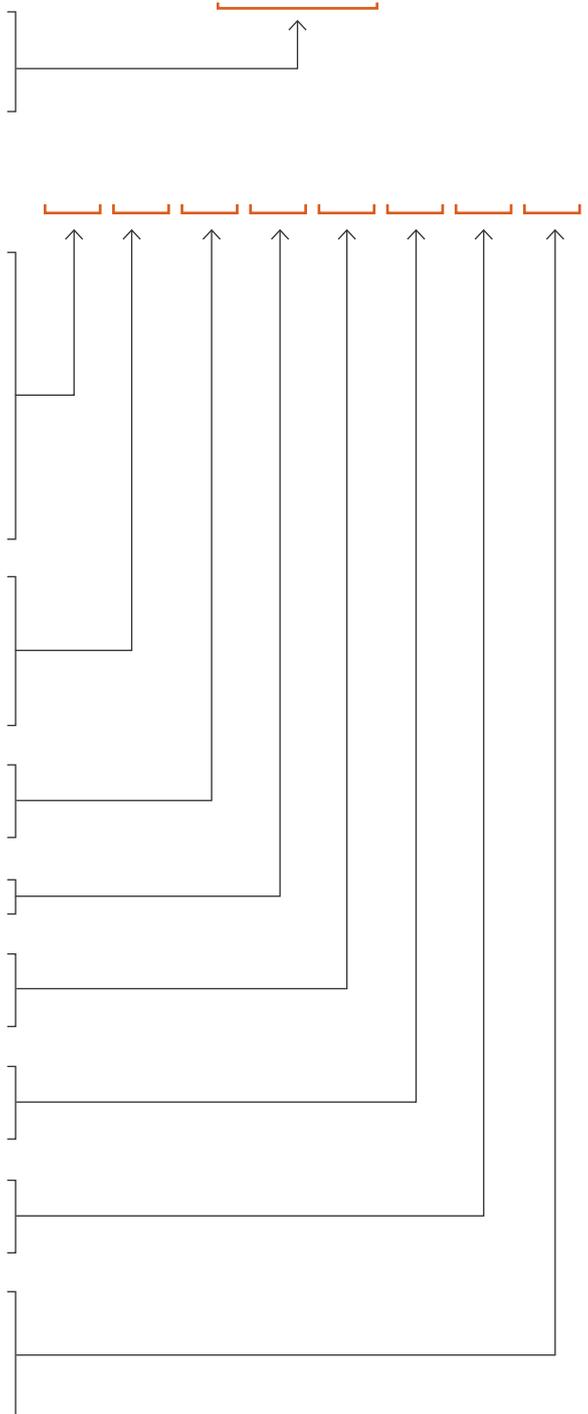
Energy register is accessible	<b>-</b>
Energy register is protected	<b>P</b>

#### COMMUNICATION PROTOCOL

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

#### TESTING AND CERTIFICATE

Full functional test, calibration at various work loads & detailed test report	<b>-</b>
All of the above, plus ISO 17025 & ILAC certified calibration certificate	<b>CC</b>



#### 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

**ORDER STRING**
**EXPANSION MODULE**

Max. 1 module per instrument, can be ordered separately

**ANALOG OUTPUTS**

4 Analog Outputs: $\pm 1$ mA	<b>AO1</b>
4 Analog Outputs: 0-20mA	<b>AO2</b>
4 Analog Outputs: 0-1mA	<b>AO3</b>
4 Analog Outputs: 4-20mA	<b>AO4</b>
4 Analog Outputs: 0-3mA	<b>AO5</b>
4 Analog Outputs: $\pm 3$ mA	<b>AO6</b>
4 Analog Outputs: 0-5mA	<b>AO7</b>
4 Analog Outputs: $\pm 5$ mA	<b>AO8</b>

**COMMUNICATION**

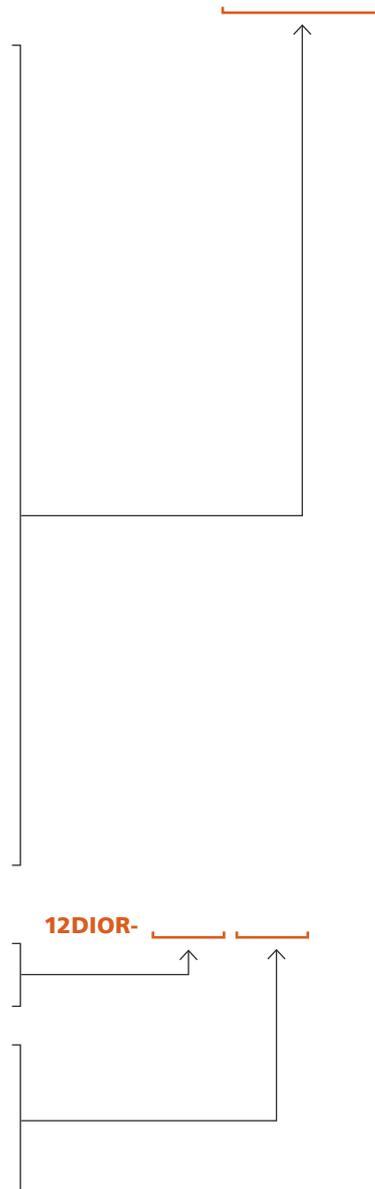
Ethernet (TCP/IP) for DIN rail	<b>ETHD</b>
PROFIBUS	<b>PRO</b>
RS232 (for DIN rail enclosure)	<b>RS232D</b>
RS232/422/485	<b>RS232</b>
2G/3G GSM DIN Rail Modem * y: T=Top Antennal; F=Front Antenna	<b>T3G-y</b>
2G/3G GSM DIN Rail Modem with 2 Analog Inputs 4-20mA * y: T=Top Antennal; F=Front Antenna	<b>T3G-y-2AI</b>
4G Modem * x: G=Europe; V=Verizon (US); A=AT&T (US); T=Telstra (AUS). y: T=Top Antennal; F=Front Antenna	<b>T4x-y</b>
Communication: RF	<b>RF-x-y</b>

**DIGITAL INPUTS**

4 DI (Dry Contact) / 2 Relay Outputs 250V / 5A AC	<b>DIOR</b>
4 DI (Dry Contact) / 2 SSR Outputs 250V / 0.1A AC	<b>DIOS</b>
8 DI (Dry Contact)	<b>8DI</b>

**12 DIOR MODULE**

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


**NOTES**

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