1 Ordering data

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Product life cycle phase *)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SAP 250 700 R0001</td>
<td>DA501, digital/analog input/output module, 16 DI, 8 DC, 4 AI, 2 AO</td>
<td>Active</td>
</tr>
<tr>
<td>1SAP 450 700 R0001</td>
<td>DA501-XC, digital/analog input/output module, 16 DI, 8 DC, 4 AI, 2 AO, XC version</td>
<td>Active</td>
</tr>
</tbody>
</table>

*) Modules in lifecycle Classic are available from stock but not recommended for planning and commissioning of new installations.
2 Dimensions

The dimensions are in mm and in brackets in inch.

3 Technical data

3.1 Technical data of the module

The system data of AC500 and S500 ☞ Chapter 4 “System data AC500” on page 9 are applicable to the standard version.

The system data of AC500-XC ☞ Chapter 5 “System data AC500-XC” on page 13 are applicable to the XC version.

Only additional details are therefore documented below.

The technical data are also applicable to the XC version.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process supply voltage</td>
<td></td>
</tr>
<tr>
<td>Connections</td>
<td>Terminals 1.8, 2.8, 3.8 and 4.8 for UP (+24 V DC) and 1.9, 2.9, 3.9 and 4.9 for ZP (0 V DC)</td>
</tr>
<tr>
<td>Protection against reverse voltage</td>
<td>yes</td>
</tr>
<tr>
<td>Rated protection fuse at UP</td>
<td>10 A fast</td>
</tr>
</tbody>
</table>
### Technical data of the digital inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated value</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Max. ripple</td>
<td>5 %</td>
</tr>
<tr>
<td>Current consumption</td>
<td></td>
</tr>
<tr>
<td>From UP</td>
<td>0.07 A + max. 0.5 A per output</td>
</tr>
<tr>
<td>From 24 V DC power supply at the terminals UP/L+ and ZP/M of the CPU/communication interface module</td>
<td>ca. 2 mA</td>
</tr>
<tr>
<td>Inrush current from UP (at power-up)</td>
<td>0.04 A²s</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes, per module</td>
</tr>
<tr>
<td>Max. power dissipation within the module</td>
<td>6 W (outputs unloaded)</td>
</tr>
<tr>
<td>Weight (without terminal unit)</td>
<td>ca. 125 g</td>
</tr>
<tr>
<td>Mounting position</td>
<td>Horizontal mounting or vertical with derating (output load reduced to 50 % at 40 °C)</td>
</tr>
<tr>
<td>Cooling</td>
<td>The natural convection cooling must not be hindered by cable ducts or other parts in the switchgear cabinet.</td>
</tr>
</tbody>
</table>

**NOTICE!**

**Attention:**

All I/O channels (digital and analog) are protected against reverse polarity, reverse supply, short circuit and continuous overvoltage up to 30 V DC.

---

**Multiple overloads**

No effects of multiple overloads on isolated multi-channel modules occur, as every channel is protected individually by an internal smart high-side switch.

---

### 3.2 Technical data of the digital inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels per module</td>
<td>16</td>
</tr>
<tr>
<td>Distribution of the channels into groups</td>
<td>2 groups of 8 channels</td>
</tr>
<tr>
<td>Terminals of the channels DI0 to DI7</td>
<td>Terminals 1.0 to 1.7</td>
</tr>
<tr>
<td>Terminals of the channels DI8 to DI15</td>
<td>Terminals 2.0 to 2.7</td>
</tr>
<tr>
<td>Reference potential for all inputs</td>
<td>Terminals 1.9...3.9 (negative pole of the supply voltage, signal name ZP)</td>
</tr>
<tr>
<td>Indication of the input signals</td>
<td>1 yellow LED per channel, the LED is ON when the input signal is high (signal 1)</td>
</tr>
<tr>
<td>Monitoring point of input indicator</td>
<td>LED is part of the input circuitry</td>
</tr>
<tr>
<td>Input type (according EN 61131-2)</td>
<td>Type 1</td>
</tr>
<tr>
<td>Input delay (0-&gt;1 or 1-&gt;0)</td>
<td>Typ. 0.1 ms, configurable from 0.1...32 ms</td>
</tr>
<tr>
<td>Input signal voltage</td>
<td>24 V DC</td>
</tr>
<tr>
<td>0-Signal</td>
<td>-3 V...+5 V</td>
</tr>
</tbody>
</table>
### 3.3 Technical data of the configurable digital inputs/outputs

Each of the configurable digital I/O channels can be defined as input or output by the user program. This is done by interrogating or allocating the corresponding channel.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undefined Signal</td>
<td>&gt;+5 V...&lt;+15 V</td>
</tr>
<tr>
<td>1-Signal</td>
<td>+15 V...+30 V</td>
</tr>
<tr>
<td>Ripple with signal 0</td>
<td>Within -3 V...+5 V</td>
</tr>
<tr>
<td>Ripple with signal 1</td>
<td>Within +15 V...+30 V</td>
</tr>
<tr>
<td>Input current per channel</td>
<td></td>
</tr>
<tr>
<td>Input voltage +24 V</td>
<td>Typ. 5 mA</td>
</tr>
<tr>
<td>Input voltage +5 V</td>
<td>&gt;1 mA</td>
</tr>
<tr>
<td>Input voltage +15 V</td>
<td>&gt;2 mA</td>
</tr>
<tr>
<td>Input voltage +30 V</td>
<td>&lt;8 mA</td>
</tr>
<tr>
<td>Max. cable length</td>
<td></td>
</tr>
<tr>
<td>Shielded</td>
<td>1000 m</td>
</tr>
<tr>
<td>Unshielded</td>
<td>600 m</td>
</tr>
</tbody>
</table>

### 3.3.1 Technical data of the digital inputs/outputs if used as inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels per module</td>
<td>8 inputs/outputs (with transistors)</td>
</tr>
<tr>
<td>Distribution of the channels into groups</td>
<td>1 group for 8 channels</td>
</tr>
<tr>
<td>If the channels are used as inputs</td>
<td></td>
</tr>
<tr>
<td>Channels DC16...DC23</td>
<td>Terminals 4.0...4.7</td>
</tr>
<tr>
<td>If the channels are used as outputs</td>
<td></td>
</tr>
<tr>
<td>Channels DC16...DC23</td>
<td>Terminals 4.0...4.7</td>
</tr>
<tr>
<td>Indication of the input/output signals</td>
<td>1 yellow LED per channel, the LED is ON when the input/output signal is high (signal 1)</td>
</tr>
<tr>
<td>Monitoring point of input/output indicator</td>
<td>LED is part of the input ciruitty</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes, per module</td>
</tr>
</tbody>
</table>

### Technical data of the configurable digital inputs/outputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels per module</td>
<td>8 inputs/outputs (with transistors)</td>
</tr>
<tr>
<td>Distribution of the channels into groups</td>
<td>1 group for 8 channels</td>
</tr>
<tr>
<td>Terminals of the channels DC16 to DC23</td>
<td>Terminals 4.0 to 4.7</td>
</tr>
<tr>
<td>Reference potential for all inputs</td>
<td>Terminals 1.9...4.9 (negative pole of the supply voltage, signal name ZP)</td>
</tr>
<tr>
<td>Indication of the input signals</td>
<td>1 yellow LED per channel, the LED is ON when the input signal is high (signal 1)</td>
</tr>
<tr>
<td>Monitoring point of input/output indicator</td>
<td>LED is part of the input ciruitty</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Input type (according EN 61131-2)</td>
<td>Type 1</td>
</tr>
<tr>
<td>Input delay (0-&gt;1 or 1-&gt;0)</td>
<td>Typ. 0.1 ms, configurable from 0.1...32 ms</td>
</tr>
<tr>
<td>Input signal voltage</td>
<td>24 V DC</td>
</tr>
<tr>
<td>0-Signal</td>
<td>-3 V...+5 V</td>
</tr>
<tr>
<td>Undefined Signal</td>
<td>&gt; +5 V...&lt; +15 V</td>
</tr>
<tr>
<td>1-Signal</td>
<td>+15 V...+30 V</td>
</tr>
<tr>
<td>Ripple with signal 0</td>
<td>Within -3 V...+5 V</td>
</tr>
<tr>
<td>Ripple with signal 1</td>
<td>Within +15 V...+30 V</td>
</tr>
<tr>
<td>Input current per channel</td>
<td></td>
</tr>
<tr>
<td>Input voltage +24 V</td>
<td>Typ. 5 mA</td>
</tr>
<tr>
<td>Input voltage +5 V</td>
<td>&gt; 1 mA</td>
</tr>
<tr>
<td>Input voltage +15 V</td>
<td>&gt; 2 mA</td>
</tr>
<tr>
<td>Input voltage +30 V</td>
<td>&lt; 8 mA</td>
</tr>
<tr>
<td>Max. cable length</td>
<td></td>
</tr>
<tr>
<td>shielded</td>
<td>1000 m</td>
</tr>
<tr>
<td>unshielded</td>
<td>600 m</td>
</tr>
</tbody>
</table>

* Due to the direct connection to the output, the demagnetizing varistor is also effective at the input (see figure) above. This is why the difference between UPx and the input signal must not exceed the clamp voltage of the varistor. The varistor limits the clamp voltage to approx. 36 V. Consequently, the input voltage must range from -12 V to +30 V when UPx = 24 V and from -6 V to +30 V when UPx = 30 V.

### 3.3.2 Technical data of the digital inputs/outputs if used as outputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels per module</td>
<td>8</td>
</tr>
<tr>
<td>Distribution of the channels into groups</td>
<td>1 group of 8 channels</td>
</tr>
<tr>
<td>Terminals of the channels DC16 to DC23</td>
<td>Terminals 4.0 to 4.7</td>
</tr>
<tr>
<td>Reference potential for all outputs</td>
<td>Terminals 1.9...4.9 (negative pole of the supply voltage, signal name ZP)</td>
</tr>
<tr>
<td>Common power supply voltage</td>
<td>For all outputs terminals 1.8, 2.8, 3.8 and 4.8 (positive pole of the supply voltage, signal name UP)</td>
</tr>
<tr>
<td>Output voltage for signal 1</td>
<td>UP (-0.8 V)</td>
</tr>
<tr>
<td>Output delay (0-&gt;1 or 1-&gt;0)</td>
<td>On request</td>
</tr>
<tr>
<td>Output current</td>
<td></td>
</tr>
<tr>
<td>rated value per channel</td>
<td>500 mA at UP = 24 V</td>
</tr>
<tr>
<td>max. value (all channels together)</td>
<td>4 A</td>
</tr>
<tr>
<td>Leakage current with signal 0</td>
<td>&lt; 0.5 mA</td>
</tr>
<tr>
<td>Fuse for UP</td>
<td>10 A fast</td>
</tr>
<tr>
<td>Demagnetization with inductive DC load</td>
<td>Via internal varistors (see figure below this table)</td>
</tr>
<tr>
<td>Output switching frequency</td>
<td></td>
</tr>
<tr>
<td>With resistive load</td>
<td>On request</td>
</tr>
</tbody>
</table>
### 3.4 Technical data of the fast counter

The fast counter of the module does not work if the module is connected to an FBP interface module or CS31 bus module.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used inputs</td>
<td>DC16 / DC17</td>
</tr>
<tr>
<td>Used outputs</td>
<td>DC18</td>
</tr>
<tr>
<td>Counting frequency</td>
<td>Max. 50 kHz</td>
</tr>
</tbody>
</table>

### 3.5 Technical data of the analog inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels per module</td>
<td>4</td>
</tr>
<tr>
<td>Distribution of channels into groups</td>
<td>1 group with 4 channels</td>
</tr>
</tbody>
</table>
### 3.6 Technical data of the analog inputs, if used as digital inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels per module</td>
<td>Max. 4</td>
</tr>
<tr>
<td>Distribution of channels into groups</td>
<td>1 group of 4 channels</td>
</tr>
<tr>
<td>Connections of the channels AI0+ to AI3+</td>
<td>Terminals 3.0 to 3.3</td>
</tr>
<tr>
<td>Reference potential for the inputs</td>
<td>Terminals 1.9, 2.9, 3.9 and 4.9 (ZP)</td>
</tr>
<tr>
<td>Indication of the input signals</td>
<td>1 LED per channel (brightness depends on the value of the analog signal)</td>
</tr>
<tr>
<td>Conversion cycle</td>
<td>1 ms (for 4 inputs + 2 outputs); with RTDs Pt/ Ni... 1 s</td>
</tr>
<tr>
<td>Resolution</td>
<td>Range 0 V...10 V: 12 bits</td>
</tr>
<tr>
<td></td>
<td>Range -10 V...+10 V: 12 bits + sign</td>
</tr>
<tr>
<td></td>
<td>Range 0 mA...20 mA: 12 bits</td>
</tr>
<tr>
<td></td>
<td>Range 4 mA...20 mA: 12 bits</td>
</tr>
<tr>
<td></td>
<td>Range RTD (Pt100, PT1000, Ni1000): 0.1 °C</td>
</tr>
<tr>
<td>Conversion error of the analog values</td>
<td>Typ. 0.5 %, max. 1 %</td>
</tr>
<tr>
<td></td>
<td>For XC version below 0 °C and above 60 °C: on request</td>
</tr>
<tr>
<td>Relationship between input signal and</td>
<td>Are configured as &quot;unused&quot; (default value)</td>
</tr>
<tr>
<td>hex code</td>
<td></td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.7 Technical data of the analog outputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal 1</td>
<td>+13 V...+30 V</td>
</tr>
<tr>
<td>Input current per channel</td>
<td></td>
</tr>
<tr>
<td>Input voltage +24 V</td>
<td>Typ. 7 mA</td>
</tr>
<tr>
<td>Input voltage +5 V</td>
<td>Typ. 1.4 mA</td>
</tr>
<tr>
<td>Input voltage +15 V</td>
<td>Typ. 3.7 mA</td>
</tr>
<tr>
<td>Input voltage +30 V</td>
<td>&lt; 9 mA</td>
</tr>
<tr>
<td>Input resistance</td>
<td>ca. 3.5 kΩ</td>
</tr>
</tbody>
</table>

3.8 Internal data exchange

<table>
<thead>
<tr>
<th></th>
<th>Without the fast counter</th>
<th>With the fast counter (only with AC500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital inputs (bytes)</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Digital outputs (bytes)</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
Without the fast counter | With the fast counter (only with AC500)
--- | ---
Analog inputs (words) | 4 | 4
Analog outputs (words) | 2 | 2
Counter input data (words) | 0 | 4
Counter output data (words) | 0 | 8

4 System data AC500

4.1 Environmental conditions

Table 1: Process and supply voltages

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V DC</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>24 V (-15 %, +20 %)</td>
</tr>
<tr>
<td>Protection against reverse polarity</td>
<td>Yes</td>
</tr>
<tr>
<td>120 V AC</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>120 V (-15 %, +10 %)</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz (-6 %, +4 %)</td>
</tr>
<tr>
<td>230 V AC</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>230 V AC (-15 %, +10 %)</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz (-6 %, +4 %)</td>
</tr>
<tr>
<td>120 V AC...240 V AC wide-range supply</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>120 V...240 V (-15 %, +10 %)</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz (-6 %, +4 %)</td>
</tr>
<tr>
<td>Allowed interruptions of power supply, according to EN 61131-2</td>
<td></td>
</tr>
<tr>
<td>DC supply</td>
<td>Interruption &lt; 10 ms, time between 2 interruptions &gt; 1 s, PS2</td>
</tr>
<tr>
<td>AC supply</td>
<td>Interruption &lt; 0.5 periods, time between 2 interruptions &gt; 1 s</td>
</tr>
</tbody>
</table>

NOTICE!
Exceeding the maximum power supply voltage for process or supply voltages could lead to unrecoverable damage of the system. The system might be destroyed.

NOTICE!
Improper voltage level or frequency range which cause damage of AC inputs:
- AC voltage above 264 V
- Frequency below 47 Hz or above 62.4 Hz
NOTICE!
Improper connection leads cause overtemperature on terminals.
PLC modules may be destroyed by using wrong cable type, wire size and cable temperature classification.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>0 °C...+60 °C: Horizontal mounting of modules.</td>
</tr>
<tr>
<td></td>
<td>0 °C...+40 °C: Vertical mounting of modules.</td>
</tr>
<tr>
<td></td>
<td>Output load reduced to 50 % per group.</td>
</tr>
<tr>
<td>Storage</td>
<td>-40 °C...+70 °C</td>
</tr>
<tr>
<td>Transport</td>
<td>-40 °C...+70 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>Max. 95 %, without condensation</td>
</tr>
<tr>
<td>Air pressure</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>&gt; 800 hPa / &lt; 2000 m</td>
</tr>
<tr>
<td>Storage</td>
<td>&gt; 660 hPa / &lt; 3500 m</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP20</td>
</tr>
</tbody>
</table>

4.2 Creepage distances and clearances

The creepage distances and clearances meet the requirements of the overvoltage category II, pollution degree 2.

4.3 Insulation test voltages, routine test

According to EN 61131-2

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 V circuits against other circuitry</td>
<td>2500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
<tr>
<td>120 V circuits against other circuitry</td>
<td>1500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
<tr>
<td>120 V...240 V circuits against other circuitry</td>
<td>2500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
<tr>
<td>24 V circuits (supply, 24 V inputs/outputs, analog inputs/outputs), if they are galvanically isolated against other circuitry</td>
<td>500 V</td>
</tr>
<tr>
<td>COM interfaces, galvanically isolated</td>
<td>500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
<tr>
<td>COM interfaces, electrically not isolated</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Not applicable</td>
</tr>
<tr>
<td>FBP interface</td>
<td>500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
<tr>
<td>Ethernet</td>
<td>500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
<tr>
<td>ARCNET</td>
<td>500 V</td>
</tr>
<tr>
<td></td>
<td>1.2/50 μs</td>
</tr>
</tbody>
</table>
### 4.4 Power supply units

For the supply of the modules, power supply units according to SELV or PELV specifications must be used.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 V circuits against other circuitry</td>
<td>1350 V AC 2 s</td>
</tr>
<tr>
<td>120 V circuits against other circuitry</td>
<td>820 V AC 2 s</td>
</tr>
<tr>
<td>120 V...240 V circuits against other circuitry</td>
<td>1350 V AC 2 s</td>
</tr>
<tr>
<td>24 V circuits (supply, 24 V inputs/outputs, analog inputs/outputs), if they are galvanically isolated against other circuitry</td>
<td>350 V AC 2 s</td>
</tr>
<tr>
<td>COM interfaces, galvanically isolated</td>
<td>350 V AC 2 s</td>
</tr>
<tr>
<td>COM interfaces, electrically not isolated</td>
<td>Not applicable Not applicable</td>
</tr>
<tr>
<td>FBP interface</td>
<td>350 V AC 2 s</td>
</tr>
<tr>
<td>Ethernet</td>
<td>350 V AC 2 s</td>
</tr>
<tr>
<td>ARCNET</td>
<td>350 V AC 2 s</td>
</tr>
</tbody>
</table>

**Safety Extra Low Voltage (SELV) and Protective Extra Low Voltage (PELV)**

To ensure electrical safety of AC500/AC500-eCo extra low voltage circuits, 24 V DC supply, communication interfaces, I/O circuits, and all connected devices must be powered from sources meeting requirements of SELV, PELV, class 2, limited voltage or limited power according to applicable standards.

**WARNING!**

Improper installation can lead to death by touching hazardous voltages!

To avoid personal injury, safe separation, double or reinforced insulation and separation of the primary and secondary circuit must be observed and implemented during installation.

- Only use power converters for safety extra-low voltages (SELV) with safe galvanic separation of the primary and secondary circuit.
- Safe separation means that the primary circuit of mains transformers must be separated from the secondary circuit by double or reinforced insulation. The protective extra-low voltage (PELV) offers protection against electric shock.
4.5 Electromagnetic compatibility

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial applications</td>
<td>Yes</td>
</tr>
<tr>
<td>Domestic applications</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic voltage in case of air discharge</td>
<td>8 kV</td>
</tr>
</tbody>
</table>
| Electrostatic voltage in case of contact discharge | 4 kV, in a closed switchgear cabinet 6 kV

1) High requirement for shipping classes are achieved with additional specific measures (see specific documentation).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test field strength</td>
<td>10 V/m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage units (DC)</td>
<td>2 kV</td>
</tr>
<tr>
<td>Supply voltage units (AC)</td>
<td>2 kV</td>
</tr>
<tr>
<td>Digital inputs/outputs (24 V DC)</td>
<td>1 kV</td>
</tr>
<tr>
<td>Digital inputs/outputs (120 V AC...240 V AC)</td>
<td>2 kV</td>
</tr>
<tr>
<td>Analog inputs/outputs</td>
<td>1 kV</td>
</tr>
<tr>
<td>CS31 bus</td>
<td>1 kV</td>
</tr>
<tr>
<td>Serial RS-485 interfaces (COM)</td>
<td>1 kV</td>
</tr>
<tr>
<td>Serial RS-232 interfaces (COM, not for PM55x and PM56x)</td>
<td>1 kV</td>
</tr>
<tr>
<td>ARCNET</td>
<td>1 kV</td>
</tr>
<tr>
<td>FBP</td>
<td>1 kV</td>
</tr>
<tr>
<td>Ethernet</td>
<td>1 kV</td>
</tr>
<tr>
<td>I/O supply (DC-out)</td>
<td>1 kV</td>
</tr>
</tbody>
</table>
Table 6: Immunity against the influence of line-conducted interferences (CW conducted), according to IEC 61000-4-6, zone B, criterion A

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test voltage</td>
<td>3V zone B, 10 V is also met.</td>
</tr>
<tr>
<td>High energy surges</td>
<td>According to IEC 61000-4-5, zone B, criterion B</td>
</tr>
<tr>
<td>Power supply DC</td>
<td>1 kV CM / 0.5 kV DM ²)</td>
</tr>
<tr>
<td>DC I/O supply</td>
<td>0.5 kV CM / 0.5 kV DM ²)</td>
</tr>
<tr>
<td>Communication Lines, shielded</td>
<td>1 kV CM ²)</td>
</tr>
<tr>
<td>AC I/O unshielded ³)</td>
<td>2 kV CM / 1 kV DM ¹)</td>
</tr>
<tr>
<td>I/O analog, I/O DC unshielded ³)</td>
<td>1 kV CM / 0.5 kV DM ³)</td>
</tr>
<tr>
<td>Radiation (radio disturbance)</td>
<td>According to IEC 55011, group 1, class A</td>
</tr>
</tbody>
</table>

²) CM = Common Mode, DM = Differential Mode
³) When DC I/O inputs are used with AC voltage, external filters limiting high energy surges to 1 kV CM / 0.5 DM are required to meet requirements according IEC 61131-2.

4.6 Mechanical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>Horizontal</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Housing</td>
<td>Classification V-2 according to UL 94</td>
</tr>
<tr>
<td>Vibration resistance acc. to EN 61131-2</td>
<td>all three axes</td>
</tr>
<tr>
<td></td>
<td>2 Hz...8.4 Hz, continuous 3.5 mm</td>
</tr>
<tr>
<td></td>
<td>8.4 Hz...150 Hz, continuous 1 g (higher values on request)</td>
</tr>
<tr>
<td>Shock test</td>
<td>All three axes</td>
</tr>
<tr>
<td></td>
<td>15 g, 11 ms, half-sinusoidal</td>
</tr>
</tbody>
</table>

Mounting of the modules:

- DIN rail according to DIN EN 50022 35 mm, depth 7.5 mm or 15 mm
- Mounting with screws Screws with a diameter of 4 mm
- Fastening torque 1.2 Nm

4.7 Approvals and certifications

Information on approvals and certificates can be found in the corresponding chapter of the Main catalog, PLC Automation.

5 System data AC500-XC

Assembly, construction and connection of devices of the variant AC500-XC is identical to AC500 (standard). The following description provides information on general technical data of AC500-XC system.
5.1 Environmental conditions

Table 7: Process and supply voltages

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V DC</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>24 V (-15 %, +20 %)</td>
</tr>
<tr>
<td>Protection against reverse polarity</td>
<td>Yes</td>
</tr>
<tr>
<td>120 V AC...240 V AC wide-range supply</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>120...240 V (-15 %, +10 %)</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz (-6 %, +4 %)</td>
</tr>
<tr>
<td>Allowed interruptions of power supply</td>
<td></td>
</tr>
<tr>
<td>DC supply</td>
<td>Interruption &lt; 10 ms, time between 2 interruptions &gt; 1 s, PS2</td>
</tr>
</tbody>
</table>

NOTICE!
Exceeding the maximum power supply voltage for process or supply voltages could lead to unrecoverable damage of the system. The system might be destroyed.

NOTICE!
For the supply of the modules, power supply units according to PELV or SELV specifications must be used.

The creepage distances and clearances meet the requirements of the overvoltage category II, pollution degree 2.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td><strong>Value</strong></td>
</tr>
<tr>
<td>Operating</td>
<td>-40 °C...+70 °C</td>
</tr>
<tr>
<td></td>
<td>-40 °C...-30 °C: Proper start-up of system; technical data not guaranteed</td>
</tr>
<tr>
<td></td>
<td>-40 °C...0 °C: Due to the LCD technology, the display might respond very slowly.</td>
</tr>
<tr>
<td></td>
<td>-40 °C...+40 °C: Vertical mounting of modules possible, output load limited to 50 % per group</td>
</tr>
<tr>
<td></td>
<td>+60 °C...+70 °C with the following deratings:</td>
</tr>
<tr>
<td></td>
<td>• System is limited to max. 2 communication modules per terminal base</td>
</tr>
<tr>
<td></td>
<td>• Applications certified for cULus up to +60 °C</td>
</tr>
<tr>
<td></td>
<td>• Digital inputs: maximum number of simultaneously switched on input channels limited to 75 % per group (e.g. 8 channels =&gt; 6 channels)</td>
</tr>
<tr>
<td></td>
<td>• Digital outputs: output current maximum value (all channels together) limited to 75 % per group (e.g. 8 A =&gt; 6 A)</td>
</tr>
<tr>
<td></td>
<td>• Analog outputs only if configured as voltage output: maximum total output current per group is limited to 75 %</td>
</tr>
<tr>
<td></td>
<td>(e.g. 40 mA =&gt; 30 mA)</td>
</tr>
<tr>
<td></td>
<td>• Analog outputs only if configured as current output: maximum number of simultaneously used output channels limited to 75 % per group (e.g. 4 channels =&gt; 3 channels)</td>
</tr>
<tr>
<td>Storage / Transport</td>
<td>-40 °C...+85 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>Operating / Storage: 100 % r. H. with condensation</td>
</tr>
<tr>
<td>Air pressure</td>
<td>Operating:</td>
</tr>
<tr>
<td></td>
<td>-1000 m...4000 m (1080 hPa...620 hPa)</td>
</tr>
<tr>
<td></td>
<td>&gt; 2000 m (&lt; 795 hPa):</td>
</tr>
<tr>
<td></td>
<td>• max. operating temperature must be reduced by 10 K (e.g. 70 °C to 60°C)</td>
</tr>
<tr>
<td></td>
<td>• I/O module relay contacts must be operated with 24 V nominal only</td>
</tr>
<tr>
<td>Immunity to corrosive gases</td>
<td>Operating: Yes, according to:</td>
</tr>
<tr>
<td></td>
<td>ISA S71.04.1985 Harsh group A, G3/GX</td>
</tr>
<tr>
<td></td>
<td>IEC 60721-3-3  3C2 / 3C3</td>
</tr>
<tr>
<td>Immunity to salt mist</td>
<td>Operating: Yes, horizontal mounting only, according to IEC 60068-2-52 severity level: 1</td>
</tr>
</tbody>
</table>

**NOTICE!**

Risk of corrosion!

- Unused connectors and slots may corrode if XC devices are used in salt-mist environments.

Protect unused connectors and slots with TA535 protective caps for XC devices.
Table 8: Electromagnetic compatibility

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device suitable for:</td>
<td></td>
</tr>
<tr>
<td>Industrial applications</td>
<td>Yes</td>
</tr>
<tr>
<td>Domestic applications</td>
<td>No</td>
</tr>
<tr>
<td>Radiated emission (radio disturbances)</td>
<td>Yes, according to: CISPR 16-2-3</td>
</tr>
<tr>
<td>Conducted emission (radio disturbances)</td>
<td>Yes, according to: CISPR 16-2-1, CISPR 16-1-2</td>
</tr>
<tr>
<td>Electrostatic discharge (ESD)</td>
<td>Yes, according to: IEC 61000-4-2, zone B, criterion B</td>
</tr>
<tr>
<td>Fast transient interference voltages (burst)</td>
<td>Yes, according to: IEC 61000-4-4, zone B, criterion B</td>
</tr>
<tr>
<td>High energy transient interference voltages (surge)</td>
<td>Yes, according to: IEC 61000-4-5, zone B, criterion B</td>
</tr>
<tr>
<td>Influence of radiated disturbances</td>
<td>Yes, according to: IEC 61000-4-3, zone B, criterion A</td>
</tr>
<tr>
<td>Influence of line-conducted interferences</td>
<td>Yes, according to: IEC 61000-4-6, zone B, criterion A</td>
</tr>
<tr>
<td>Influence of power frequency magnetic fields</td>
<td>Yes, according to: IEC 61000-4-8, zone B, criterion A</td>
</tr>
</tbody>
</table>

In order to prevent malfunctions, it is recommended, that the operating personnel discharge themselves prior to touching communication connectors or perform other suitable measures to reduce effects of electrostatic discharges.

NOTICE!
Risk of malfunctions!
- Unused slots for communication modules are not protected against accidental physical contact.
  - Unused slots for communication modules must be covered with dummy communication modules to achieve IP20 rating.
  - I/O bus connectors must not be touched during operation.
### 5.2 Mechanical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring method</td>
<td>Spring terminals</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Yes, according to:</td>
</tr>
<tr>
<td></td>
<td>IEC 61131-2</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-6</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-64</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>Yes, according to:</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-27</td>
</tr>
<tr>
<td>Assembly position</td>
<td>Horizontal</td>
</tr>
<tr>
<td></td>
<td>Vertical (no application in salt mist environment)</td>
</tr>
<tr>
<td>Assembly on DIN rail</td>
<td>According to IEC 60715</td>
</tr>
<tr>
<td></td>
<td>35 mm, depth 7.5 mm or 15 mm</td>
</tr>
<tr>
<td>Assembly with screws</td>
<td></td>
</tr>
<tr>
<td>Screw diameter</td>
<td>4 mm</td>
</tr>
<tr>
<td>Fastening torque</td>
<td>1.2 Nm</td>
</tr>
</tbody>
</table>

### 5.3 Environmental tests

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage</td>
<td>IEC 60068-2-1 Test Ab: cold withstand test -40 °C / 16 h</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-2 Test Bb: dry heat withstand test +85 °C / 16 h</td>
</tr>
<tr>
<td>Humidity</td>
<td>IEC 60068-2-30 Test Db: Cyclic (12 h / 12 h) damp-heat test 55 °C, 93 % r. H. / 25 °C, 95 % r. H., 6 cycles</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-78, stationary humidity test: 40 °C, 93 % r. H., 240 h</td>
</tr>
<tr>
<td>Insulation Test</td>
<td>IEC 61131-2</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>IEC 61131-2 / IEC 60068-26: 5 Hz...500 Hz, 2 g (with memory card inserted)</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-64: 5 Hz...500 Hz, 4 g rms</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>IEC 60068-2-27: all 3 axes 15 g, 11 ms, half-sinusoidal</td>
</tr>
</tbody>
</table>

**Table 9: EMC immunity**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD)</td>
<td>Electrostatic voltage in case of air discharge: 8 kV</td>
</tr>
<tr>
<td></td>
<td>Electrostatic voltage in case of contact discharge: 6 kV</td>
</tr>
<tr>
<td>Fast transient interference voltages (burst)</td>
<td>Supply voltage units (DC): 4 kV</td>
</tr>
<tr>
<td></td>
<td>Digital inputs/outputs (24 V DC): 2 kV</td>
</tr>
<tr>
<td></td>
<td>Analog inputs/outputs: 2 kV</td>
</tr>
<tr>
<td></td>
<td>Communication lines shielded: 2 kV</td>
</tr>
<tr>
<td></td>
<td>I/O supply (DC-out): 2 kV</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>High energy transient interference voltages (surge)</td>
<td>Supply voltage units (DC): 1 kV CM *) / 0.5 kV DM *)</td>
</tr>
<tr>
<td></td>
<td>Digital inputs/outputs (24 V DC): 1 kV CM *) / 0.5 kV DM *)</td>
</tr>
<tr>
<td></td>
<td>Digital inputs/outputs (AC): 4 kV</td>
</tr>
<tr>
<td></td>
<td>Analog inputs/outputs: 1 kV CM *) / 0.5 kV DM *)</td>
</tr>
<tr>
<td></td>
<td>Communication lines shielded: 1 kV CM *)</td>
</tr>
<tr>
<td></td>
<td>I/O supply (DC-out): 0.5 kV CM *) / 0.5 kV DM *)</td>
</tr>
<tr>
<td>Influence of radiated disturbances</td>
<td>Test field strength: 10 V/m</td>
</tr>
<tr>
<td>Influence of line-conducted interferences</td>
<td>Test voltage: 10 V</td>
</tr>
<tr>
<td>Power frequency magnetic fields</td>
<td>30 A/m 50 Hz</td>
</tr>
<tr>
<td></td>
<td>30 A/m 60 Hz</td>
</tr>
</tbody>
</table>

*) CM = Common Mode, * DM = Differential Mode