ET 200SP AI Energy Meter
### Challenges surrounding energy data management

<table>
<thead>
<tr>
<th>Typical drivers and goals</th>
<th>Transparency solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing energy costs, regulation requirements and sustainability needs</td>
<td>Need for modular, scalable standardized solutions compliant to ISO50001</td>
</tr>
<tr>
<td>Meeting corporate targets for productivity and efficiency</td>
<td>Need for consumption transparency and reliable reports as basis for decisions. Benchmarks to identify inefficient equipment</td>
</tr>
<tr>
<td>Continuously uncovering savings potential</td>
<td>Need to identify standby consumption and abnormalities in consumption patterns and analysis of inefficient production methods</td>
</tr>
</tbody>
</table>
What role does energy transparency play?

EnMS in accordance with ISO 50001 or EMAS
Compliance with legal and regulatory requirements

Evaluate measures
- Verification management and reporting
- Evaluate measures
- Check economic viability
- Define measures
- Identify potential energy

Measures Implementation
- Reduced energy costs
- Image enhancement

Transparency of consumption
- Raise awareness of energy efficiency
- Evaluate measures
- Identify potential energy

EnMS = energy management system
Legal requirements are ramping up the pressure to act

**Energy Efficiency Directive 2012/27/EU**

*Goal: To increase energy efficiency by 20% by 2020*

- **Mandatory energy audits** in accordance with EN 16247-1 for all large companies (not small to medium-sized companies) every 4 years, or the introduction of an energy management system by 5 December 2015
- Mandatory programs for small to medium-sized companies
- Obligation to make energy savings of 1.5% per year
- **Electronic consumption measurement** in the electricity and gas area, expandable to the supply of heat and cold (air-conditioning)

**German national action plan for energy efficiency**

*Goal: Greenhouse gas emissions reduced by 25-30 million metric tons p.a.*

- Obligation on all large companies (NOT SMALL TO MEDIUM-SIZED COMPANIES) to carry out energy audits in accordance with EN 16247 (by 5.12.2015) and to repeat these every four years – alternatively: Introduction of a certified EnMS according to ISO50001 or an environmental management system according to EMAS
- Compensation under German Renewable Energy Law linked to a certified EnMS (> 5GWh)
- Tax incentives for peak demand management linked to an EnMS or reduction in annual energy intensity (with verification)

EnMS = energy management system
Energy Management with SIMATIC
From acquisition to energy controlling and management

Plant wide energy management

For buildings, utilities and production
- From monitoring to energy controlling based on energy performance indicators (EnPI)
- Efficiency-evaluation for equipments based on Equipment EnPI
- Reporting and Dashboards (User group based data presentation)
- Switch-off in standby, non-productive times

Management level
- ERP/MES functions
- EDMS SIMATIC B.Data

Machine level
- PLC and HMI
- Distributed I/O und Drives

Acquisition

Monitoring

Assembly
- Energy metering and monitoring, standby management

Body shop
- Energy metering and monitoring, standby management

Powertrain
- Metering, Monitoring, Equipment state based analysis

Infrastructure
- Metering, Monitoring, Controlling and Energy Accounting

- HVAC
- Lighting
- Compr. Air

ERD/EDMS SIMATIC B.Data

EDMS SIMATIC B.Data

SINUMERIK 840Dsl EDMS

SIMATIC B.Data

BMS

EEnPI = Equipment Energy Performance Indicator

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Energy Management with SIMATIC
From acquisition to energy controlling and management

<table>
<thead>
<tr>
<th>Management level</th>
<th>Machine level</th>
<th>Energy data acquisition (all types of energy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP/MES functions</td>
<td>PLC and HMI</td>
<td>Power, Water, Gas, Compr. Air…</td>
</tr>
<tr>
<td>EDMS SIMATIC B.Data</td>
<td>Distributed I/O und Drives</td>
<td>ET200 SP AI Energy Meter, 7KM PAC 3200/4200, SITRANS</td>
</tr>
</tbody>
</table>

- **Plant wide energy management**
  - Energy Monitoring and reporting
  - Energy Controlling (from plant to machine level)
  - Dashboards according the needs of the user
  - Energy Efficiency Measures

- **Machine-orientated energy monitoring and - management**
  - SIMATIC WinCC based
  - SIMATIC HMI based
  - SINUMERIK based
  - Standard Templates and reports
  - Configuration instead programming
  - Long- and short term evaluation
  - Consistent Monitoring on machine Level
  - Standard data interface
  - Short-term evaluation
  - Energy data (for all energy types) and machine state
  - Integrated metering

*) EEnPI = Equipment Energy Efficiency
## Energy Management with SIMATIC

### Plant wide energy management with SIMATIC B.Data

<table>
<thead>
<tr>
<th>For plant level and production related tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monitoring</strong></td>
</tr>
<tr>
<td><strong>What …</strong></td>
</tr>
<tr>
<td>Transparency about energy flow</td>
</tr>
<tr>
<td>Increase the efficiency</td>
</tr>
<tr>
<td>Reduce costs</td>
</tr>
<tr>
<td>Increase the awareness</td>
</tr>
<tr>
<td>Increase the image</td>
</tr>
<tr>
<td>Comply with regulations</td>
</tr>
</tbody>
</table>

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Energy Management with SIMATIC
Machine-oriented Energy Monitoring and -management

Energy monitoring solution on machine level based on standard S7 function blocks and HMI faceplates

Standard interfaces for Energy Data
ET200 SP AI Energy Meter, 7KM PAC 3200/4200, 3VA, SIRIUS, SINAMICS…

Solution for standard controllers
SIMATIC S7-300/400 and S7-1200/1500

Consistent Monitoring on machine Level
Basic and Comfort Panels, SCADA

Ready for EDMS (e.g. SIMATIC B.Data)
Standard PDI (Process Data Interface) for Energy Data
Energy Management with SIMATIC
Energy data acquisition with SIMATIC ET200SP AI Energy Meter

Cost-efficient, integrated metering; modular metering station for electrical energy and more

- Space saving
  Width per Modul: 20mm

- Integrated in standard distributed I/O ET200 SP

- Standard communication
  PROFINET or PROFIBUS

- Cost saving Engineering
  TIA Integration and available Application examples

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ET 200SP AI Energy Meter
Overview ET 200SP IO System

**Hardware**
- 64 Modules per station
- Flexible bus connection (RJ45/FC/SCRJ)

**Portfolio**
- A system for factory and process automation
- Flexible modules optimized for series machines and machines with distributed architecture
- Controller available for the lower and high-end performance range

**Size**
- 50% smaller than ET 200S / comparable systems
- System-integrated power modules

**Hardware**
- Toolless wiring
- Extended option handling

**Communication**
- Interface module PROFINET and PROFIBUS
- Modules for AS-Interface (incl. Safety)
- IO-Link modules

**Act. Back panel**
- Configuration control for features and complete modules
- Quick swapping of the modules with Hot Swapping

**Safety**
- Simple setting of all F-Parameter and software

**Energy efficiency**
- PROFIenergy as an integrated function
- Energy registration with the energy meter
ET 200SP AI Energy Meter
Overview module property

<table>
<thead>
<tr>
<th>Feature / Function</th>
<th>Customer benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving lot of space in the cabinet</td>
<td>Simple expandability on existing machines and cost saving on new facilities</td>
</tr>
<tr>
<td>Up to 42 Energy Meter modules per station</td>
<td>Provide transparency at large machines as well</td>
</tr>
<tr>
<td>Provides over 200 different electrical measurement and energy values</td>
<td>Flexibility in the connection and in existing systems</td>
</tr>
<tr>
<td>Communication with PROFINET or PROFIBUS</td>
<td>All necessary measured values for machine levels and energy distribution</td>
</tr>
<tr>
<td>$U = \text{Voltage Ph-Ph and Ph-N}$</td>
<td></td>
</tr>
<tr>
<td>$I = \text{Current per phase}$</td>
<td></td>
</tr>
<tr>
<td>$f = \text{Net frequency}$</td>
<td></td>
</tr>
<tr>
<td>$\cos \varphi = \text{power factor per phase and overall}$</td>
<td></td>
</tr>
<tr>
<td>$S$, $Q$ and $P$: Apparent, reactive and active power for each phase and overall</td>
<td></td>
</tr>
<tr>
<td>$\varphi = \text{Phase angle for each phase}$</td>
<td></td>
</tr>
<tr>
<td>$E = \text{Energy counter}$</td>
<td></td>
</tr>
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</table>

USA List Price
$388
ET 200SP AI Energy Meter - Hardware
Wiring of Energy Meter

Power supply
L1 and N directly connected to voltage input for power supply
No supply with 24V of the interface module

Inputs for voltage measurement
L1 – L3 directly connected to the inputs without voltage converter
Measurement range between 110V – 230V PH – N

Special base unit for Energy Meter

Inputs for current measurement
L1 – L3 connected indirect with current transformer
MLFB: 6ES7193-6BP00-0BD0
ET 200SP AI Energy Meter
ET 200SP AI Energy Meter provides transparency in the energy distribution

System overview

Your energy distribution

10 KV
480 V

Energy data management

Hall 1
Hall 2
Compressor
Ventilation

SIMATIC ET200 SP
PLC S7-1500

AI Energy Meter

Description

Ready for EM

SIMATIC B.Data

SIMATIC EDMS

HMI Visualization

SIMATIC HMI

Web Visualization

SIMATIC Web server

Gathering and processing

SIMATIC Distributed Controller
ET200 SP AI Energy Meter

*) Current transformer
ET 200SP AI Energy Meter
ET 200SP AI Energy Meter provides transparency at the machine level

**System overview**

- Energy data management
- PROFINET
- 480V AC
- AI / DO / DI

**Your machine**

- SIMATIC ET200 SP
- SIMATIC PLC S7-1500
- SIMATIC HMI Comfort Panel TP1500
- Application

**Description**

**Ready for EM**

SIMATIC EDMS

**Visualization**

SIMATIC HMI

**Processing**

SIMATIC Controller

**Gathering**

SIMATIC Distributed I/O
ET200 SP AI Energy Meter

*) Current transformer
ET 200SP AI Energy Meter
ET 200SP AI Energy Meter provides transparency at the machine level

<table>
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<th>System overview</th>
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<tbody>
<tr>
<td>Your machine</td>
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<tr>
<td>Energy data management</td>
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<table>
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<tr>
<th>Description</th>
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<tr>
<td>Ready for EM</td>
</tr>
<tr>
<td>SIMATIC B.Data</td>
</tr>
<tr>
<td>Visualization via Cltr-E</td>
</tr>
<tr>
<td>Processing</td>
</tr>
<tr>
<td>Gathering</td>
</tr>
</tbody>
</table>

- SIMATIC EDMS
- SINUMERIK Operate
- SINUMERIK

- SIMATIC Distributed I/O
  ET200 SP AI Energy Meter

*) Current transformer

*) Current transformer
ET 200SP AI Energy Meter
Choice of the current transformer

Current Transformers (CTs) from Siemens

- 50A, 125A, 250A, 400A, 600A, 800A, and 1200A
- Part number: US2-SEM3SCCTXX (XX is the current amps value)
- Provide 100mA output
- Lead wires are 18AWG, stranded 16/30
Energy Management with SIMATIC

Machine-oriented Energy Monitoring and -management
Energy Management with SIMATIC
Machine-oriented Energy Monitoring and -management

See more
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See more
ID: 109475285

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Thank you!

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