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PAC4200 Power Meter

Power quality monitoring for electrical power systems

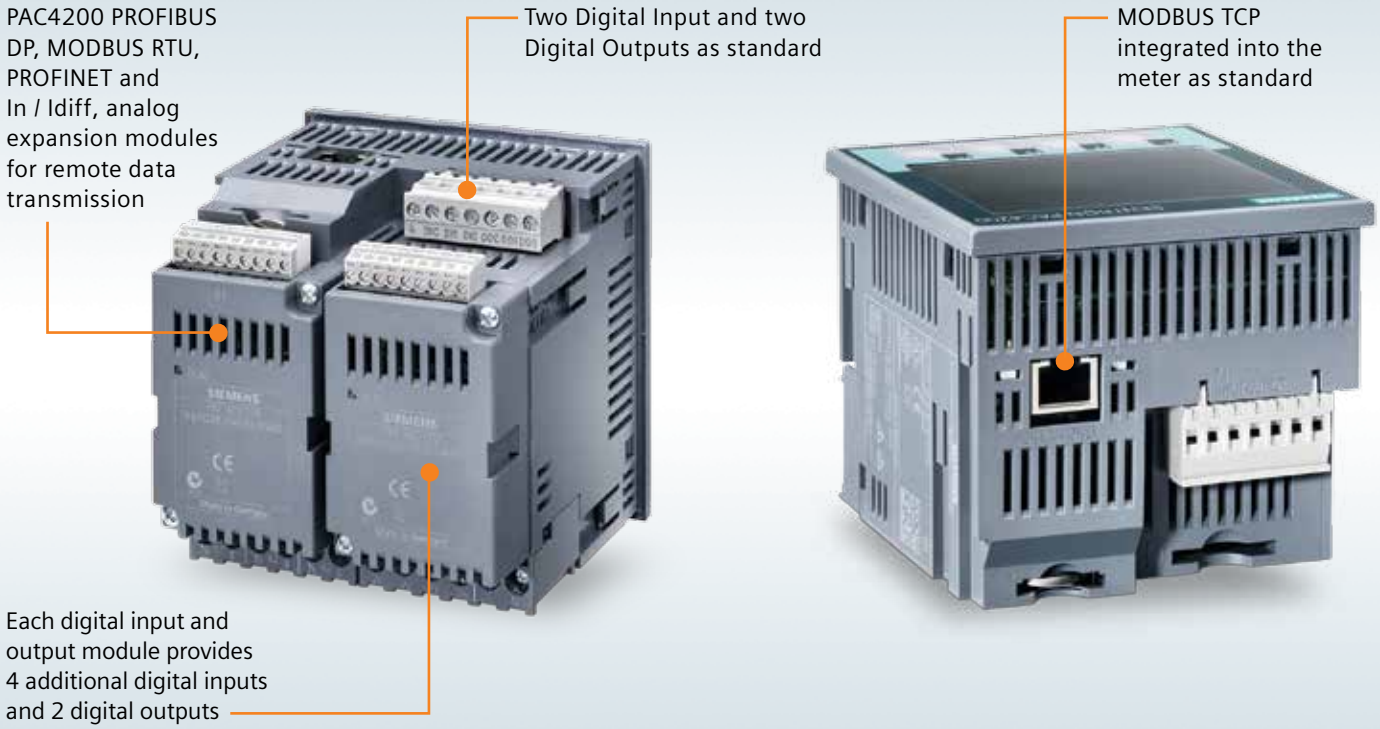
The PAC4200 is a feature packed power monitoring device that is suitable for use in industrial, government and commercial applications where basic to advanced metering, logging, and I/O is required. The meter may be used as a stand alone device monitoring over 200 parameters or as part of an industrial control, building automation or global enterprise wide monitoring system.

Advanced power quality monitoring and logging applications range from single low voltage breaker / building metering to sub-station main feeder monitoring, sub-billing or cost allocation installtions with multiple tariffs. The PAC4200 can also be used to support LEED certifi cation and provide the needed energy metering data for federal/local government EPACT 2005 energy reduction programs.

Whether your goal is to reduce operation cost, reduce your carbon footprint or to maintain your power assets, the PAC 4200 meter should be an important part of your power monitoring system.

The PAC4200 provides open communication using the standard built-in Ethernet Modbus TCP, Optional Modbus RTU, PROFINET or PROFIBUS-DP protocols for easy integration into any local or remote monitoring system.

The gateway functionality of this device reduces installation cost by replacing other gateway devices and simplifying wiring. Simple confi guration of the meter can be done from the front display or by using a PC with powerconfig setup software, supplied with the meter.



Power management and PAC4200
The PAC4200 can easily be integrated into a power management system using Modbus RTU (option), PROFINET (option) or PROFIBUS DP (option). With communication, the PAC4200 transmits measured values to the supervisory systems, where the data can be further processed for display and control. As a serial to Ethernet gateway, this device can reduce cost by replacing other devices and simplifying wiring while giving visibility to down stream devices.

The PAC4200 can also serve three masters via the TCP connection, so multiple supervisory systems can access the data. This helps to reduce system cost by eliminating the need or duplicate devices.

Siemens offers a low cost Powermanager or enterprise level WinPM.Net power monitoring software which can provide easy integration to the PAC4200 meter. Powermanager or WinPM.Net provide standard overview displays allowing detailed analysis of the electrical power, which allows for easy allocation of power consumption and cost. Additionally, unexpected operating conditions can be detected on a timely basis.

PAC4200 makes consumption apparent
To accomplish a sustainable reduction of power costs, you must fi rst analyze the electrical system's current consumption and power flows. The PAC4200 power meter precisely and reliably delivers the required information of power values to put you on the path to reduce your power cost and provides logging for 40 days at 15 minute intervals in non-volatile RAM.

Applications Summary

- Ideal for replacing multiple analog meters. Use it for external (enclosure) or embedded automatic meter reading in panels, switchboards, switchgear, transformers, and more, to allocate energy costs on a building by building basis.

- Basic Metering
  The PAC4200 offers high-accuracy power, energy and demand measurements. These revenue-accurate values can be used for bill verifi cation, monitoring backup power on critical systems and offering cost effective energy solutions.

- Cost Allocation / Energy Monitoring
  Perfect for monitoring right down to the tool level, the meter can help monitor cost centers, identify opportunities for demand control and check energy consumption patterns. The acquisition of power or energy can be based on a certain time frame (15 min. time interval) or controlled by a signal.

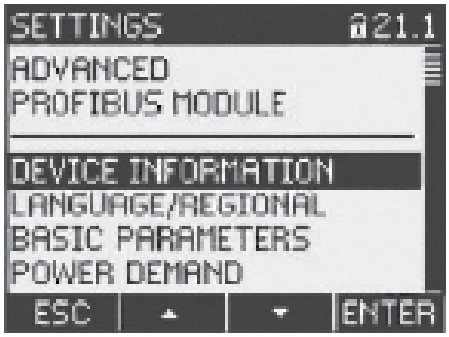
- Automation integration monitors critical equipment processes and ties directly to the Siemens family of PLCs and automation networks. Full integration into the Simatic system is made easy using one of several methods. One method is powerrate a premium add-on for WinCC and PCS7. It can be used for energy management and control. Another is pre-engineered faceplates integrated into the Simatic library or by simply using the GSD fi les available for the meter.

- Sub-Metering
  Low cost, high accuracy and simple retrofit installation enables economical measurement of commercial and

1) 99mm, 3.90 in., with expansion module.

residential tenant space. Integrate the PAC4200 with existing energy management systems and RTUs. Reduce energy consumption by eliminating previously uncontrolled expenses.

Example of the PAC4200 menu



Example of operating menu: The texts can be displayed in several languages, which can be selected directly on the device.2) The large graphic LCD display facilitates reading even from a distance. For optimum visibility even in poor light conditions, the PAC4200 comes with a gradually adjustable background illumination

Large graphic LCD display provides:

- Display title or designation of the displayed measurements
- Custom default screen
- Phase angles and measurements
- Measured real-time and min/max values
- All reading with appropriate units
- Custom labeling for function keys
- Bar charts showing up to the 63rd harmonic
- Four user defined custom screens with numeric or bar chart values

1) Languages included as standard in the meter are English, German, French, Spanish, Italian, Portuguese, Polish, Turkish, Russian and Chinese.

Functional features

Instantaneous values		
Voltage	Phase-phase / phase-neutral	✓
Currents	Per phase and neutral (calculated)	✓
Apparent, active and reactive power (kW, kVAR, kVA)	Per phase and total	✓
(PF) and displacement power factor (cos phi)	Per phase and total	✓
Frequency	45...64 Hz	✓
THD for voltage and current	Per phase	✓
Individual harmonics	Through the 63rd for volts and amps	✓
Min. / max. values	Voltage – phase-phase, phase-neutral Current / Power / Power factor / THD φ per phase Frequency, phase angle Three phase average voltage and current Odd harmonics for voltage and current per phase up to the 31st Demand values for active, apparent and reactive power	✓ ✓ ✓ ✓ ✓ ✓
Average values	Voltage – phase-phase, phase-neutral Voltage min. / max. for phase-phase-phase-neutral Current Current min. / max.	✓ ✓ ✓ ✓
Energy measurement – logging		
Real (active) energy (kWH)	Import / export; high / low tariff	✓
Reactive energy (kVARH)	Positive / negative; high / low tariff	✓
Apparent energy (kWH)	High / low tariff	✓
Energy demand per measuring period	Three phase average rating for active and reactive power	1 to 60 min.
Event logging	4000 events in non volatile memory	✓
kW, kWd and Min. / max. logging	40 days Non-volatile log file @ 15 minutes	✓
Meter running counter	Uptime in hours	✓
Universal counter	Pulse counting of external devices like water, gas, etc.	✓
Measurement accuracy		
Zero blind	Measurement per IEC 61577-12	✓
Sampling rate	170 samples/cycle at 60Hz (1) [1)]	✓
True RMS measurement	For voltage and current harmonics up to the 63rd	✓
Voltages		±0.2%
Currents		±0.2%
Power factor / Power		+/-2% / +/-0.2%
Active energy		Class 0.2 according to IEC61557-12 and/or class 0.2S according to IEC62053-2 ANSI C12.20
Reactive energy		Class 2 according to IEC61557-12 and/or IEC62053-23
Monitoring functions		
Set point monitoring	V, I, power, VAR, VA, Freq. THD, PF	Up to 12 values
Simple logic functions for alarming	Alarm via digital	
Phase unbalance	Voltage and / or >< current	✓

[1)] Per IEC61557-12, which defines the accuracy as percentage of reading.

Functional features (continued)

Communication			
Ethernet	Integrated into meter as standard and supports up to 32 Modbus serial devices in gateway mode with Modbus RTU module. (can support two masters simultaneously)		10/100 Base-T (100 Mbit/sec)
Modbus TCP	Integrated RJ45 port		10/100 Base-T (100 Mbit/sec)
PROFIBUS DP expansion module	Optional • Parameterization via device front or with powerconfig software • Transition of data via GSD file	• Support of all baud rates from 9600 BPS to 12 MBPS (9.6 Kbit/ sec to 12 Mbit/sec)	
Modbus RTU expansion module	Optional – required for gateway feature • Parameterization via device front or with powerconfig software • Transition of data via MODBUS register based points	• Support of all baud rates of 4800, 9600, 19.2K and 38.4K BPS (4.8 / 9.6 / 19.2 and 38.4 kB/sec	
PROFINET expansion module	Optional • Parameterizatio via device front or with powerconfig software • Transition of data via GSDML file	• Support of 10 and 100 Mbit/s baud rates	
General			
Password protection			✓
Inputs / Outputs			
Input voltage / at digital input • initial value for signal<1>-recognition • at DC / rated value • at DC / maximum • Full-scale value for signal <0> recognition		19 V 24 V 30 V 10V	
Number of digital outputs		2	
Number of digital inputs		2	
Digital output version		Switching or pulse output function	
Type of switching output		solid state	
Input current / at digital input • for signal <1>		4 mA	
Output current • at digital output / with signal <0> / maximum • at digital output / for signal <1> / minimum • at digital output / for signal <1> / maximum • at the digital outputs / at DC / limited to 100 ms / maximum • at the digital outputs / at DC / maximum		0.2 mA 10 mA 27 mA 300 mA 100 mA	
Output delay / at digital output • for signal <0> to <1> / maximum • for signal <1> to <0> / maximum		5 ms 5 ms	
Operating conditions for digital inputs / external voltage supply		Yes	
Operating voltage / as output voltage / at DC / maximum permissible		30 V	
Property of the output / Short-circuit proof		Yes	
Input delay time / at digital input • for signal <0> to <1> / maximum • for signal <1> to <0> / maximum		5 ms 5 ms	
Internal resistance / at the digital outputs		55 Ω	
Measuring category / for digital signals		CATI	
Switching frequency / at digital output / maximum		20 Hz	

Functional features (continued)

Technical data		
Two-quadrant (import) / four-quadrant (import and export) measuring		4Q
Measurement types		1 ph, 2 ph or 3 ph
Applicable for network type		TN, TT, IT
Measured voltage without transformer	Direct connection up to max. delta/wye	690 V / 400 V (CAT III) for IEC 600/347 for UL / CSA
Current inputs	Settable on device	1A or 5A nominal
Power supply	AC/DC	95...240V AC (±10%) / 110...340V DC (±10%) 22...65V DC (=±10%)
Dimensions	L x W x D in mm Installation depth without module (mm) Installation depth with module (mm)	96 x 96 77 mm / 3.03in. 99 mm / 3.90 in.
Degree of protection	Front Rear	IP65 - NEMA 12 IP20 - NEMA 1A
Operating temperature	°C / °F	–10...+55 / +14...+131
Display	Type Resolution (pixels)	Background-illuminated graphic LCD 128 x 96
Text displays		Multilingual
Optional ports	1	Two ports are available for optional modules
MTBF		169.7 Years
Connections		
Type of electrical connection • at the measurement inputs for voltage • of the fast Ethernet interface	 screw-type terminals RJ45 (8P8C)	
Mechanical Design		
Height	96 mm	
Height / of the display	54 mm	
Width	96 mm	
Width • of the display	 72 mm	
Depth	56 mm	
Mounting position	vertical	
Installation depth	51 mm	
Mounting type / panel mounting	Yes	
Net weight	451 g	
Environmental conditions		
Installation altitude / at height above sea level / maximum	2 000 m	

Functional features (continued)

Standard	
• for EMC for industrial sector	IEC 61000-6-2 respectively IEC 61326-1:2005, table 2
• for EMC against unloading	IEC 61000-4-2: 2001-04
• for EMC against high frequency fields	IEC 61000-4-3: 2006-02
• for EMC against conducted LF disturbance variables (industry)	IEC 61000-6-4, Group 1 Klasse A / CISPR11 Gruppe 1 Klasse A FCC Part 15 Subpart B Class A
• for EMC against conducted disturbance variables via HF fields	IEC 61000-4-6: 2001-12
• for EMC against magnetic fields with power engineering frequencies	IEC 61000-4-8: 2001-03
• for EMC against quick, transient electrical disturbances	IEC 61000-4-4: 2005-07
• for EMC against voltage drops and interruptions	IEC 61000-4-11: 2004-03
• for EMC against surge voltages	IEC 61000-4-5: 2001-12
• for free fall	IEC 60068-2-32: 1975
• for pulse emitter	according to IEC62053-31
• for cyclic, environmental damp heat check	IEC 60068-2-30
• for environmental coldness check	IEC 60068-2-1
• for environmental dry heat check	IEC 60068-2-2
Relative humidity / at 25 °C / without condensation / during operation	
• minimum	5 %
• maximum	95 %
Ambient temperature	
• during operation / minimum	-10 °C
• during operation / maximum	55 °C
• during storage / minimum	-25 °C
• during storage / maximum	70 °C
Certificates	
Certificate of suitability	
• as EC declaration of conformity	IEC 61010-1: 2001 (2nd Ed.) with Corr. 1, EN 61010-1: 2001 (2nd Ed.) and DIN EN 61010-1:2002 with “Berichtigung 1”
• as approval for Canada	UL 61010-1, 2nd Ed. CAN/CSA-C22.2 NO. 61010-1-04
• as approval for USA	UL 61010-1, 2nd Ed. CAN/CSA-C22.2 NO. 61010-1-04
Reference identifier / acc. to DIN EN 61346-2	P

General Product Approval

Declaration of Conformity

Order information

Product	Order Number[1)]
PAC4200 compression terminals not suitable for use with ring tongue terminals, AC/DC	**7KM4212-0BA00-3AA0**
PAC4200 Compression Terminals and 24VDC power supply only	**7KM4211-1BA00-3AA0**
PAC PROFIBUS DP expansion module	**7KM9300-0AB01-0AA0**
PAC PROFINET module	**7KM9300-0AE01-0AA0**
PAC MODBUS RTU expansion module	**7KM9300-0AM00-0AA0**
PAC I/O module 4DI + 2DO	**7KM9200-0AB00-0AA0**
Adapter Plate for 4700/4720 meter cutout	**93-47ADAPTER**
PAC3xxx/4xxx Meter DIN Rail adapter – Meter display will not be seen	**7KM9900-0YA00-0AA0**
PAC3xxx/4xxx Meter Front Facing DIN Rail adapter	**7KM9900-0XA000-AA0**
PAC4200 In / Idiff, analog expansion module	**7KM9200-0AD00-0AA0**
SITOP Power Supply AC 99-264VAC, 24 VDC, 0.5A	**6EP1331-5BA00**

1) Omit dashes from part numbers when ordering except on 93-47ADAPTER.

Published by
Siemens Industry, Inc. 2018.

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Order No.: PMSS-PAC42-0418
Printed in U.S.A.