SENTRON Multifunction Measuring Instruments

PAC3200 multifunction measuring instruments

Overview

Measuring precisely with SENTRON PAC3200 - New dimensions with the multifunction measuring instrument

The SENTRON PAC3200 is a control panel instrument for measuring and indicating more than 50 electric power distribution variables such as voltage, current, power, electrical work and frequency with their minimum, maximum and mean values. It convinces through its compact design and high performance capacity.

A large, backlit graphic display can be read 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. SENTRON PAC3200 offers several communication options in addition to one digital input and one digital output. For integration in a higher-level power management system it is possible to use either the integrated Ethernet interface or the optionally available expansion modules.

SENTRON PAC3200 is also available with UL and CSA approval for use in the USA and Canada.

The SENTRON powerconfig software for user-friendly device configuration is included in the scope of supply.

The advantages of the SENTRON PAC3200 at a glance:

- Three-phase control panel measuring device for measuring electrical variables
- Measuring more than 50 variables such as phase voltage and phase-to-phase voltage, current, power, work, power factor, frequency, etc.
- High measuring accuracy for electrical work; Class 0.5S according to IEC 62053-22
- Can be used for single-phase measurements as well as for multiphase measurements in 3 and 4-conductor networks
- Can be connected directly to three-phase industrial networks up to 690/400 V or up to max. 500/289 V for devices with DC power supply unit with extra-low voltage (CATIII)
- Measuring higher voltages using a voltage transformer; adjustable transformer ratio
- For x/1A and x/5A current transformers. Adjustable transformer ratio and current direction
- 2 device types available with power supply unit with wide voltage range and with extra-low voltage in order to cover all standard AC and DC auxiliary voltage supply needs
- Slot for expansion modules such as the SENTRON PAC PROFIBUS DP or SENTRON PAC RS485 communication modules
- Small space requirement thanks to compact design (96 mm x 96 mm, mounting depth 51 mm or 73 mm with module)
- Large, graphic LCD display with intuitive user operation using function buttons
- Menu selections, test displays and documentation available in nine languages (German, English, Portuguese, Turkish, Spanish, Italian, French, Chinese and Russian)
- Language selection on the device or using configuration software
- IP65 using standard sealing
- Multifunctional digital input, for example for detecting counting pulses or for monitoring the status of switching devices
- Multifunctional digital output, for example for emitting active or reactive power pulses (S0) or for indicating limit value violations
- Monitoring of up to 6 limit values and connecting the limit values with logical AND/OR operations
- Measuring period averages for active and reactive power with minimum and maximum value
- Operating hours counter for indicating the load running time
- Integrated Ethernet interface (Modbus TCP or SEAbus TCP) for integration in power management systems
- UL and CSA approval for the USA and Canada
- CD with SENTRON powerconfig software for user-friendly device configuration included in scope of supply

The product variants of the SENTRON PAC3200

<table>
<thead>
<tr>
<th>PAC3200</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>With AC/DC power supply unit with wide voltage range and screw terminals</td>
<td></td>
</tr>
<tr>
<td>• $U_{\text{ALK}}$: 95 ... 240 V AC ±10 %, 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>• $U_{\text{e}}$: max. 3 AC 690/400 V, 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>With DC power supply unit with extra-low voltage and screw terminals</td>
<td></td>
</tr>
<tr>
<td>• $U_{\text{ALK}}$: 22 ... 65 V DC ±10 %</td>
<td></td>
</tr>
<tr>
<td>• $U_{\text{e}}$: max. 3 AC 500/289 V</td>
<td></td>
</tr>
<tr>
<td>With AC/DC power supply unit with wide voltage range and cable lug terminals</td>
<td></td>
</tr>
<tr>
<td>• $U_{\text{ALK}}$: 95 ... 240 V AC ±10%, 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>• $U_{\text{e}}$: max. 3 AC 690/400 V, 50/60 Hz</td>
<td></td>
</tr>
</tbody>
</table>

These connections are indicated in the Technical specifications by orange backgrounds.

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

Based on Siemens Catalog LV 1 T - 2009

Page 1 of 16
**Measurement functions**

The SENTRON PAC3200 measures the following variables:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Display range</th>
<th>L1/L1-2</th>
<th>L2/L2-3</th>
<th>L3/L3-1</th>
<th>Total</th>
<th>Minimum value</th>
<th>Mean value</th>
<th>Maximum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0 A ………120 kA</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓ (1)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voltage L-N</td>
<td>0 V ……… 700 kV</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓ (1)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voltage L-L</td>
<td>0 V ……… 1200 kV</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓ (1)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Frequency</td>
<td>44.00 … 67.00 Hz</td>
<td>✓</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Active power per phase</td>
<td>0 W … 100 GW</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reactive power per phase</td>
<td>0 var … 100 Gvar</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Apparent power per phase</td>
<td>0 VA … 100 GVA</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Active power total</td>
<td>0 W … 100 GW</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>✓ (2)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reactive power total</td>
<td>0 var … 100 Gvar</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>✓ (2)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Apparent power total</td>
<td>0 VA … 100 GVA</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Power factor per phase</td>
<td>0 …1</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Power factor total</td>
<td>0 …1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Active work total</td>
<td>0 Wh … 1000 GWh</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓ (3)</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reactive work total</td>
<td>0 varh … 100 Gvarh</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓ (3)</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Apparent work total</td>
<td>0 Whh … 100 GVArh</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓ (3)</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>THD voltage per phase</td>
<td>0 … 100 %</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>THD current per phase</td>
<td>0 … 100 %</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voltage asymmetry</td>
<td>0 … 100 %</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Current asymmetry</td>
<td>0 … 100 %</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Operating hours</td>
<td>0 h … 300 years</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Universal counter</td>
<td>0 … 999 999 999 pulses</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>✓</td>
<td>--</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

1) The values quoted are mean values of all three phases.

2) Can be called up only through communication. The power averages (power count values), including minimum and maximum values, are transmitted for an adjustable measurement period. The measurement period can be selected in the range 1 … 60 min; the default setting is 15 min.

3) The values for high rate and low rate are shown on the display.

✓ Measuring possible

– Measuring not possible or not meaningful

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**PAC3200 multifunction measuring instruments**

### Design

**Enclosure**

SENTRON PAC3200 comes with a plastic enclosure for installation in control panels. It is fastened by one holder on the right side of the device and one on the left side.

Mounting the SENTRON PAC3200

To mount the SENTRON PAC3200 it is inserted from the front through the square cut-out in the control cabinet door and secured with the supplied holders.

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

The following picture shows how to join together the SENTRON PAC3200 and the expansion module in the light of the rear view of the SENTRON PAC3200 and the top view of the expansion module (here: PAC PROFIBUS DP).

### Operating and indicating elements

The following picture shows the SENTRON PAC3200 from the front, divided into the function blocks provided for operation and monitoring, including a description.

**Front of the SENTRON PAC3200**

The device is 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.

**Operating and indicating elements**

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

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 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.
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.

Transparency in power matters

Altogether 10 power meters for active, reactive and apparent work monitor the power consumption in the system, separately according to the high rate and low rate, for both power input and power feedback.

This makes the SENTRON PAC3200 the optimum choice of data supplier for a higher-level power management system. Integrated in such a system it enables the user to record his installation’s load profile.

For this purpose the SENTRON PAC3200 also supplies the required power averages for active and reactive power.

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.

Operation, also multilingual

A special highlight is the intuitive user operation. Operation is quick to learn using the four function buttons together with multilingual plain text displays. Following languages can be selected: English, German, Portuguese, Turkish, Spanish, Italian, French, Chinese and Russian.

Mounting and start-up in the shortest possible time

With its ingenious mounting method the SENTRON PAC3200 is quick and easy to install using combination latching holders.

The pair of combination 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 screws of the latching holder can be used to increase its contact pressure evenly on all sides so that the control panel cut-out is cleanly sealed by the integrally molded gasket, which is a standard feature. The often bothersome and time-consuming insertion of an accessory gasket is a thing of the past.

As the result of the easy-to-use combination holders and the small mounting depth of only 51 mm it is easy to mount several devices side by side.

Powerful communication

Unique in this device class 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. For optimum system adaptation it is possible to switch between the SEAbus TCP protocol and the Modbus TCP protocol.

The optional SENTRON PAC PROFIBUS DP and PAC RS485 expansion modules for Modbus RTU and SEAbus are available for communication in a network.

Integration in PROFIBUS takes place using a standarized 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 and can start cyclic operation immediately.

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.

Multifunctional digital input and output

The SENTRON PAC3200 is equipped with one digital input and one digital output, to each of which various functions can be assigned.

Functions of the digital input:

• Counting input for work pulses (kWh, kvarh) from third-party devices
• Status monitoring of a switching device
• Rate switchover between high rate and low rate
• Signal input for synchronization of the measurement period

Functions of the digital output:

• Pulse output for sending work pulses (kWh, kvarh)
• Alarm output for signaling limit value violations
• SENTRON PAC3200 operating state indicator
• Phase sequence indicator
• Switching output for remote control using system software

With its wide range of functions, the SENTRON PAC3200 can be used in all applications.

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PAC3200 multifunction measuring instruments

Monitoring of measurement variables for limit value violations

The SENTRON PAC3200 can monitor up to 6 measurement variables for violation of an adjustable upper or lower limit value. The following variables can be monitored: voltage, current, power, power factor, THD \( U/I \), frequency or asymmetry of voltage and current.

The following can be assigned to each limit value:
- A measurement variable: \( U_{L-N}, U_{L-L}, I_{L}, P_{L}, Q_{L}, S_{L}, LF_{L}, \) THD-\( U/I \) for all 3 phases and \( U_{L-N}, \) mean value, \( U_{L-L}, \) mean value, \( I_{L}, \) mean value, \( S_{tot}, P_{tot}, Q_{tot}, \) LF\(_{tot}, \) frequency, asymmetry \( U/I \);
- The monitoring mode (overshooting or undershooting);
- A limit value;
- A delay time and
- A hysteresis

In addition, the limit values can be interconnected by an AND/OR logic function. Like the individual limit values, the result of the logic operation can also trigger certain actions.

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.

Monitoring of voltage and current for asymmetry

The device measures, among other things, the asymmetry 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

The SENTRON PAC3200 can be used for measuring in two, three and four-conductor networks. It is capable of measuring in three phases as well as in one and two phases.

Thanks to its large measuring voltage range, the device can be directly connected in every low-voltage system up to a rated system voltage of 690 V (\( U_{L-L} \)). 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 comes 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 an interface.

Integration

Using the interface modules it is possible to integrate the SENTRON PAC3200 in every I&C system or every SIMATIC S7 environment.

When the SENTRON PAC3200 is fully integrated in a power management system, e.g. SIMATIC WinCC powerrate or SIMATIC PCS 7 powerrate, it monitors the power consumption.

At the same time the SENTRON PAC3200 helps to monitor the operating state of the installation. Measured values, limit value violations, operating hours of a connected load or power flows are supplied by the device quickly and reliably.
Configuration

Configuration directly on the device

The SENTRON PAC3200 is designed for user-friendly configuring directly on the device. All menus are displayed in plain text and are self-explanatory. No manual is required therefore.

Configuring interface of the SENTRON PAC3200

Configuring with SENTRON powerconfig is user-friendly

The scope of supply of the PAC3200 includes the SENTRON powerconfig software for the user-friendly configuring of the PAC3200 from the PC.

The software runs on the following operating systems:
- Windows 2000 Professional SP4 and higher
- Windows XP Professional SP2 and higher

SENTRON powerconfig is available in German or English, with selection possible at any time through the Options menu. The integrated online help is likewise bilingual and describes the software’s functions in detail.

After SENTRON powerconfig is installed, the PAC3200 can be connected to the PC in two ways:
- Using a commercially available crossover cable which connects the PAC3200 directly to the network interface of the PC
- Or using a hub/switch in an Ethernet network In this case conventional patch cables are used.

Simplified making of connections through search function

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

Configuring interface of SENTRON powerconfig

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 and expansion modules are grouped in a library. The required PAC3200 units are selected from the library and moved into the device tree by means of Drag & Drop. Expansion modules can be added to the device tree in the same way. However, they can only be entered under a device.
- Sending the offline device configurations: During start-up, 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.

The figure below shows the program interface of SENTRON powerconfig by way of example.

Note:
The required cable material is not included in the scope of supply.
# PAC3200 multifunction measuring instruments

## Technical specifications

### Measurement

**Networks**
- **Voltage types**: Only for alternating voltage systems
- **Number of phases**: 1-, 2- or 3-phase
- **Number of conductors**: 3 or 4 conductors
- **Load type**: Same or any load
- **Quadrants**: 4 quadrants (input and output)

**Frequency of fundamental wave**
- **Hz**: 50/60

**Signal detection**
- **For power, current and voltage**: Seamless
- **Curve shape**: 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:
  - Phase/N: V AC
  - Phase/phase: V AC
  - 7KM2112-0BA00-3AA0 or 7KM2112-0BA00-2AA0
  - 400 (max. 347 for UL) +20 %
  - 690 (max. 600 for UL) +20 %
- Device with DC power supply unit with extra-low voltage:
  - Phase/N: V AC
  - Phase/phase: V AC
  - 7KM2111-1BA00-3AA0
  - 289 +20 %
  - 500 +20 %

**Measuring category**: CAT III

**Input resistance**
- **Phase/N**: MΩ
- **Per phase**: mW
  - 1.05
  - 220

**Measuring inputs for current**

**Rated current 3 AC $I_e$ per phase**
- Adjustable
- **AC A**: 1 or 5

**Operating range current per phase**
- With setting 1 A
  - **AC A**: 0.01 ... 1.2
- With setting 5 A
  - **AC A**: 0.05 ... 6

**Permanent load capacity**
- **AC A**: 10

**Surge overload capability**
- **For 1 second**: AC A
  - 100

**Power consumption**
- **Per phase**: mVA
  - 4 at 1A, 115 at 5A

**Measuring category**: CAT III

**Zero point suppression**
- **Adjustable**: %
  - 0 ... 10

### Measuring of currents using current transformer

**Supply voltage**

**Power supply unit with wide voltage range**
- **Operational range**
  - 7KM2112-0BA00-3AA0 or 7KM2112-0BA00-2AA0
  - V AC
  - 95 ... 240 ±10%
  - 110 ... 340 ±10%
- **Rated frequency**: Hz
  - 50/60

**Power supply unit with extra-low voltage**
- **Operational range**: V DC
  - 22 ... 65 ±10%

**Power consumption**
- **Without optional expansion module**: VA
  - 6
- **Including optional expansion module**: VA
  - 8

**Overvoltage category**: CAT III
### PAC3200 multifunction measuring instruments

#### Fault limits

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>±0.3</td>
</tr>
<tr>
<td>Current</td>
<td>±0.2</td>
</tr>
<tr>
<td>Rating</td>
<td>±0.5</td>
</tr>
<tr>
<td>Frequency</td>
<td>±0.05</td>
</tr>
<tr>
<td>Power factor</td>
<td>±0.5</td>
</tr>
</tbody>
</table>

#### Active energy

Class 0.5S acc. to IEC 62053-22:2003-01

#### Reactive energy

Class 2 acc. to IEC 62053-23:2003-01

When taking measurements on external current or voltage transformers, the accuracy of the measurements depends on the quality of the transformers.

#### Digital input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>1</td>
</tr>
<tr>
<td>Rated value</td>
<td>V DC 24</td>
</tr>
<tr>
<td>Max. input voltage</td>
<td>V DC 30</td>
</tr>
<tr>
<td>Input threshold signal &quot;1&quot;</td>
<td>V DC &gt; 13</td>
</tr>
<tr>
<td>Input threshold signal &quot;0&quot;</td>
<td>V DC &lt; 8</td>
</tr>
<tr>
<td>Input current signal &quot;1&quot;</td>
<td>DC mA 7</td>
</tr>
</tbody>
</table>

#### Digital output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>1</td>
</tr>
<tr>
<td>Required voltage</td>
<td>V DC 12 ... 24</td>
</tr>
<tr>
<td>Max. switched output voltage</td>
<td>V DC 30</td>
</tr>
<tr>
<td>Output current signal &quot;0&quot;</td>
<td>DC mA Max. 0.2</td>
</tr>
<tr>
<td>Output current signal &quot;1&quot;</td>
<td>DC mA 10 ... 27, DC mA 100, DC mA 300, DC mA 100</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>Hz 17</td>
</tr>
<tr>
<td>Short-circuit protection</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Communication

- **Ethernet**
  - Transmission rate max.: 10 MBit/s
  - Protocol: RJ45 socket
  - Transmission rate V1: 12 MBit/s
  - Using expansion module: PAC PROFIBUS DP
  - Protocol: Either SEAbus TCP or Modbus TCP (selectable)

- **PROFIBUS DP**
  - Using expansion module: PAC PROFIBUS DP
  - Protocol: PROFIBUS DP V1
  - Variables to be transmitted: Definable using GSD file

- **RS485**
  - Using expansion module: PAC RS485
  - Transmission rates: Optionally 4.8/9.6/19.2/38.4 kBd
  - Protocol: Optionally SEAbus or Modbus RTU (selectable)

#### Indicating and operating

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display type</td>
<td>LCD, full graphic</td>
</tr>
<tr>
<td>Displays</td>
<td>Alphanumeric and text</td>
</tr>
<tr>
<td>Resolution</td>
<td>Dots 128 x 96</td>
</tr>
<tr>
<td>Size</td>
<td>mm 72 x 54</td>
</tr>
<tr>
<td>Contrast</td>
<td>Adjustable</td>
</tr>
<tr>
<td>Display</td>
<td>Display invertible, pos/neg mode</td>
</tr>
</tbody>
</table>

#### Background lighting

- **Lighting intensity**
- **Lighting intensity dimmed**
- **Dimming time**: Adjustable, 0 ... 99 min

#### Languages

- German, English, Portuguese, Turkish, Spanish, Italian, French, Chinese and Russian
## PAC3200 Multifunction Measuring Instruments

### Connection elements and terminals

#### Measuring inputs and supply voltage

<table>
<thead>
<tr>
<th>Conductor cross-sections</th>
<th>Solid</th>
<th>mm²</th>
<th>1 x 0.5 ... 4</th>
<th>1 x 20 ... 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Finely stranded with end sleeve</td>
<td>mm²</td>
<td>2 x 0.5 ... 2.5</td>
<td>2 x 20 ... 14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Tool size ± Screw, Pozidriv</th>
<th>2</th>
</tr>
</thead>
</table>

#### Ring terminal lug connection

<table>
<thead>
<tr>
<th>Conductor cross-sections</th>
<th>Dependent on ring terminal lug used</th>
<th>mm²</th>
<th>1 x 10...6.0</th>
<th>AWG 1 x 18...10</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Tool size ± Screw, Pozidriv</th>
<th>2</th>
</tr>
</thead>
</table>

#### Digital output, digital input

<table>
<thead>
<tr>
<th>Conductor cross-sections</th>
<th>Solid</th>
<th>mm²</th>
<th>1 x 0.2 ... 2.5</th>
<th>1 x 24 ... 12</th>
</tr>
</thead>
</table>

|                        | Finely stranded with end sleeve | mm² | 2 x 0.25 ... 1.0 | 2 x 24 ... 12 |

<table>
<thead>
<tr>
<th></th>
<th>Tool size ± Screw, Pozidriv</th>
<th>1</th>
</tr>
</thead>
</table>

### Dimensions and weights

**Enclosure for installing in control panel**

<table>
<thead>
<tr>
<th>Acc. to IEC 61554</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Enclosure dimensions (W x H x D)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Without expansion module</th>
<th>96 x 96 x 56</th>
</tr>
</thead>
<tbody>
<tr>
<td>With expansion module</td>
<td>96 x 96 x 78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting depth</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Without expansion module</th>
<th>51</th>
</tr>
</thead>
<tbody>
<tr>
<td>With expansion module</td>
<td>73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control panel thickness</th>
</tr>
</thead>
</table>

| 0.5 ... 4 |

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Without expansion module</th>
<th>Approx.</th>
<th>325</th>
</tr>
</thead>
<tbody>
<tr>
<td>With expansion module</td>
<td>Approx.</td>
<td>370</td>
</tr>
</tbody>
</table>

### Degree of protection and safety class

**Safety class acc. to EN 61010-1**

<table>
<thead>
<tr>
<th>From the front when installed</th>
</tr>
</thead>
</table>

| II |

**Degree of protection acc. to EN 60529**

<table>
<thead>
<tr>
<th>All devices</th>
<th>On front</th>
<th>IP65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device with screw terminals</td>
<td>Rear</td>
<td>IP20</td>
</tr>
<tr>
<td>Device with cable lug terminals</td>
<td>Rear</td>
<td>IP10</td>
</tr>
</tbody>
</table>
# Ambient conditions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
</tr>
<tr>
<td>Operating temperature °C</td>
<td>-10 … + 55</td>
</tr>
<tr>
<td>Storage and transport temperature °C</td>
<td>-25 … + 70</td>
</tr>
<tr>
<td><strong>Relative air humidity</strong></td>
<td></td>
</tr>
<tr>
<td>At 25 °C without condensation %</td>
<td>95</td>
</tr>
<tr>
<td><strong>Operating altitude</strong></td>
<td></td>
</tr>
<tr>
<td>Above sea level up to max. m</td>
<td>2000</td>
</tr>
<tr>
<td><strong>Degree of pollution</strong></td>
<td>2</td>
</tr>
</tbody>
</table>

### Safety

#### Password protection
- 4-digit numeric code

#### Safety requirements
- Verification of suitability as EC conformity declaration -
  - Device test according to the following standards:
    - IEC 61010-1:2001 (2nd Ed.) with Corr.1
    - EN 61010-1-1:2001 (2nd Ed.)
    - EN 61010-1:2002 with Corr.1
- Verification of suitability as approval for the USA and Canada:
  - UL 61010-1, 2nd Ed. CAN/CSA-C22.2 NO. 61010-1-04

### Electromagnetic compatibility

#### Emitted interference
- IEC 61000-6-4 Group 1;
- Class A/CISPR11 Group 1;
- Class A FCC Part 15 Subpart B;
- Class A

#### Enclosure interference immunity
- Electrostatic discharge: IEC 61000-4-2:2001-04
- Electromagnetic fields: IEC 61000-4-3:2006-02
- Line-frequency magnetic fields: IEC 61000-4-8:2001-03

#### Measuring and supply voltage
- Voltage dips: IEC 61000-4-11:2004-03
- Rapid transients: EN 61000-4-4:2005-07
- Surge voltages: EN 61000-4-5:2001-12
- Line-conducted RF signals: EN 61000-4-6:2001-12

#### Inputs and outputs, interfaces
- Rapid transients: IEC 61000-4-4:2004-07
- Surge voltages: IEC 61000-4-5:2005-11
- Line-conducted RF interference fields: EN 61000-4-6:2001-12

### Mechanical dynamic stress

#### Vibratory load

#### Seismic stress
- Acc. to IEC 60068-3-3:1991-02/EN 60068-3-3:1993-09

#### Shock stress

#### Bumping, resistance

#### Continuous bumping

#### Mechanical strength
- Against surges and shocks: Acc. to IEC 60068-2-7:5:1997-08
PAC3200 multifunction measuring instruments

Dimensions of multifunction measuring instrument

Left: Front view; middle: PAC3200 with screw terminals, view from the right; right: PAC3200 with cable lug terminals, view from the right

Control panel cut-out

Cut-out from the front

Control panel cut-out, lateral

Left: PAC3200 with screw terminals, view from the right
Right: PAC3200 with cable lug terminals, cut-out from right

Mounting clearances

Based on Siemens Catalog LV 1 T - 2009
**Connection examples**

**Connection example 1:**
Three-phase measurement, four conductors, asymmetric load, without voltage transformer, with three current transformers

![Diagram 1](NSE0_01932)

**Connection example 2:**
Three-phase measurement, four conductors, asymmetric load, with voltage transformer, with three current transformers

![Diagram 2](NSE0_01933)

**Connection example 3:**
Three-phase measurement, four conductors, symmetric load, without voltage transformer, with one current transformer

![Diagram 3](NSE0_01934)

**Connection example 4:**
Three-phase measurement, four conductors, symmetric load, with voltage transformer, with one current transformer

![Diagram 4](NSE0_01935)

**Connection example 5:**
Three-phase measurement, three conductors, asymmetric load, without voltage transformer, with three current transformers

![Diagram 5](NSE0_01936)

**Connection example 6:**
Three-phase measurement, three conductors, asymmetric load, with voltage transformer, with three current transformers

![Diagram 6](NSE0_01937)

* Fuses must be provided by the user.

** Connection of the supply voltage.
Connection example 7:
Three-phase measurement, three conductors, asymmetric load,
without voltage transformer, with two current transformers

Connection example 8:
Three-phase measurement, three conductors, asymmetric load,
with voltage transformer, with two current transformers

Connection example 9:
Three-phase measurement, three conductors, symmetric load,
without voltage transformer, with one current transformer

Connection example 10:
Three-phase measurement, three conductors, symmetric load,
with voltage transformer, with one current transformer

Connection example 11:
Two-phase measurement, three conductors, asymmetric load,
without voltage transformer, with two current transformers

Connection example 12:
Single-phase measurement, two conductors, without voltage
transformer, with one current transformer

* Fuses must be provided by the user.

** Connection of the supply voltage.
Connection example 13:
Three-phase measurement, four conductors, asymmetric load, with voltage transformer, with three current transformers

Protection of the supply voltage input:

<table>
<thead>
<tr>
<th>Fuse holders</th>
<th>Cylindrical fuse links</th>
</tr>
</thead>
<tbody>
<tr>
<td>3NW7-5130HG</td>
<td>3NW1006-0HG (0.6A)</td>
</tr>
</tbody>
</table>

---

**Connection**

PAC3200 terminal assignment in overview

PAC3200 terminal assignment in detail

Based on Siemens Catalog LV 1 T - 2009
PAC PROFIBUS DP expansion modules

Technical specifications

<table>
<thead>
<tr>
<th>Communication</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFIBUS DP</td>
<td></td>
</tr>
<tr>
<td>Transmission rate max.</td>
<td>MBit/s</td>
</tr>
<tr>
<td>Protocol</td>
<td>PROFIBUS DPV1</td>
</tr>
<tr>
<td>Variables to be transmitted</td>
<td>Definable using GSD file</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions and weights</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure dimensions (W x H x D)</td>
<td>mm</td>
</tr>
<tr>
<td>Weight</td>
<td>g</td>
</tr>
</tbody>
</table>

| Degree of protection | IP20 |

<table>
<thead>
<tr>
<th>Ambient conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>°C</td>
</tr>
<tr>
<td>Storage and transport temperature</td>
<td>°C</td>
</tr>
</tbody>
</table>

| Relative air humidity | % | 95 |

<table>
<thead>
<tr>
<th>Operating altitude</th>
<th>m</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of pollution</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Dimensional drawings

Dimensions of PAC PROFIBUS DP expansion module at the side and from above

Dimensions of the plug connector between the PAC PROFIBUS DP expansion module and the PAC3200

More information

More information can be found on the Internet at
http://www.siemens.com/powermanagementsystem
### Technical specifications

#### Communication

<table>
<thead>
<tr>
<th>RS485</th>
<th>Transmission rates</th>
<th>kBd</th>
<th>Optionally 4.8/9.6/19.2/38.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Optionally SEAbus or Modbus RTU (selectable)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Dimensions and weights

<table>
<thead>
<tr>
<th>Enclosure dimensions (W x H x D)</th>
<th>mm</th>
<th>43 x 63 x 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight approx.</td>
<td>g</td>
<td>41</td>
</tr>
</tbody>
</table>

#### Degree of protection

| Degree of protection acc. to EN 60529 | IP20 |

#### Ambient conditions

<table>
<thead>
<tr>
<th>Temperature range</th>
<th>°C</th>
<th>-10 … + 55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage and transport temperature</td>
<td>°C</td>
<td>-25 … + 70</td>
</tr>
<tr>
<td>Relative air humidity</td>
<td>%</td>
<td>95</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>m</td>
<td>2000</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

#### Dimensional drawings

Dimensions of PAC RS485 expansion module at the side and from above

Dimensions of the plug connector between the PAC RS485 expansion module and the PAC3200

---

### More information

More information can be found on the Internet at

http://www.siemens.com/powermanagementsystem