PAC3200 and PAC4200
Multifunction Measuring Instruments

Catalog News LV 1 N · 01/2009

SENTRON

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Related catalogs

Low-Voltage Controls and Distribution SIRIUS · SENTRON · SIVACON Order No.:		
Catalog E86060-K1002-A101-A8-7600 Incl. PDF CD-ROM	LV 1	
Technical Information E86060-T1002-A101-A8-7600	LV 1 T	

Systems • Controlgear: Contactors and contactor assemblies, solid-state switching devices • Protection equipment • Motor starters, soft starters and load feeders • Monitoring and control devices • Detecting devices • Commanding and signaling devices • Transformers • Power supplies • Planning and configuration with SIRIUS • Power Management System • SIVACON Power, distribution boards, busway and cubicle systems • SENTRON switching and protection devices for power distribution: Air circuit breakers, molded case circuit breakers, switch disconnectors, busbar systems • Software for power distribution • BETA low-voltage circuit protection

Low-Voltage Controls and Distribution LV 16
Controls and Components for Applications according to UL
Order No.:
E86060-K1816-A101-A2-7600

SIRIUS 3RV17 and 3RV18 circuit breakers according to UL 489/ CSA C22.2 No. 5-02 • SIVACON Components for Feeder Circuit • SENTRON 3WL5 air circuit breakers/non-automatic air circuit breakers according to UL 489/IEC 60947-2 • SENTRON 3VL Molded Case Circuit Breakers according to UL 489/IEC 60947-2 • ALPHA Devices according to UL Standard • BETA Devices according to UL standard

SIMATIC NET IK PI
Industrial Communication
Order No.:
E86060-K6710-A101-B6-7600

PROFINET/Industrial Ethernet • Industrial Wireless Communication • PROFIBUS • SIMATIC ET 200 distributed I/Os • AS-Interface • Telecontrol • Routers • ECOFAST system

SIVACON LV 50
System Cubicles and Cubicle Air-Conditioning
Order No.:
E86060-K1920-A101-A3-7600

System cubicles • Cubicle modifications • Cubicle expansion components • Accessories • Special cubicles • Cubicle solutions in applications • Cubicle air-conditioning • Special colors

SIDAC LV 60
Reactors and Filters
Order No.:
E86060-K2803-A101-A4-7600

Commutating reactors for converters • Mains reactors for frequency converters • Iron-core output reactors • Ferrite output reactors • Iron-core smoothing reactors • Smoothing air-core reactors • Filter reactors • Application-specific reactors • Radio interference suppression filters • dv/dt filters • Sinewave filters

SIVACON 8PS LV 70
CD-L, BD01, BD2 Busbar Trunking Systems up to 1250 A
Order No.:
E86060-K1870-A101-A4-7600

Busbar trunking systems, overview • CD-L system (25 A to 40 A) • BD01 system (40 A to 160 A) • BD2 system (160 A to 1250 A)

The Offline Mall CA 01
DVD:
E86060-D4001-A510-C7-7600

All products of automation, drives and installation technology, including those in the catalogs listed above.

The Online Mall
Internet:
http://www.siemens.com/ automation/mall

All products of automation, drives and installation technology, including those in the catalogs listed above.

Catalog-PDF
Internet:
http://www.automation. siemens.com/cd

All catalogs for low-voltage controls and distribution can be downloaded as PDF files.
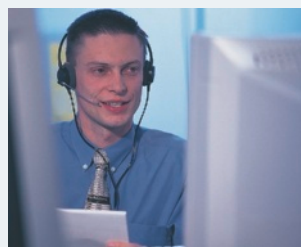
Contents

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Further information about low-voltage controls is available on the Internet at:
http://www.siemens.com/lowvoltage

Technical Assistance

Expert technical assistance for Low-voltage controls and electrical installation.
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E-Mail: technical-assistance@siemens.com

SENTRON

PAC3200 and PAC4200 Multifunction Measuring Instruments

Catalog News LV 1 N · 01/2009

The products and systems listed in this catalog are distributed/manufactured using a certified quality management system which complies with EN ISO 9001 (for the Certificate Register No. see the Appendix to LV 1 · 2009). The certificate is recognized in all IQNet countries.

The corresponding section in Catalog LV 1 · 2009 is replaced by this Catalog News.

Contact your local Siemens sales office for further information

Explanations

General information

Delivery time class (DT)

►	Preferred type
A	2 working days
B	1 week
C	3 weeks
D	6 weeks
X	On request

Preferred types are available immediately from stock, i. e. are dispatched within 24 hours.

Normal quantities of the products are usually delivered within the specified time following receipt of your order at our branch.

In exceptional cases, the actual delivery time may differ from that specified.

The delivery times apply up to the ramp at Siemens AG (products ready for dispatch). The transport times depend on the destination and type of shipping. The standard transport time for Germany is 1 day.

The delivery time classes specified here represent the state of 10/2008. They are permanently optimized. Up-to-date information can be found at http://www.siemens.com/automation/mall.

Price units (PU)

The price unit defines the number of units, sets or meters to which the specified price and weight apply.

Packaging sizes (PS)

The packaging size defines the number, e. g. of units, sets or meters, for outer packaging.

Only the quantity defined by the packaging size or a multiple thereof can be ordered!

For multi-unit packing and reusable packaging see Appendix.

Price groups (PG)

Each product is assigned to a price group.

Weight

The defined weight in kg refers to the price unit (PU).

Dimensions

All dimensions in mm.

Explanations

■ **Order number index including metal surcharges and export markings**

Order No.	Metal sur-charges	Export markings		Page
		ECCN	AL	
3Z				
3ZS	--	5D992	N	Page 6
7K				
7KM2 111-1BA00-3	--	EAR99H	N	Page 6
7KM2 112-0BA00-2	--	EAR99H	N	Page 6
7KM2 112-0BA00-3	--	EAR99S	N	Page 6
7KM4 212-0BA00-3	--	EAR99H	N	Page 7
7KM4 212-0BA00-2	--	EAR99H	N	Page 7
7KM9 300-0AB00	--	N	N	Page 8
7KM9 300-0AM00	--	N	N	Page 9

-- No surcharge

Notes

SENTRON Multifunction Measuring Instruments

General data

Overview

Functional overview		PAC3200	PAC4200
Basic measurement variables			
Voltage	L-L, L-N, 3 phase average	✓	✓
Current	Per phase, 3 phase average	✓	✓
Neutral conductor current		--	✓
Apparent power	Per phase and total	✓	✓
Active power	Per phase and total	✓	✓
Total reactive power	Per phase and total	--	✓
Reactive power of the fundamental wave	Per phase and total	✓	✓
Power factor	Per phase and total	✓	✓
Power factor of the fundamental wave	Per phase	--	✓
Frequency	Of the reference phase	✓	✓
Min/max values | date & time	Slave pointer function	✓ | --	✓ | ✓
Sliding mean values	U, I, S, P, Q, LF	--	✓
Extended measurement variables			
Phase displacement angle	Between voltage and current per phase	--	✓
Phase angle	Between the phase voltages	--	✓
THD voltage	Per phase	THD-R ($U_{\text{L-N}}$)	THD ($U_{\text{L-N}}$ and $U_{\text{L-L}}$)
THD current	Per phase	THD-R ($I_{\text{L1..3}}$)	THD ($I_{\text{L1..3}}$)
Harmonics in voltage	Per phase	--	3rd to 31st
Harmonics in current	Per phase	--	3rd to 31st
Distortion current strength	Per phase	--	✓
Max values | date & time	Slave pointer function	✓ | --	✓ | ✓
Unbalance of voltage | current	Three-phase system	$U_{\text{nba}} \mid I_{\text{nba}}$[1]	$U_{\text{nb}} \mid I_{\text{nb}}$[1]
Power measurement/counters			
Apparent energy	Endless counters for total energy	✓	✓
Active energy	Endless counters for total energy	✓	✓
	Input and output	✓	✓
Reactive energy	Endless counters for total energy	✓	✓
	Input and output	✓	✓
2-tariff counter (high tariff / low tariff)	Apparent, active and reactive energy	✓	✓
Daily energy values for 365 days	Apparent, active and reactive energy	--	✓
Demand for energy in last measurement period	Active and reactive power average	✓	✓
Measurement period	Can be set in minutes	✓	✓
Min/max values of the power types	Within the measurement period	✓	✓
Operating hours counter	Operating hours of loads	✓	✓
Universal counter	Multifunctional	✓	✓
Monitoring functions			
Limit value monitoring	Max. number of limit values	6	12
Boolean logic	AND, OR | NAND, NOR, XOR, XNOR	✓ | --	✓ | ✓
Limit values | inputs	Suitable for logic operations	✓ | --	✓ | ✓
Recording functions			
Load profile record		--	✓
• Apparent, active and reactive power averages		--	✓
• Min/max values	Per measurement period	--	✓
• Duration of recording	With 15-minute measurement period	--	40 days
• Synchronization	Digital input, bus, internal clock	--	✓
• Adjustable mean-value generation	Arithmetic or cumulated	--	✓
• Recording methods	Fixed block or rolling block	--	✓
Event recording		--	✓
• Max. number of events		--	> 4000
• Priority control		--	✓
• Selectable alert levels		--	✓
• Selectable mandatory acknowledgment		--	✓
• Selectable recording	Per event type	--	✓

SENTRON Multifunction Measuring Instruments

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Functional overview

Interfaces		PAC3200	PAC4200
Ethernet (integrated)	For twisted pair cable	10 Mbit/s	10/100 Mbit/s
• Interface functions	Auto negotiation / auto MDI(X)	--	✓
• Number of connections	Simultaneous	1	3
• Protocol	Modbus TCP	✓	✓
• Gateway	Ethernet ⇔ RS485 (Modbus)	--	✓
PROFIBUS DP (V1)	Using PAC PROFIBUS DP module	Expansion module optional	Expansion module optional
Modbus RTU/SEAbus	Using PAC RS485 module	Expansion module optional	Expansion module optional
Inputs/outputs			
Digital inputs	Multifunctional	1	2
Digital outputs	Multifunctional	1	2
Operational voltage DI/DO	Rated value	24 V DC	24 V DC
Clock/calendar			
Real-time clock	Time stamp accurate to the second	--	✓
Calendar function	Selectable date and time format	--	✓
Summer/winter time changeover	According to region or user-defined	--	✓
Fault limits			
Voltage | current	Related to the measured value	±0.3 % | ±0.2 %	±0.2 %[2] | ±0.2 %[2]
Apparent | active | reactive power	Related to the measured value	±0.5 % | ±0.5 % | ±2 %	±0.5 %[2] | ±0.2 %[2] | ±1 %[2]
Active energy	According to IEC 62053-22	Class 0.5S	Class 0.2S
Reactive energy	According to IEC 62053-23	Class 2	Class 2
Indication/operation			
Display	LCD with background lighting	✓	✓
Types of indication		Alphanumeric and text	Full graphic
Operation	Menu-prompted using function keys	✓	✓
Languages	DE, EN, PT, TR, ES, IT, FR, ZH, RU	✓	✓
User-definable indicators	Bar or digital indicators	--	4
Measurement/supply voltages			
Measuring inputs for voltage	3 AC; U_{L-L}/U_{L-N}; CAT III	Max. 690 V / 400 V	Max. 690 V / 400 V
• Power supply unit with wide voltage range	AC/DC	95...240 V AC, 50/60 Hz ±10 % and 110..340 V DC ±10 %	
Measuring inputs for voltage	3 AC; U_{L-L}/U_{L-N}; CAT III	Max. 500 V / 289 V	--
• Power supply unit with extra-low voltage	DC	22...65 V DC ±10 %	--
Measurement on voltage transformers	For voltages > 500 V or 690 V	✓	✓
Measuring inputs for current	3 AC; CAT III	x/1 A or x/5 A	x/1 A or x/5 A
• Current direction	Programmable	✓	✓ per phase
Enclosures			
Dimensions	W x H x D in mm	96 x 96 x 56	96 x 96 x 82
Mounting depth without module	In mm	51	77
Mounting depth with module	In mm	73	99
Safety class		II	II
Degree of protection	On front	IP65	IP65
Expansion module slots	Number	1	2
Approvals			
CE	Europe	✓	✓
cULus	USA / Canada	✓	✓
C-Tick	Australia	✓	✓
GOST	Russia	✓	✓

[1] U_{nba}, I_{nba} unbalance with regard to amplitude
U_{nb}, I_{nb} unbalance with regard to amplitude and phase

[2] Satisfies the specified function-related accuracy classes according to IEC 61557-12.

✓ Available

-- Not available

SENTRON Multifunction Measuring Instruments

General data

Measuring precisely with SENTRON PAC3200/4200 - New dimensions with the multifunction measuring instruments

The multifunction measuring instruments of the SENTRON PAC series are used to measure and indicate all relevant network parameters in low-voltage power distribution. They can be used for single-phase measurements as well as for multiphase measurements in 3 and 4-conductor networks (TN, TT, IT).

Power values for electrical feeders or individual loads are recorded precisely and reliably, and important measured values are supplied in addition for assessing the state of the plant and the quality of the network.

For example, the PAC3200 measures more than 50 variables such as voltage, current, power and frequency with their minimum, maximum and mean values, as well as the power consumption for power input and power recovery.

The measurement data supplied by the PAC4200 are even more exact and more comprehensive. With its approximately 200 electrical measurement variables this instrument is ideally suited for monitoring the power distribution system. In addition to the measurement variables of the PAC3200, the PAC4200 supplies for example the neutral conductor current, power factors of the fundamental wave, odd-order network harmonics of the voltage and current up to the 31st harmonic, sliding mean values with selectable averaging interval, phase and system angle, and diverse other measurement data.

The PAC4200 is equipped with a whole series of monitoring and recording functions. More than 4000 operation, control and system-related events are saved in the memory integrated in the device. Load profiles with minimum and maximum values can be recorded for 40 days with a measurement period of 15 minutes.

Both control-panel instruments convince through their compact design and high performance capacity.

A large, backlit graphic display can be read without difficulty even from great distances. User-friendly, intuitive operation is made possible by plain text displays in nine languages in combination with four function buttons. Language selection is possible either directly on the device or using configuration software.

Several communication options are available in addition to multifunctional digital inputs and outputs. For integration in a higher-level power management system it is possible to use an integrated Ethernet interface or optionally available expansion modules.

The advantages of the PAC3200 and PAC4200 at a glance:

- Measurement of more than 50 basic measurement variables
- 10 power meters for active, reactive and apparent work
- Four-quadrant measurement
- Measurement voltage up to 690 V (U_{L-L})
- Can be operated in 2, 3 and 4-wire systems
- Suitable for TN, TT and IT networks
- High measuring accuracy, e. g. for power according to IEC 62053-22
  PAC3200: Class 0.5S, PAC4200: Class 0.2S
- Integrated Ethernet interface
- Can be retrofitted with expansion modules
- LCD with user guidance in nine languages
- Multifunctional digital inputs and outputs
- IP65 using standard sealing
- Limit monitoring with logic function
- Operating hours counter for indicating the load running time
- With UL and CSA approval for the USA and Canada
- SENTRON powerconfig configuration software included in the scope of supply

Additional functions of the PAC4200

- Supplies approximately 200 measurement variables, including important characteristic variables for assessing the quality of the network and the state of the plant
- THD and odd-order network harmonics from the 3rd to the 31st harmonic for three and four conductor networks
- Real-time clock for time stamp accurate to the second; calendar with summer/winter time changeover
- Load profile memory for recording power averages together with minimum and maximum values for 40 days with a measurement period of 15 minutes
- Event memory for more than 4000 operation, control and system-related events
- High measuring accuracy for voltages, currents, powers, etc. according to IEC 61557-12
- 10/100 Mbit/s Ethernet interface with auto negotiation and auto MDI(X) function, supports 3 connections simultaneously
- Gateway function for connecting up to 247 devices with an RS485 interface to an Ethernet network (Modbus)
- 4 user-definable convenience indicators
- Daily work meter for 1 year for cut-off date assessment
- Quantity measurement for any media, e. g. electricity, gas, water, steam, compressed air etc. using meters with S0 interface
- Limit monitoring for up to 12 limit values
- Graphically programmable logic function for connecting limit values and digital inputs

SENTRON Multifunction Measuring Instruments

Benefits

- Thanks to the wide range of functions, only one device variant of the PAC3200 or PAC4200 is required for different measuring tasks.
- Latching holders ensure easy and fast assembly.
- Wrong connections of the external current transformers can be corrected by software means.
- Direct connection to power supply networks up to 690 V[1] make external voltage transformers superfluous.
- Comprehensive and precise power measurements form the basis for identifying savings potential in the system.
- The many different measuring and monitoring functions contribute indirectly to a higher level of availability because faults are detected early.
- A large, illuminated graphic display guarantees good reading even in poor light conditions.
- Multilingual, intuitive user guidance makes for easy operation.
- One Ethernet interface for high transmission speeds is provided as standard. This enables simple and cost-effective integration in power management systems.
- The SENTRON powerconfig configuration software makes it easier to configure several instruments.
- The instruments have integrated inputs and outputs as standard and can be subsequently expanded using expansion modules.
- Easy integration in automation systems or power management systems, for example SIMATIC WinCC powerrate or SIMATIC PCS 7 powerrate, is favored by the optional PAC PROFIBUS DP and PAC RS485 expansion modules.
- With their technical configuration, various approvals and certifications such as UL and CSA for the USA and Canada, and support for nine languages, the instruments can be used world-wide.

1) Max. 500 V (U_{L-L}) for version with DC power supply unit with extra-low voltage (7KM2111-1BA00-3AA0).

Additional benefits when using a PAC4200

- The PAC4200 has a 10/100 Mbit/s Ethernet interface with even more power and additional convenience functions.
- Using the integrated gateway function it is possible to integrate lower-level devices, which are equipped with only a serial RS485 interface (Modbus-RTU), in an Ethernet network at no additional expense.
- Extensive convenience indicators such as user-definable indicators, bar and status indicators, phase diagram and list and histogram graphics provide a quick overview of the state of the plant.
- The integrated time and calendar function enables time-related recording of minimum, maximum and mean values as well as operation, control and system-related events, making fault analysis far easier.
- Power averages with their related minimum and maximum values for apparent, active and reactive power can be recorded over 40 days in synchronized timing with the power supply company's measurement and be read out through interfaces in order to assess and optimize the plant's capacity utilization.
- Daily work meters for apparent, active and reactive work enable a cut-off date assessment of the power consumption levels over the last 12 months on site and at the PC.
- Thanks to extensive mean-value indicators with related minimum and maximum values it is possible to identify potential overloading of cables, transformers and switching devices in good time.
- In order to assess the quality of the network the PAC4200 determines not only THD, unbalance and the power factor but also the 3rd to 31st network harmonic for current and voltage, distortion current strength and the neutral conductor current.
- SENTRON PAC4200 meets the high requirements according to IEC 61557-12. You can be sure therefore that performance, safety and operation characteristics will satisfy the demands of modern industrial plants and that the indicators of the measuring devices will supply clear results.

Application

Three-phase multifunction measuring instruments are used to measure and indicate all relevant network parameters of an electrical installation and they monitor these parameters permanently.

Uses

Wherever power has to be distributed, be it in industrial or infrastructural buildings, the SENTRON PAC supplies important information to the building services system or the power controlling system.

The many different communication options offered by the SENTRON PAC make it an indispensable supplier of data for power management systems and for plant and building automation.

Industries

Power distribution systems for the power supply are needed in all sectors of industry. SENTRON PAC is used accordingly in all sectors where power consumption and electrical parameters are to be measured.

More information

More information is available on the Internet at:
www.siemens.com/powermanagementsystem

SENTRON Multifunction Measuring Instruments

PAC3200 multifunction measuring instruments

Selection and ordering data

	Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
								kg
7KM2 112-0BA00-3AA0	**SENTRON PAC3200** Control panel instrument 96 mm x 96 mm Screw terminals for connecting current and voltage AC/DC power supply unit with wide voltage range U_{AUX}: 95 … 240 V AC ±10 %, 50/60 Hz 110 … 340 V DC ±10 % Measuring inputs U_e: max. 3 AC 690/400 V, 50/60 Hz I_e: /1 A or /5 A	A	**Screw terminals** ⊕ **7KM2 112-0BA00-3AA0**		1	1 unit	133	0.325
7KM2 111-1BA00-3AA0	**SENTRON PAC3200** Control panel instrument 96 mm x 96 mm Screw terminals for connecting current and voltage DC power supply unit with extra-low voltage U_{AUX}: 22 … 65 V DC ±10 % Measuring inputs U_e: max. 3 AC 500/289 V, 50/60 Hz I_e: /1 A or /5 A	A	**Screw terminals** ⊕ **7KM2 111-1BA00-3AA0**		1	1 unit	133	0.325
7KM2 112-0BA00-2AA0	**SENTRON PAC3200** Control panel instrument 96 mm x 96 mm Cable lug terminals for connecting current and voltage AC/DC power supply unit with wide voltage range U_{AUX}: 95 … 240 V AC ±10 %, 50/60 Hz 110 … 340 V DC ±10 % Measuring inputs U_e: max. 3 AC 690/400 V, 50/60 Hz I_e: /1 A or /5 A	A	**Cable lug terminals** ⊕ **7KM2 112-0BA00-2AA0**		1	1 unit	133	0.325

Accessories

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
							kg
SIMATIC PCS 7 Library PAC3200 Software for integration of the SENTRON PAC3200 in SIMATIC PCS 7							
• Engineering + Runtime license	B	**3ZS2 781-1CC10-0YG0**		1	1 unit	133	0.250
• Runtime license	B	**3ZS2 781-1CC10-6YH0**		1	1 unit	133	0.250
PAC3200 function block library for SIMATIC WinCC Software for integration of the SENTRON PAC3200 in SIMATIC WinCC							
• Engineering + Runtime license	B	**3ZS2 791-1CC10-0YG0**		1	1 unit	133	0.250
• Runtime license	B	**3ZS2 791-1CC10-6YH0**		1	1 unit	133	0.250

More information

Suitable current transformers can be found
• In Chapter 16 "SENTRON Switching and Protection Devices – Molded Case Circuit Breakers"
• In the Mall, Section "Low-Voltage Controls and Distribution" --> "Low-Voltage Power Distribution" --> "Switching and Protection Devices for Power Distribution" -->

"Molded Case Circuit Breakers" --> "3VL Molded Case Circuit Breakers up to 1600 A" --> "Accessories and spare parts"

For more information about the software components of the Power Management System see Chapter 18 and on the Internet at:
www.siemens.com/powermanagementsystem

* You can order this quantity or a multiple thereof.

SENTRON Multifunction Measuring Instruments

Selection and ordering data

	Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
								kg
7KM4 112-0BA00-3AA0	**SENTRON PAC4200** Control panel instrument 96 mm x 96 mm Screw terminals for connecting current and voltage AC/DC power supply unit with wide voltage range U_{AUX}: 95 … 240 V AC ±10 %, 50/60 Hz 110 … 340 V DC ±10 % Measuring inputs U_e: max. 3 AC 690/400 V, 50/60 Hz I_e: /1 A or /5 A	A	**Screw terminals** ⊕ **7KM4 212-0BA00-3AA0**		1	1 unit	133	0.450
7KM4 112-0BA00-2AA0	**SENTRON PAC4200** Control panel instrument 96 mm x 96 mm Cable lug terminals for connecting current and voltage AC/DC power supply unit with wide voltage range U_{AUX}: 95 … 240 V AC ±10 %, 50/60 Hz 110 … 340 V DC ±10 % Measuring inputs U_e: max. 3 AC 690/400 V, 50/60 Hz I_e: /1 A or /5 A	A	**Cable lug terminals** ⊕ **7KM4 212-0BA00-2AA0**		1	1 unit	133	0.450

More information

Suitable current transformers can be found
• In Catalog LV 1 · 2009, Chapter 16 "SENTRON Switching and Protection Devices – Molded Case Circuit Breakers"
• In the Mall, Section "Low-Voltage Controls and Distribution" --> "Low-Voltage Power Distribution" --> "Switching and Protection Devices for Power Distribution" --> "Molded Case Circuit Breakers" --> "3VL Molded Case Circuit Breakers up to 1600 A" --> "Accessories and spare parts"

For more information about the software components of the Power Management System see Chapter 18 and on the Internet at:
www.siemens.com/powermanagementsystem

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* You can order this quantity or a multiple thereof.

SENTRON Multifunction Measuring Instruments

Expansion modules
PAC PROFIBUS DP

■ Overview

The PAC PROFIBUS DP expansion module has the following features:

- PROFIBUS DP plug-in communication module for SENTRON PAC multifunction measuring instruments
- Parameterizable from the front of the device or using parameterization software
- Using PROFIBUS DPV1, data can be transferred in both cyclic and acyclic modes
- Easy integration using GSD file, with free choice of the measurement variables to be transmitted
- Plug and play
- All baud rates from 9.6 Kbit/s to 12 Mbit/s are supported
- Connection through 9-pole Sub-D connector according to IEC 61158
- No external auxiliary power necessary
- Status indication by LED on the module

■ Application

The SENTRON PAC PROFIBUS DP communication module is plugged onto the rear of the PAC multifunction measuring instrument. The device identifies the module automatically and presents the parameters of relevance for this module for selection in the parameterization menu.

All measurement variables supplied by the SENTRON PAC multifunction measuring instruments are selected and cyclically or acyclically transmitted by means of the GSD file.

The state of the module is indicated by an LED.

■ Selection and ordering data

	Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
								kg
	PAC PROFIBUS DP							
	Expansion modules for SENTRON PAC3200 (PROFIBUS DPV1)	A	**7KM9 300-0AB00-0AA0**		1	1 unit	133	0.045
	For SENTRON PAC4200 on request							
7KM9300-0AB00-0AA0								

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SENTRON Multifunction Measuring Instruments

■ Overview

The PAC RS485 expansion module has the following features:

- PAC RS485 plug-in communication module for SENTRON PAC multifunction measuring instruments
- Parameterizable from the front of the device or using parameterization software
- Support for Modbus RTU and SEAbus protocols
- Plug and play
- Baud rates of 4.8 / 9.6 / 19.2 and 38.4 kBd are supported
- Connection by means of 6-pole screw terminals
- No external auxiliary power necessary
- Status indication by LED on the module

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■ Application

The SENTRON PAC RS485 communication module is plugged onto the rear of the PAC multifunction measuring instrument. The device identifies the module automatically and presents the parameters of relevance for this module for selection in the parameterization menu. The state of the module is indicated by the integrated LED.

In connection with the SENTRON PAC multifunction measuring instrument, the Modbus RTU and SEAbus protocols are supported with baud rates of 4.8 / 9.6 / 19.2 and 38.4 kBd.

■ Selection and ordering data

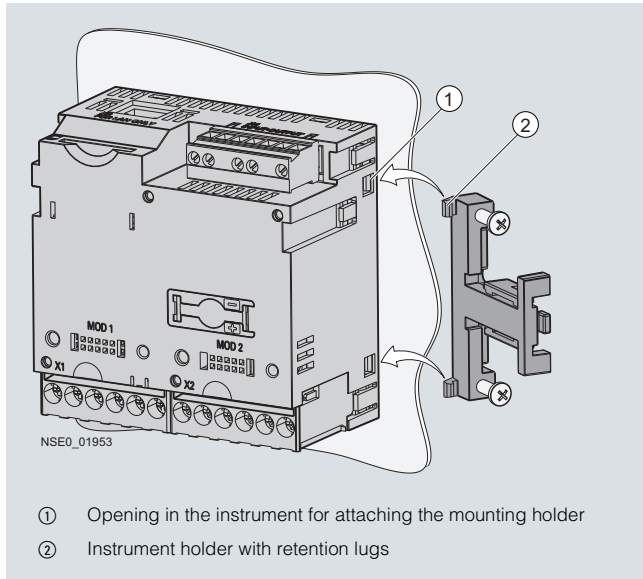| Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
PAC RS485							
Expansion modules for SENTRON PAC3200 and PAC4200 (SEAbus and Modbus RTU)	A	**7KM9 300-0AM00-0AA0**		1	1 unit	133	0.041

7KM9300-0AM00-0AA0

SENTRON Multifunction Measuring Instruments

PAC3200 and PAC4200
multifunction measuring instruments

■ **Design**

Mounting in the shortest possible time

The instruments of the SENTRON PAC3200 and PAC4200 series come with a plastic enclosure for installation in control panels. They are fastened by one holder on the right side of the instrument and one on the left side.

NSE0_01953

① Opening in the instrument for attaching the mounting holder

② Instrument holder with retention lugs

Mounting the SENTRON PAC3200 and PAC4200

To mount the instruments they are inserted from the front through the square cut-out in the control cabinet door and secured with the supplied combination latching holders.
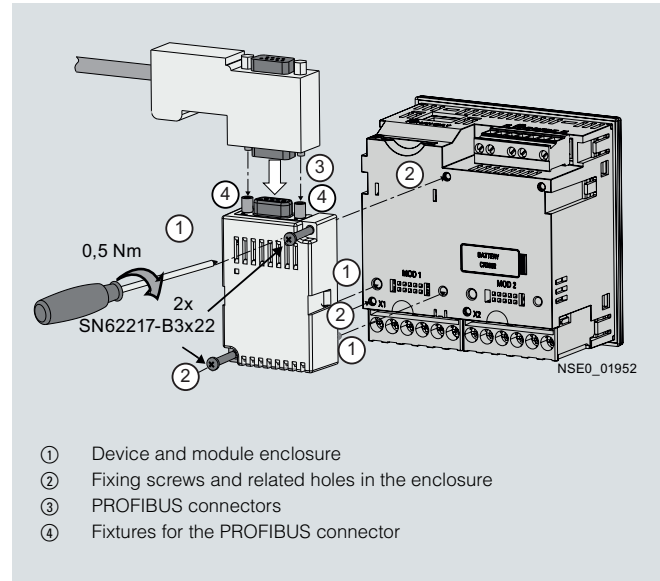
The pair of combination latching holders performs two functions:

• Thanks to the latching mechanism the fitter can fasten the device in the control panel quickly and without the use of any tools.

• If greater protection is required, the four latching holder screws can be used to increase contact pressure evenly on all sides so that the control panel cut-out is completely sealed by the integrally molded gasket, which is a standard feature. It is no longer necessary to insert an accessory gasket in addition.

From the front, i. e. in the installed state, the device thus complies with Safety Class II with degree of protection IP65.

As the result of the easy-to-use combination latching holders and the small mounting depth it is easy to mount several devices side by side.
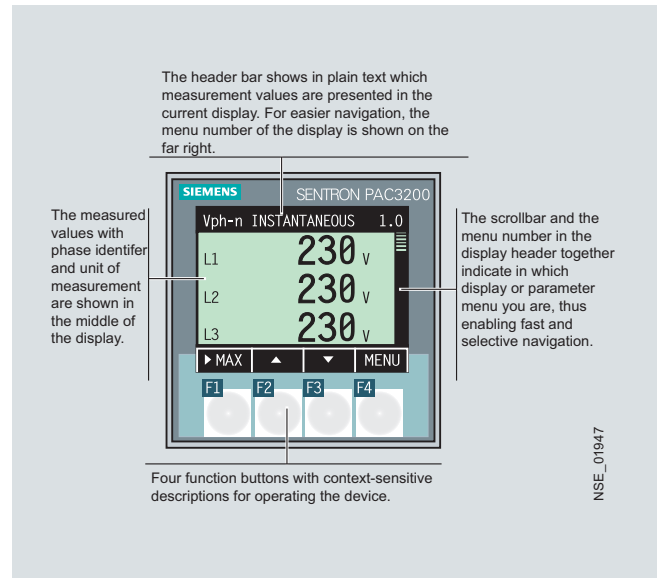
The following illustration of the rear view of the SENTRON PAC3200 and top view of the expansion module (in this case the PAC PROFIBUS DP) shows by way of example how the SENTRON PAC3200 and the expansion module are joined together. An expansion module is mounted on a SENTRON PAC4200 in similar manner.

0,5 Nm

2x
SN62217-B3x22

NSE0_01952

① Device and module enclosure

② Fixing screws and related holes in the enclosure

③ PROFIBUS connectors

④ Fixtures for the PROFIBUS connector

Mounting the expansion module, for example the PAC PROFIBUS DP on the SENTRON PAC3200 and PAC4200

Operating and indicating elements

The following picture shows the instrument from the front, divided into the function blocks provided for operation and monitoring, including a description.

The header bar shows in plain text which measurement values are presented in the current display. For easier navigation, the menu number of the display is shown on the far right.

The measured values with phase identifer and unit of measurement are shown in the middle of the display.

SIEMENS   SENTRON PAC3200

Vph-n INSTANTANEOUS   1.0

L1   230 v
L2   230 v
L3   230 v

▶ MAX   ▲   ▼   MENU

F1   F2   F3   F4

The scrollbar and the menu number in the display header together indicate in which display or parameter menu you are, thus enabling fast and selective navigation.

Four function buttons with context-sensitive descriptions for operating the device.

NSE_01947

Front of the SENTRON PAC3200 and PAC4200

The instruments are operated using 4 function buttons, which correspond to the 4 text fields situated above them. The buttons are each assigned with several functions; their function at any time depends on the menu then displayed. Which function a button has in the respective menu is indicated by the text in the related display.

SENTRON Multifunction Measuring Instruments

■ Function

Precise measurement of variables

With its high accuracy, the SENTRON PAC3200 meets the increasing demand for precise power measurement. It satisfies the accuracy requirements of Class 0.5S according to IEC 62053-22 for solid-state active consumption meters.

The SENTRON PAC4200 supplies measurement data of far greater accuracy for determining and processing power data and for assessing the quality of the network:

- For voltage, current, active power and active energy the instrument achieves for example Class 0.2 according to IEC 61557-12.
- For active energy this corresponds to Class 0.2S according to the international meter standard IEC 62053-22.

The SENTRON PAC4200 thus meets the accuracy requirements of the high-precision meters used by the power supply companies, which are normally reserved for exacting industrial applications.

Transparency in power matters

Altogether 10 power meters for active, reactive and apparent work monitor the power input and power feedback continuously and separated according to high rate and low rate.

In addition to the endless counters for apparent, active and reactive power, the PAC4200 saves the power consumption levels per day for a period of 365 days. A cut-off date assessment accurate to the day is possible by entering the required calculation period. The power consumption for a preselected period can be called up either directly on the instrument or using the communication interface.

Daily counter indicator of the PAC4200

The SENTRON PAC3200 and PAC4200 supply the power averages for active and reactive power required for the load profile record and serve as reliable suppliers of data for a higher-level power management system.

Load profile record with the PAC4200

As soon as the power drawing conditions per measurement period or the reactive work components begin to affect a company's power costs it is important to have an exact picture of the load profile of one's own plant.

With its generously sized memory, the SENTRON PAC4200 is ideal for this purpose. With a selected measurement period of 15 minutes it records for 40 days the load profile for apparent, active and reactive work with minimum and maximum values for input and feedback. The length of the recording can be increased or decreased depending on the measurement period selected.

The measurement period can be synchronized with the period used by the power supply company so that the measurement data can be compared with the power supply company's records. This can be done either through one of the digital inputs

or using a synchronization command over the communication interface. If there is no synchronization possibility available, the instrument synchronizes itself with its internal clock.

For the load profile record the SENTRON PAC4200 supports the fixed block method (only one measurement period) or the rolling block method (division of the measurement period into several sub-periods). In addition it is possible to choose between arithmetic or cumulated power average calculation.

Individual adaptation of the load profile record is possible with the SENTRON powerconfig configuration software.

Powerful communication

Ethernet interface

Unique in these instrument classes up to now is the Ethernet interface provided as a standard feature which can be used not only for configuration purposes using SENTRON powerconfig but also for system communication in a higher-level power management system. This makes additional hardware superfluous.

The 10 Mbit/s Ethernet interface of the SENTRON PAC3200 permits one communication connection while the 10/100 Mbit/s Ethernet interface of the PAC4200 permits three such connections simultaneously. Both instruments support the Modbus TCP protocol.

The Ethernet interface of the SENTRON PAC4200 offers not only a higher data transmission rate but also additional functions:

- Auto MDI(X) (auto crossover) and auto negotiation
- Serial gateway for connecting devices with an RS485 interface to an Ethernet network

PROFIBUS DP interface

Use of the multifunction measuring instruments in PROFIBUS DP is made possible by the optionally available SENTRON PAC PROFIBUS DP expansion module.

Integration in PROFIBUS DP takes place using a standardized text file called the GSD (Geräte-Stammdaten-Datei). This GSD file is read into the master with the help of the PROFIBUS configuration tool. The master thus receives the slave-specific framework of the PAC3200 or PAC4200 and can start cyclic operation immediately. With DP V1 the SENTRON PAC PROFIBUS DP expansion module also supports acyclic data traffic.

Modbus-RTU or SEAbus interface

Use of the multifunction measuring instruments in Modbus-RTU or SEAbus field buses is made possible by the optionally available PAC RS485 expansion module.

Integration in Modbus RTU or SEAbus systems takes place through parameterization of the device address and baud rate using the device keyboard or SENTRON powerconfig.

### PAC4200 provides comprehensive information about events

Voltage failures, limit value violations, switching operations, unit configuration changes, counter resets or deleting of the memory are just some of the possible events which the PAC4200 records and saves to the events list.

The integrated memory has space for more than 4000 operation, control and system-related events, which the user can organize according to his requirements.

For example, in addition to the three selectable alert levels for information, warning or alarm it is possible to choose the priority of each event independently of each other. And it is also possible of course to choose whether an event is to be recorded at all and in which order the events are to be shown on the display.

SENTRON Multifunction Measuring Instruments

PAC3200 and PAC4200
multifunction measuring instruments
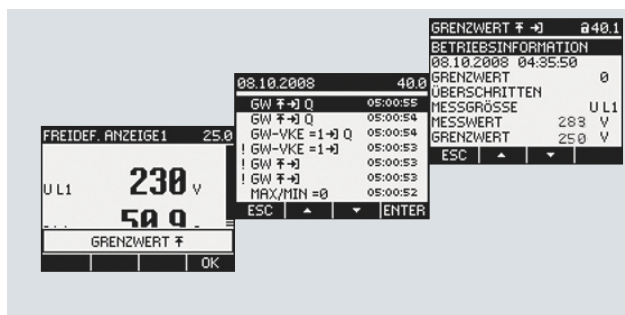
Three-level event indicators on the PAC4200

Events are presented in three levels:

- Popup window for signaling important events, e. g. in the case of alarm indications. Mandatory acknowledgment is selectable for particularly important events.
- Events list for clear-cut presentation of the individual events with symbols indicating the alert level
- Detail window with particulars of the event, e. g. event class, date and time of occurrence, reason for triggering the event and, where applicable, the measurement variable in question with its measured value and limit value

The events record can be configured with the SENTRON powerconfig configuration software.

Plain-text displays

A large, full graphic LCD display enables easy reading even from great distances. To make sure that this is also the case in poor light conditions, the background lighting can be individually adapted to the actual requirements.

In addition to the standard indicators of the SENTRON PAC3200, the PAC4200 offers up to four user-definable indicators. These indicators can be used for individual arrangement of the desired measurement variables and for their presentation as bar or digital indicators.

Operation, also multilingual

Operation is quick to learn thanks to the intuitive user guidance using the four function buttons together with multilingual plain text displays. Direct navigation is available in addition for the experienced user, who can thus call up the menus of choice even more quickly.

Following languages can be selected: German, English, Portuguese, Turkish, Spanish, Italian, French, Chinese and Russian.
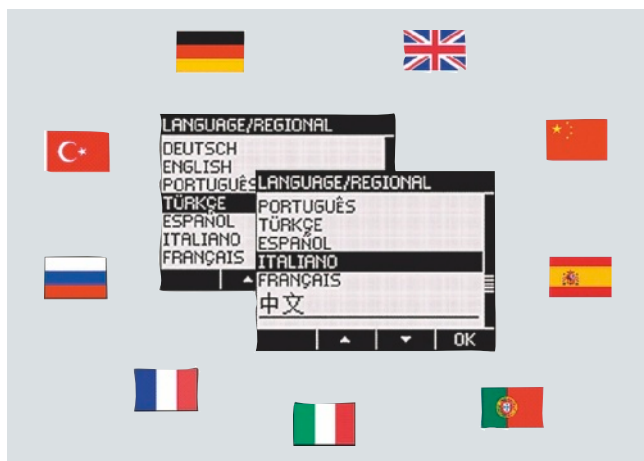
Operating languages of the PAC3200 / PAC4200

The product documentation is also available in 9 languages.

Multifunctional digital inputs and outputs

The SENTRON PAC3200 is equipped with one and the SENTRON PAC4200 with two multifunctional digital inputs and outputs, to each of which various functions can be assigned.

Functions of the digital input

	PAC3200	PAC4200
Number of integrated digital inputs	1	2
Counting input for work pulses (kWh, kvarh) from third-party devices	✓	✓ + any energy form
Status monitoring of a switching device	✓	✓
Rate switchover between high rate and low rate	✓	✓
Signal input for synchronization of the measurement period	✓	✓
Time synchronization of the internal clock with a master clock	--	✓

Functions of the digital output:

	PAC3200	PAC4200
Number of integrated digital outputs	1	2
Pulse output for sending work pulses (kWh, kvarh)	✓	✓
Alarm output for signaling limit value violations	✓	✓
Operating state indicator	✓	✓
Phase sequence indicator	✓	✓
Switching output for remote control using system software	✓	✓
Synchronization of third-party devices with one's own measurement period	--	✓

✓ Available

-- Not available

Monitoring of measurement variables for limit value violations

The SENTRON PAC3200 has a function for monitoring up to 6 and the PAC4200 up to 12 measurement variables for violation of an adjustable upper or lower limit value.

The following variables can be monitored: voltage, current, power, power factor, THD for voltage and current, frequency, unbalance of voltage and current.

In addition it is possible with the PAC4200 to monitor the phase angle, distortion current strength, individual network harmonics from the 3rd to the 31st harmonic, and sliding mean values.

The following can be assigned to each limit value:

- A measurement variable
- The monitoring mode (overshooting or undershooting)
- A limit value
- A delay time and
- A hysteresis

It is possible to select the action which will be triggered by violation of a limit value.

For example, a signal can be sent through the digital output or the communication interface. The integrated universal counter can be used to total the number of limit value violations. Whether a limit value has been violated is indicated on the device.

SENTRON Multifunction Measuring Instruments

Interconnected with logic operations...

Both instruments have a function for interconnecting limit values using logic operations as follows:

- PAC3200: AND / OR
- PAC4200: AND / OR / NAND / NOR / XOR / XNOR

Like the individual limit values, the result of the logic operation can also trigger selective actions, which were previously described in the section "Monitoring of measurement variables for limit value violations".

...and conveniently programmed with the PAC4200

In addition to the interconnection of limit values it is also possible with the PAC4200 to include the digital inputs in the logic operation.

On the SENTRON PAC4200 the logic operations are configured in user-friendly manner using a graphic programming interface. To each of the 5 logic gates it is possible to assign 4 random inputs (limit value or digital input) and one logic function (AND, OR, NAND, …).

From the small black bar at the inputs of the gates the user can see the state of the input at a glance.
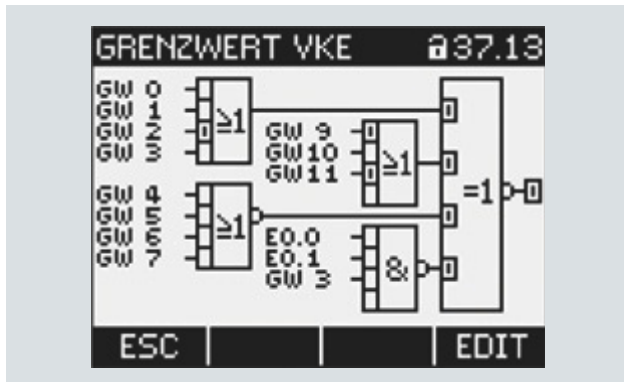
Logic operations with limit value events on the PAC4200

Monitoring of voltage and current for unbalance

The device measures, among other things, the unbalance of voltage and current in the network. Now that a limit value can also be assigned to these two parameters, problems due to unsymmetrical loads in the installation can be detected early and avoided.

Operating hours counter

An important service function is performed by the integrated operating hours counter, which can be used to monitor e. g. pumps, motors or machines. The counter measures the running time of a connected load, helping to ensure that important maintenance intervals are observed.

The count can be read out and evaluated by a PC. A higher-level power management system is thus able to generate a suitable maintenance message.

Universal

Both instruments, the SENTRON PAC3200 and the SENTRON PAC4200, can be used for measuring in two, three and four-conductor networks. Single-phase, 2-phase and 3-phase measurements are possible.

Thanks to their large measuring voltage range, the instruments can be directly connected in every low-voltage system up to a rated system voltage of 690 V (U_{L-L})[1]. Higher voltages can be measured using voltage transformers.

For measuring currents it is possible to use both x/1A and x/5A current transformers. Transformer ratios and current direction can be programmed on the device for adaptation to local conditions.

Protection against unauthorized access

The SENTRON PAC3200 and PAC4200 come with integrated password protection so that the power and parameter data are safe from unauthorized access. Changes to the parameterization can be traced using a configuration counter which can be read out through the communication interface.

1) Max. 500 V (UL-L) for version with DC power supply unit with extra-low voltage (7KM2111-1BA00-3AA0).

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SENTRON Multifunction Measuring Instruments

## PAC3200 and PAC4200
multifunction measuring instruments

■ Integration

When the SENTRON PAC3200 and PAC4200 are fully integrated in a power management system, they monitor the power consumption and help to monitor the operating state of the plant. Measured values, limit value violations, operating hours of a connected load or power flows are supplied by the instruments quickly and reliably.

Using the optionally available interface modules it is possible to integrate both instruments in every I&C system or every SIMATIC S7 environment.

System integration using function block libraries

Optionally available function block libraries make it easy to integrate the multifunction measuring instruments in the SIMATIC PCS 7 process control system and the SCADA-System SIMATIC WinCC. Together with the faceplates as user interface for operating and monitoring, the driver blocks and diagnostics blocks in the control system enable technologically important values and functions of the measuring devices to be displayed and operated.
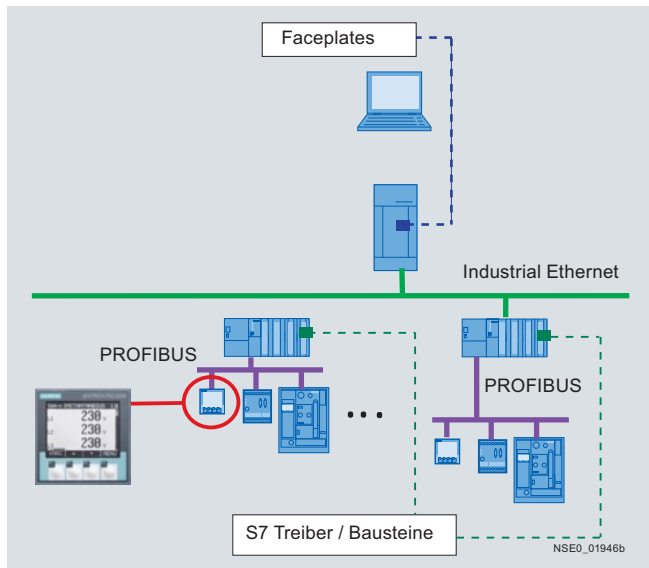

Integration of the SENTRON PAC3200/PAC4200 in SIMATIC PCS 7 / WinCC powerrate

System integration of RS485 field bus devices through Ethernet

A special feature is the integrated gateway function of the PAC4200. It enables a cost-effective and simple connection of devices with an RS485 interface to an Ethernet network

Everything required is provided by the SENTRON PAC RS485 expansion module, to which a maximum of 31 lower-level devices can be connected without a repeater and as many as 247 with a repeater.

The gateway function of the SENTRON PAC4200 supports the Modbus or SEAbus protocols and can be parameterized using SENTRON powerconfig.
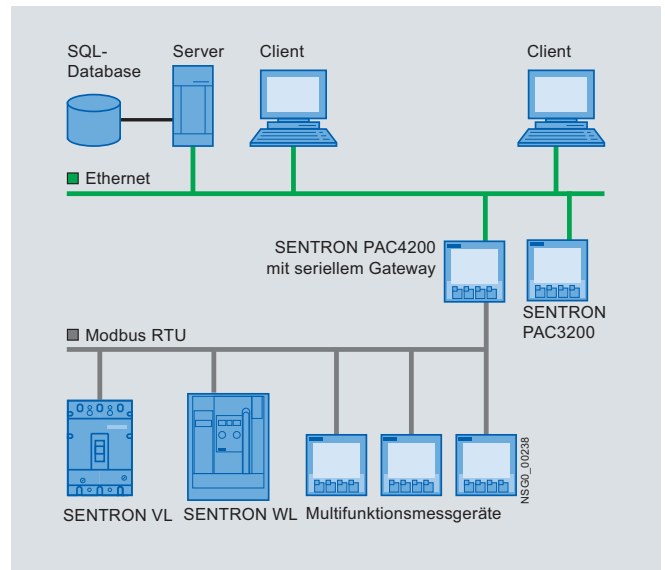
Connecting Modbus-RTU devices to a power management system through PAC4200

■ Configuration

Configuration directly on the instrument

Both the SENTRON PAC3200 and the SENTRON PAC4200 are designed for user-friendly configuring directly on the instrument. All menus are displayed in plain text and are self-explanatory.

Configuring interface of the SENTRON PAC3200 and PAC4200

### Configuring with SENTRON powerconfig is user-friendly

The SENTRON powerconfig software is included in the scope of supply of the PAC3200 / PAC4200 multifunction measuring instruments. In Version 2.0 and higher, the measuring devices themselves as well as the 3WL and 3VL circuit breakers are easily configured from the PC through Modbus.

SENTRON powerconfig runs on the following operating systems:
- Windows 2000 Professional SP4 and higher
- Windows XP Professional SP2 and higher
- Microsoft Windows XP Professional 32-Bit, SP2 and SP3
- Microsoft Windows Vista 32-Bit Ultimate SP1
- Microsoft Windows Vista 32-Bit Business SP1

After SENTRON powerconfig has been installed, the multifunction measuring instruments can be connected to the PC as follows:
- Using a commercially available crossover cable which connects the instrument directly to the network interface of the PC. With the PAC4200 it is also possible to use a commercially available patch cable thanks to the Auto MDI(X) function.
- Or using a hub/switch in an Ethernet network. In this case, conventional patch cables can be used.
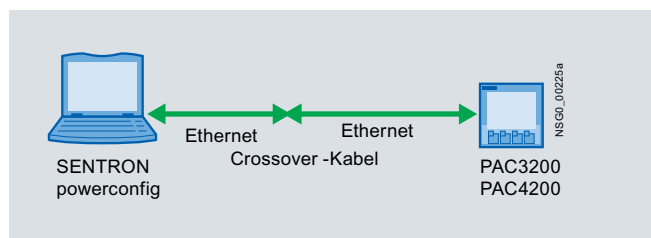
Direct connection between the PC and PAC3200/PAC4200
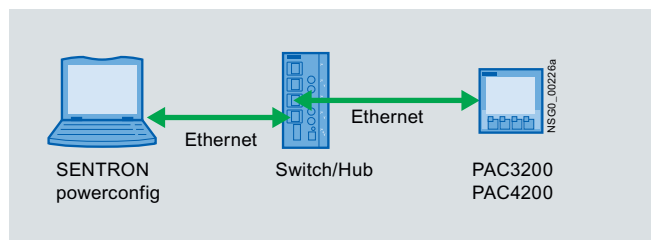
Connection between the PC and PAC3200/PAC4200 through a hub/switch

Note:

The required cable material is not included in the scope of supply.

Information on connecting the 3WL and 3VL circuit breakers to COM11 / COM16 can be found in the product documentation issued for the circuit breakers.

Simplified making of connections through search function

SENTRON powerconfig comes with a search function which facilitates the finding of all PAC3200 and PAC4200 units connected to the same network. Making the first connection is thus easier. The communication status and the configuration status are indicated by symbols in the tree view.

Configuration management

With the project manager in SENTRON powerconfig it is possible to save device configurations and also to copy them if required.

For the documentation of device configurations, SENTRON powerconfig has a user-friendly printing function with preview feature.

Off-line device configurations

Using the offline device configurations, all the devices of a plant can be configured in the comfort of the office as follows:
- Creating the offline device configurations: All available devices are grouped in a library. The required devices are selected from the library and moved into the device tree by means of Drag & Drop.
  Expansion modules appear as a device feature with related slot
- Sending the offline device configurations: The offline device configurations can be sent to the devices as soon as they are connected to SENTRON powerconfig.

User interface of SENTRON powerconfig

The individual subwindows can be positioned on the monitor as required, including outside the main window of SENTRON powerconfig. In this way the interface of the software can be adapted to the user's individual preferences.
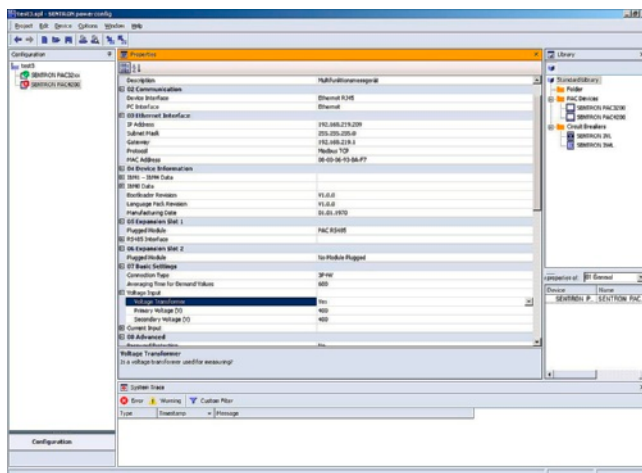
Configuring interface of SENTRON powerconfig

Data export for memory contents of the PAC4200

SENTRON powerconfig V2.0 permits not only configuration of the SENTRON PAC4200 but also read-outs and exports of event records and load profile records.

The memory contents of the SENTRON PAC4200 can be exported as files into any folder on the PC. These files can then be opened for example with Microsoft Excel and be processed further into reports, tables or reserve curve presentations.

SENTRON Multifunction Measuring Instruments

PAC3200 and PAC4200
multifunction measuring instruments

■ Technical specifications

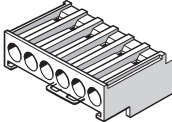| Instrument			PAC3200	PAC4200
Measurement				
Networks				
Voltage types			Only for alternating voltage systems	Only for alternating voltage systems
Number of phases			1-, 2- or 3-phase	1-, 2- or 3-phase
Number of conductors			3 or 4 conductors	3 or 4 conductors
Load type			Same or any load	Same or any load
Quadrants			4 quadrants (input and output)	4 quadrants (input and output)
Frequency of fundamental wave		Hz	50/60	50/60
Signal detection				
For power, current and voltage			Seamless	Seamless
Curve shape			Sinusoidal or distorted	Sinusoidal or distorted
Measuring inputs for voltage				
Rated voltage 3 AC U_e (max.)				
Device with AC/DC power supply unit with wide voltage range			7KM2112-0BA00-3AA0 or 7KM2112-0BA00-2AA0	7KM4 212-0BA00-3AA0 or 7KM4 212-0BA00-2AA0
	Phase/N	V AC	400 (max. 347 for UL) +20 %	400 (max. 347 for UL) +20 %
	Phase/phase	V AC	690 (max. 600 for UL) +20 %	690 (max. 600 for UL) +20 %
Device with DC power supply unit with extra-low voltage			7KM2111-1BA00-3AA0	--
	Phase/N	V AC	289 +20 %	--
	Phase/phase	V AC	500 +20 %	--
Minimum measurable voltage	Phase/N	V AC	40	11.5
	Phase/phase	V AC	69.3	20
Voltage withstand capability				
	1.2/50 µs	kV	9.5	9.5
Input resistance				
	Phase/N	MΩ	1.05	1.05
Power consumption				
	Per phase	mW	220	220
Measuring category			CAT III	CAT III
Measuring of voltages > 690 or 500 V AC using voltage transformer				
Measuring inputs for current				
Rated current 3 AC I_e per phase	Adjustable	A AC	1 or 5	1 or 5
Permanent load capacity	Permanent	A AC	10	10
Surge overload capability	For 1 second	A AC	100	100
Power consumption	Per phase	mVA	4 at 1 A, 115 at 5 A	4 at 1 A, 115 at 5 A
Measuring category			CAT III	CAT III
Zero point suppression	Adjustable	%	0 ... 10	0 ... 10
Measuring of currents using current transformer x/1 A or x/5 A				
Supply voltage				
AC/DC power supply unit with wide voltage range			7KM2112-0BA00-3AA0 or 7KM2112-0BA00-2AA0	7KM4212-0BA00-3AA0 or 7KM4212-0BA00-2AA0
Operating range		V AC	95 … 240 ±10 %	95 … 240 ±10 %
		V DC	110…340 ±10 %	110…340 ±10 %
Rated frequency of the AC operating range		Hz	50/60	50/60
DC power supply unit with extra-low voltage			7KM2111-1BA00-3AA0	--
Operating range		V DC	22 … 65 ±10 %	--
Power consumption (max.)				
Without optional expansion module		AC VA	6	11
		DC W	3	5.5
Including optional expansion module		AC VA	8	32
		DC W	3.5	11
Overvoltage category			CAT III	CAT III

SENTRON Multifunction Measuring Instruments

			PAC3200 and PAC4200 multifunction measuring instruments	

Instrument			PAC3200	PAC4200
Fault limits				
Voltage				
	Phase/N	%	±0.3	±0.2[1]
	Phase/phase	%	±0.3	±0.2[1]
Current		%	±0.2	±0.2[1]
Apparent power		%	±0.5	±0.5[1]
Active power		%	±0.5	±0.2[1]
Reactive power		%	±2	±1[1]
Frequency		%	±0.05	±0.05[1]
Power factor		%	±0.5	±0.5[1]
Apparent energy			±0.5	±0.5[1]
Active energy	Acc. to IEC 62053-22		Class 0.5S	Class 0.2S
Reactive energy	Acc. to IEC 62053-23		Class 2	Class 2
When taking measurements on external current or voltage transformers, the accuracy of the measurements depends on the quality of the transformers.				
Digital inputs				
Number			1	2
Rated value		V DC	24	24
Max. input voltage		V DC	30 (SELV or PELV supply)	30 (SELV or PELV supply)
Input threshold	Signal "1"	V DC	> 13	>19
	Signal "0"	V DC	< 8	< 10
Input current	Signal "1"	DC mA	7	4
Max. input delay time	From "0" to "1"	ms	5	5
	From "1" to "0"	ms	5	5
Digital outputs				
Number			1	2
Function			Switching or pulse output	Switching or pulse output
Required operational voltage		V DC	12 ... 24	12 ... 24
Max. switched output voltage		V DC	30 (SELV or PELV supply)	30 (SELV or PELV supply)
Output current signal "1"				
Typical		DC mA	10 ... 27	10 ... 27
Permanent		DC mA	100	100
Short-time overload for max. 100 ms		DC mA	300	300
Resistive load		DC mA	100	100
Switching frequency		Hz	17	17
Max. output delay time	From "0" to "1"	ms	5	5
	From "1" to "0"	ms	5	5
Pulse output function			Signal characteristic acc. to IEC 62053-31	Signal characteristic acc. to IEC 62053-31
Adjustable pulse duration		ms	30 … 500	30 … 500
Minimum adjustable time frame		ms	10	10
Short-circuit protection			Yes	Yes

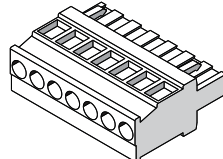[1] Satisfies the specified function-related accuracy classes according to IEC61557-12.
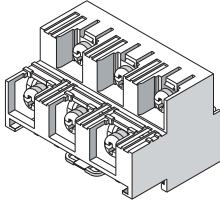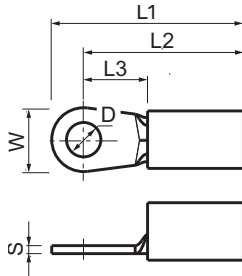
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PAC3200 and PAC4200
multifunction measuring instruments

Instrument			PAC3200	PAC4200
Communication				
Ethernet				
Version			RJ45 (8P8C)	RJ45 (8P8C)
Usable cable types (ground necessary)			Twisted pair (CAT 5)	Twisted pair (CAT 5)
Protocol			Modbus TCP	Modbus TCP
Transmission rate max.		MBit/s	10	10/100
Supported functions			--	Auto negotiation and auto MDI(X)
Ethernet ports			1	2
Max. number of simultaneous connections			1	3
Max. update time at the interface for momentary values		ms	200	200
Serial gateway				
Protocol (Ethernet)			--	Modbus TCP
Protocol (lower-level devices)			--	Modbus RTU or SEAbus
Use requirement			--	PAC RS485 expansion module
Max. number of lower-level devices			--	Without repeater: 31 With repeater: 247
PROFIBUS DP				
Using expansion module	PAC PROFIBUS DP V1		Yes	Yes
Transmission rate max.		MBit/s	12	12
Variables to be transmitted			Definable using GSD file	Definable using GSD file
RS485				
Using expansion module	PAC RS485		Yes	Yes
Transmission rates		kBd	Optionally 4.8 /9.6 /19.2 / 38.4	Optionally 4.8 /9.6 /19.2 / 38.4
Protocol	Selectable		SEAbus or Modbus RTU	SEAbus or Modbus RTU
Indicating and operating				
Display type			LCD, monochrome	LCD, monochrome
Types of indication			Alphanumeric and text	Full graphic
Resolution		Dots	128 x 96	128 x 96
Size		mm	72 x 54	72 x 54
Contrast			Adjustable	Adjustable
Display			Display invertible, pos/neg mode	Display invertible, pos/neg mode
Background lighting				
Background color			White	White
Lighting intensity			Adjustable	Adjustable
Lighting intensity reduced			Adjustable	Adjustable
Time until reduction of lighting intensity		min	0 ... 99	0 ... 99
Update time		s	0.33 … 3	0.33 … 3
Languages			German, English, Portuguese, Turkish, Spanish, Italian, French, Chinese and Russian	German, English, Portuguese, Turkish, Spanish, Italian, French, Chinese and Russian

SENTRON Multifunction Measuring Instruments

Instrument			PAC3200	PAC4200
Connection elements and terminals				
Measuring inputs and supply voltage			⊕ **Screw terminals**	
Conductor cross-sections	Solid	mm²	1 x 0.5 ... 4	1 x 0.5 ... 4
			AWG 1 x 20 ... 12	AWG 1 x 20 ... 12
		mm²	2 x 0.5 ... 2.5	2 x 0.5 ... 2.5
			AWG 2 x 20 ... 14	AWG 2 x 20 ... 14
	Finely stranded with end sleeve	mm²	1 x 0.5 ... 2.5	1 x 0.5 ... 2.5
			AWG 1 x 20 … 12	AWG 1 x 20 … 12
		mm²	2 x 0.5 ... 1.5	2 x 0.5 ... 1.5
			AWG 2 x 20 … 16	AWG 2 x 20 … 16
Tool size	± screw, Pozidriv		2	2
Measuring inputs and supply voltage			⊕ **Ring terminal lug connections**	
Conductor cross-sections	Dependent on ring terminal lug used	mm²	1 x 1.0...6.0	1 x 1.0...6.0
			AWG 1 x 18...10	AWG 1 x 18...10
		mm	D: 3...4	D: 3...4
			S: 0.75 ... 1.0	S: 0.75 ... 1.0
			W: ≤ 8	W: ≤ 8
			L1: ≤ 24	L1: ≤ 24
			L2: ≤ 20	L2: ≤ 20
			L3: ≥ 8	L3: ≥ 8
		Inch	D: 0.118 ... 0.157	D: 0.118 ... 0.157
			S: 0.029 ... 0.039	S: 0.029 ... 0.039
			W: ≤ 0.314	W: ≤ 0.314
			L1: ≤ 0.944	L1: ≤ 0.944
			L2: ≤ 0.787	L2: ≤ 0.787
			L3: ≥ 0.314	L3: ≥ 0.314
Tool size	± screw, Pozidriv		2	2
Required tool			Crimping or fitting tool for ring terminal lugs	Crimping or fitting tool for ring terminal lugs
Digital output, digital input			⊕ **Screw terminals**	
Conductor cross-sections	Solid	mm²	1 x 0.2 … 2.5	1 x 0.2 … 2.5
		mm²	2 x 0.2 … 1.0	2 x 0.2 … 1.0
			AWG 1 x 24 ... 12	AWG 1 x 24 ... 12
	Finely stranded with end sleeve	mm²	1 x 0.25 … 2.5	1 x 0.25 … 2.5
		mm²	2 x 0.25 … 1.0	2 x 0.25 … 1.0
			AWG 1 x 24 … 12	AWG 1 x 24 … 12
Tool size	± screw, Pozidriv		1	1
Dimensions and weights				
Enclosure dimensions (W x H x D)				
Without expansion module		mm	96 x 96 x 56	96 x 96 x 82
With expansion module		mm	96 x 96 x 78	96 x 96 x 104
Mounting depth				
Without expansion module		mm	51	77
With expansion module		mm	73	99
Weight				
Without expansion module	Approx.	g	325	450
With expansion module	Approx.	g	370	540
Control panel cut-out		mm	92$^{+0.8}$ x 92$^{+0.8}$	92$^{+0.8}$ x 92$^{+0.8}$
Enclosure for installing in control panel			Acc. to IEC 61554	Acc. to IEC 61554
Control panel thickness		mm	0.5 … 4	0.5 … 4
Mounting position			Vertical	Vertical

L1
L2
L3
D
W
S
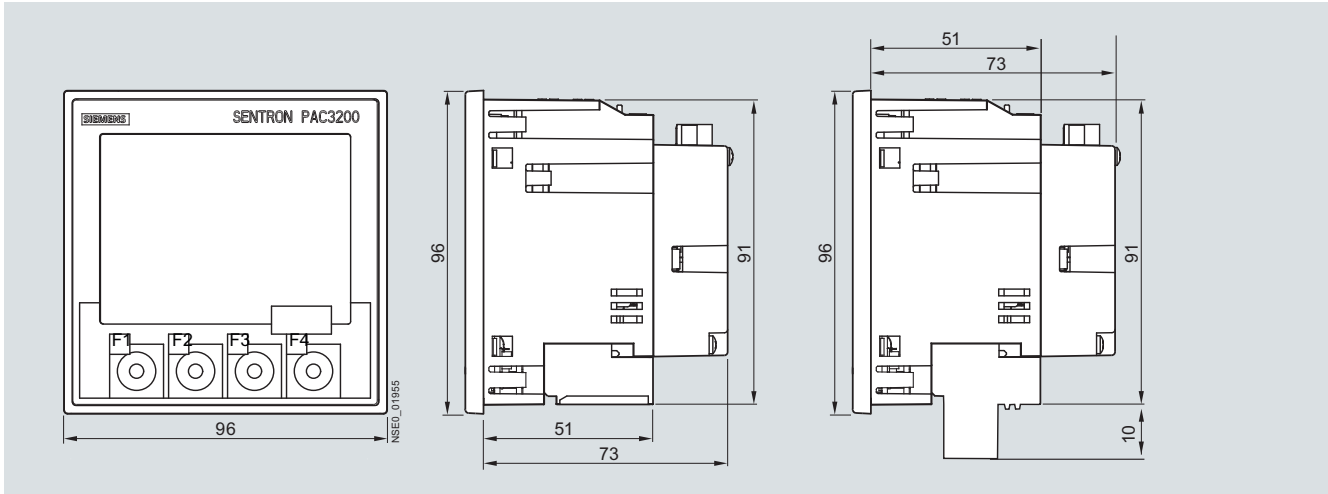
SENTRON Multifunction Measuring Instruments

**PAC3200 and PAC4200
multifunction measuring instruments**

Instrument		PAC3200	PAC4200
Degree of protection and safety class			
Safety class acc. to EN 61010-1			
From the front when installed		II	II
Degree of protection acc. to EN 60529			
All instruments	On front	IP65	IP65
Instrument with screw terminals	Rear	IP20	IP20
Instrument with cable lug terminals	Rear	IP10	IP10
Ambient conditions			
Temperature range			
Operating temperature	°C	-10 … + 55	-10 … + 55
Storage and transport temperature	°C	-25 … + 70	-25 … + 70
Relative air humidity At 25 °C without condensation	%	95	95
Operating altitude			
Above sea level up to max.	m	2000	2000
Degree of pollution		2	2
Battery for measurement variables buffer			
Recommended battery types	Non-rechargeable types	--	BR2032 or CR2032
Approval		--	Acc. to UL1642
Nominal voltage/nominal discharge current	V/mA	--	3 / 0.2
Minimum permissible reverse current	mA	--	5
Suitable for ambient temperatures up to at least	°C	--	70
Access privileges			
Password protection		4-digit numeric code	4-digit numeric code
Password protection prevents the following:		Effective through:	Effective through:
• Changing of the instrument settings, including the password		• Direct input on the instrument	• Direct input on the instrument
• Changing and deleting of values			• Through the Ethernet interface
• Deleting of data and memory content			• Through the SENTRON PAC RS485 expansion module
• Setting and resetting of counts			
Reading out of measured values and memory content		Possible without restriction	Possible without restriction
Standards and approvals			
CE	EU	Acc. to the CE conformity declaration	Acc. to the CE conformity declaration
cULus	USA / Canada	Acc. to UL File E314880	Acc. to UL File E314880
UL50		Type enclosure 5	Type enclosure 5
FCC		Class A, Part 15 Subpart B	Class A, Part 15 Subpart B
Environmental tests		IEC 60068	IEC 60068

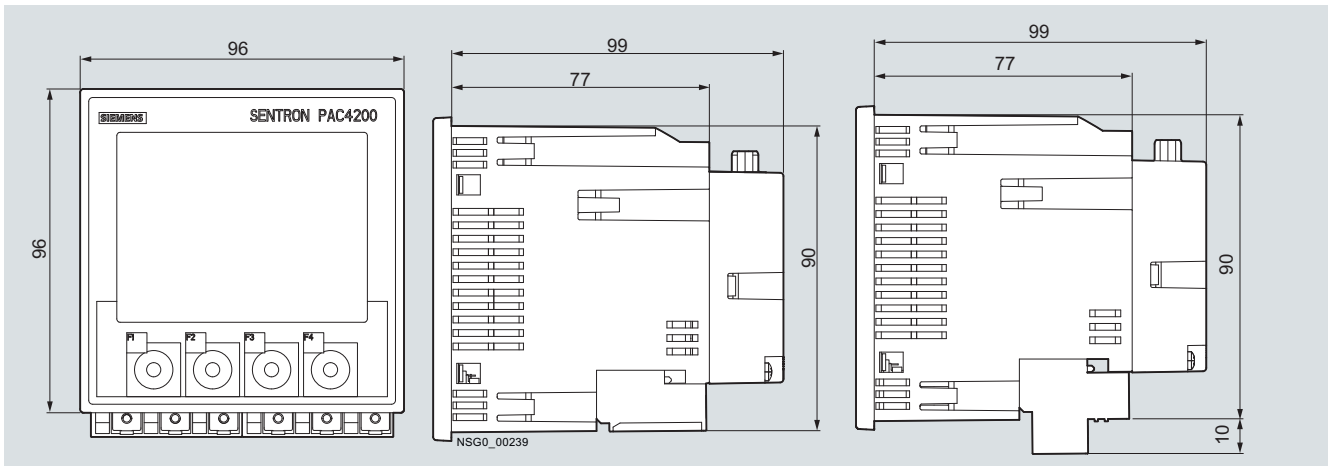# SENTRON Multifunction Measuring Instruments

## ■ Dimensional drawings

Dimensions of the SENTRON PAC3200

Left: front view with screw terminals; middle: side view with screw terminals; right: side view with cable lug terminals
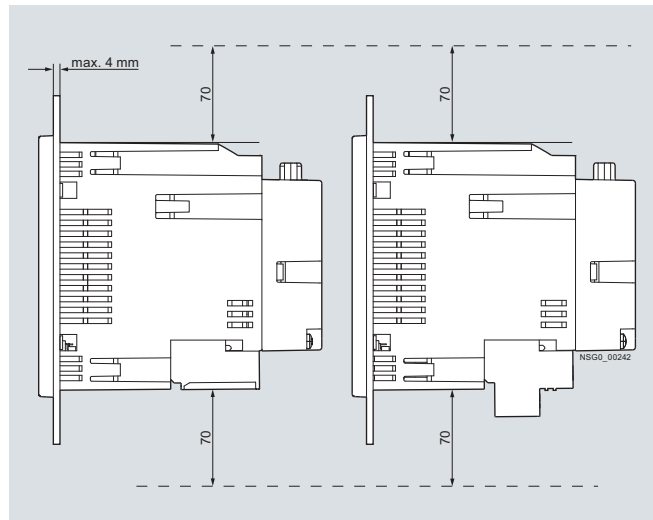
Dimensions of the SENTRON PAC4200

Left: front view with cable lug terminals; middle: side view with screw terminals; right: side view with cable lug terminals

Panel cut-out on the SENTRON PAC3200, side
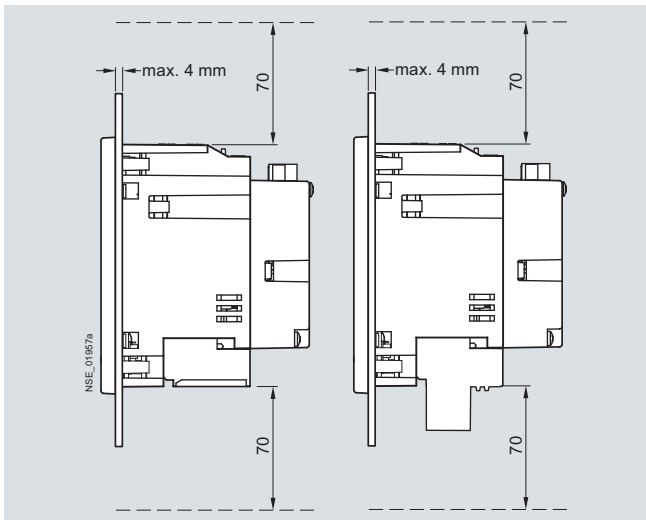
Left: PAC3200 with screw terminals,
right: PAC3200 with cable lug terminals
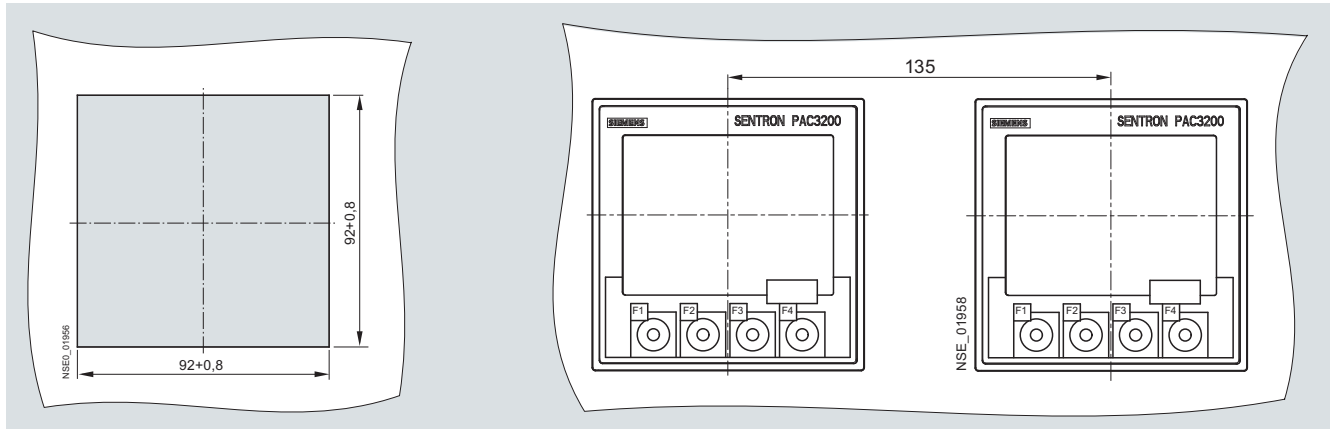
Panel cut-out on the SENTRON PAC4200, side

Left: PAC4200 with screw terminals,
right: PAC4200 with cable lug terminals

SENTRON Multifunction Measuring Instruments

PAC3200 and PAC4200
multifunction measuring instruments

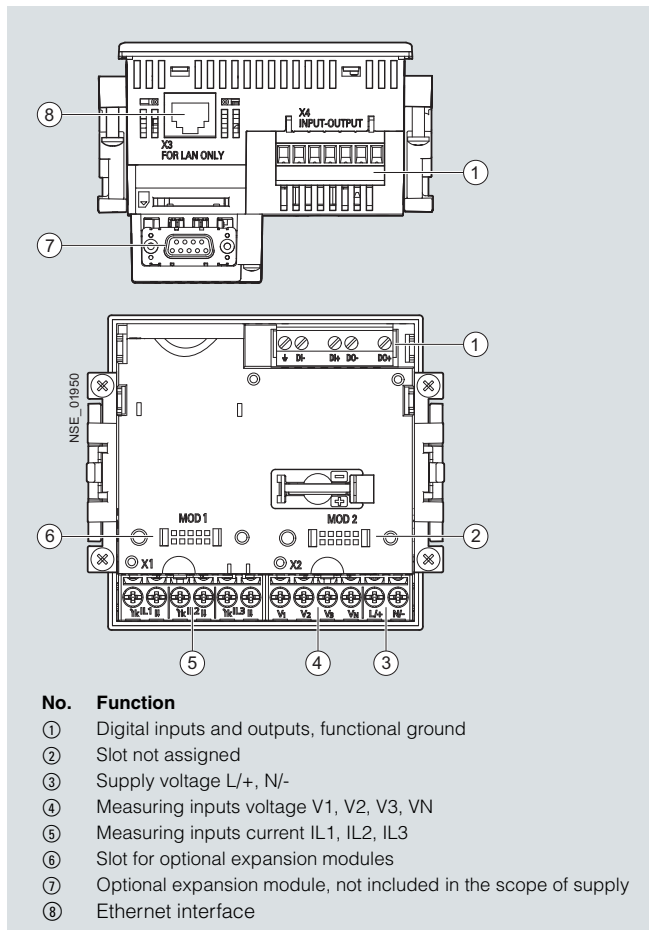## Panel cut-out and mounting clearances for the SENTRON PAC3200 and PAC4200

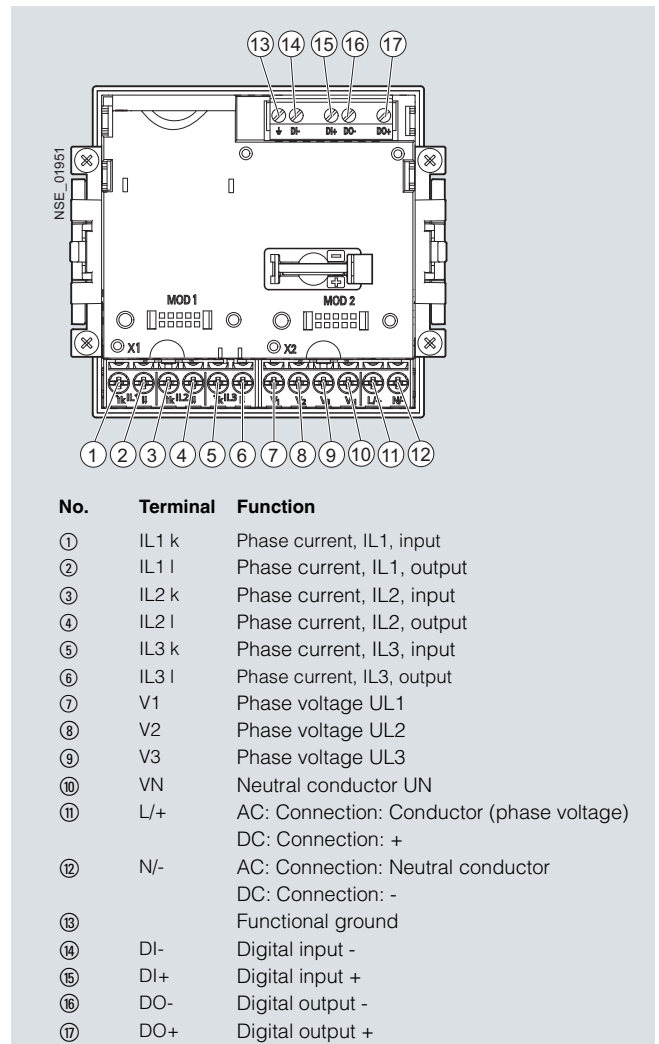Left: panel cut-out from the front,   right: mounting clearances of two instruments

■ Schematics

Connection graphics

Connection graphics for SENTRON PAC3200

No.	Function
①	Digital inputs and outputs, functional ground
②	Slot not assigned
③	Supply voltage L/+, N/-
④	Measuring inputs voltage V1, V2, V3, VN
⑤	Measuring inputs current IL1, IL2, IL3
⑥	Slot for optional expansion modules
⑦	Optional expansion module, not included in the scope of supply
⑧	Ethernet interface
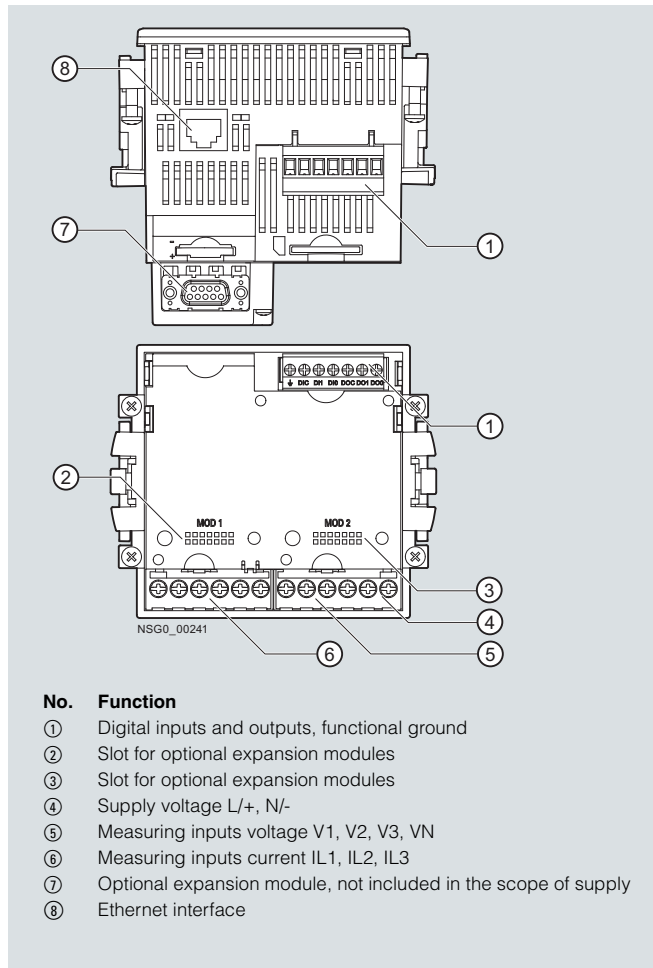
PAC3200 terminal assignment in overview

No.	Terminal	Function
①	IL1 k	Phase current, IL1, input
②	IL1 l	Phase current, IL1, output
③	IL2 k	Phase current, IL2, input
④	IL2 l	Phase current, IL2, output
⑤	IL3 k	Phase current, IL3, input
⑥	IL3 l	Phase current, IL3, output
⑦	V1	Phase voltage UL1
⑧	V2	Phase voltage UL2
⑨	V3	Phase voltage UL3
⑩	VN	Neutral conductor UN
⑪	L/+	AC: Connection: Conductor (phase voltage)
		DC: Connection: +
⑫	N/-	AC: Connection: Neutral conductor
		DC: Connection: -
⑬		Functional ground
⑭	DI-	Digital input -
⑮	DI+	Digital input +
⑯	DO-	Digital output -
⑰	DO+	Digital output +

PAC3200 terminal assignment in detail

Connection graphics for SENTRON PAC4200

PAC4200 terminal assignment in overview

No.   Function
①   Digital inputs and outputs, functional ground
②   Slot for optional expansion modules
③   Slot for optional expansion modules
④   Supply voltage L/+, N/-
⑤   Measuring inputs voltage V1, V2, V3, VN
⑥   Measuring inputs current IL1, IL2, IL3
⑦   Optional expansion module, not included in the scope of supply
⑧   Ethernet interface

No.	Terminal	Function
①	IL1 k	Phase current, IL1, input
②	IL1 l	Phase current, IL1, output
③	IL2 k	Phase current, IL2, input
④	IL2 l	Phase current, IL2, output
⑤	IL3 k	Phase current, IL3, input
⑥	IL3 l	Phase current, IL3, output
⑦	V1	Phase voltage UL1
⑧	V2	Phase voltage UL2
⑨	V3	Phase voltage UL3
⑩	VN	Neutral conductor UN
⑪	L/+	AC: Connection: Conductor (phase voltage)
		DC: Connection: +
⑫	N/-	AC: Connection: Neutral conductor
		DC: Connection: -
⑬		Functional ground
⑭	DIC	Digital inputs (common)
⑮	DI1	Digital input 1
⑯	DI0	Digital input 0
⑰	DOC	Digital outputs (common)
⑱	DO1	Digital output 1
⑲	DO0	Digital output 0

PAC4200 terminal assignment in detail

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SENTRON Multifunction Measuring Instruments

Expansion modules
## PAC PROFIBUS DP

Technical specifications

Communication		
PROFIBUS DP		
Transmission rate max.	MBit/s	12
Protocol		PROFIBUS DPV1
Variables to be transmitted		Definable using GSD file
Dimensions and weights		
Enclosure dimensions (W x H x D)		
Module enclosure for plug-in mounting	mm	43 x 63 x 22
Weight approx.	g	45
Degree of protection		
Degree of protection acc. to EN 60529		IP20
Ambient conditions		
Temperature range		
Operating temperature	°C	-10 … + 55
Storage and transport temperature	°C	-25 … + 70
Relative air humidity		
At 25 °C without condensation	%	95
Operating altitude		
Above sea level up to max.	m	2000
Degree of pollution		2

Dimensional drawings

Dimensions of PAC PROFIBUS DP expansion module, side and top
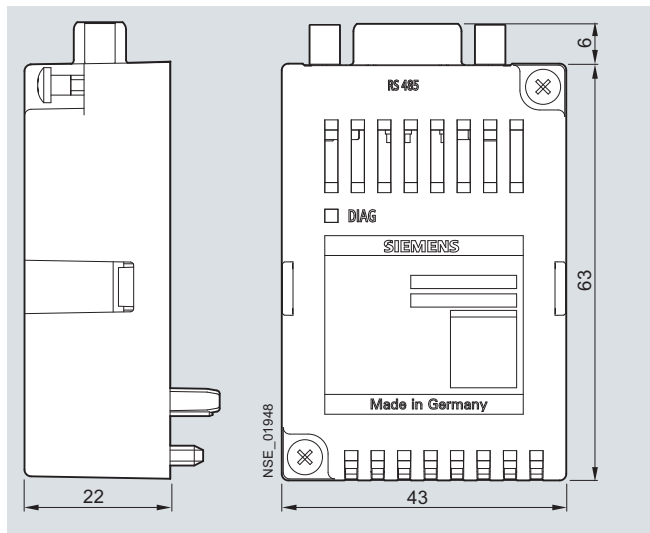
Dimensions of the plug connector between the PAC PROFIBUS DP expansion module and the SENTRON PAC multifunction measuring instrument
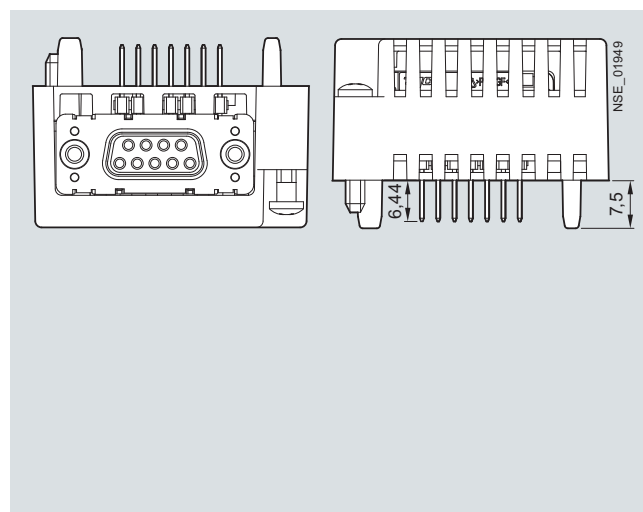
More information

More information can be found on the Internet at

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Technical specifications

Communication		
RS485		
Transmission rates	kBd	Optionally 4.8 /9.6 /19.2 / 38.4
Protocol		Optionally SEAbus or Modbus RTU (selectable)
Dimensions and weights		
Enclosure dimensions (W x H x D)		
Module enclosure for plug-in mounting	mm	43 x 63 x 22
Weight approx.	g	41
Degree of protection		
Degree of protection acc. to EN 60529		IP20
Ambient conditions		
Temperature range		
Operating temperature	°C	-10 … + 55
Storage and transport temperature	°C	-25 … + 70
Relative air humidity		
At 25 °C without condensation	%	95
Operating altitude		
Above sea level up to max.	m	2000
Degree of pollution		2

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Dimensional drawings

Dimensions of PAC RS485 expansion module, side and top
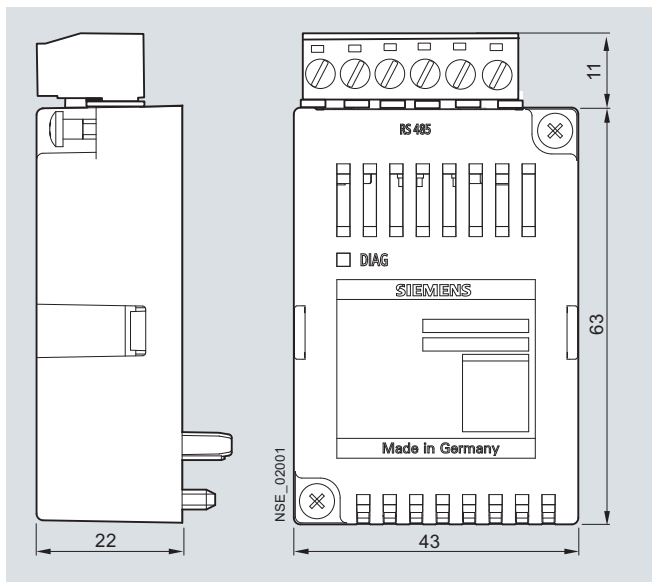
Dimensions of the plug connector between the PAC RS485 expansion module and the SENTRON PAC multifunction measuring instrument
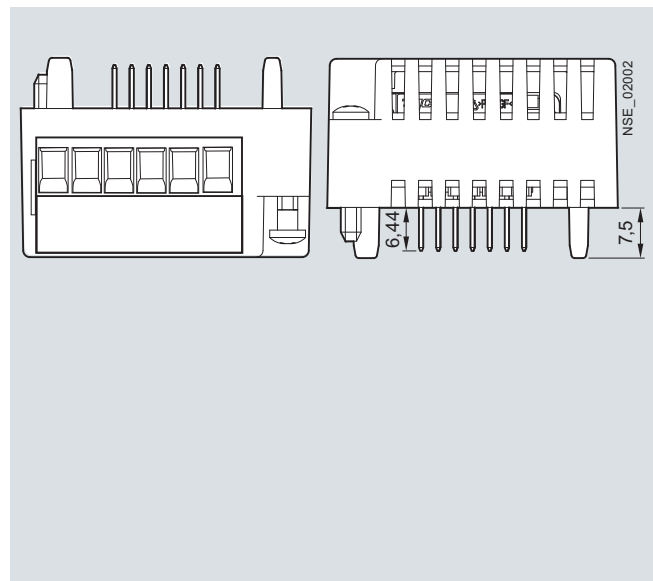
More information

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Notes

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