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#### **SIMATIC S7-200**

- The micro PLC offers maximum automation at minimum cost
- Extremely simple installation, programming and operation
- Large-scale integration, space-saving, powerful
- Can be used both for simple controls and for complex automation tasks
- All CPUs can be used in stand alone mode, in networks and within distributed structures
- Suitable for applications where programmable controllers would not have been viable in the past
- With outstanding real-time performance and powerful communication options (PPI, PROFIBUS DP, AS-Interface)
- Shipbuilding certification from
  - American Bureau of Shipping (ABS)
  - Bureau Veritas (BV)
  - Des Norske Veritas (DNV)
  - Germanischer Lloyd (GL)
  - Lloyds Register of Shipping (LRS)
  - Registro Italiano Navale (RINA)
  - Nippon Kaiji Kyokai (NK)

#### **SIPLUS S7-200**

- The PLC for use in the harshest environmental conditions
- With extended temperature range from -25 to +70°C
- Suitable for extraordinary medial load (pollution gas atmosphere)
- Occasional short-term condensation and increased mechanical loading permissible
- With the proven PLC technology of the S7-200
- Convenient handling, programming, maintenance and service
- Ideal for use in the automotive industry, environmental technology, mining, chemical plants, production technology, food industry etc.
- The alternative to expensive custom solutions

More Information you can find at:

<http://www.siemens.com/siplus>

### Technical specifications

#### General Technical specifications SIMATIC S7-200

|   |  |
|---|--|
| Degree of protection  | IP20 in accordance with IEC 529  |
| Ambient temperature   |  |
| <ul style="list-style-type: none"> <li>• Operation (95% relative humidity) <ul style="list-style-type: none"> <li>- With horizontal mounting 0 to 55°C</li> <li>- With vertical mounting 0 to 45 °C</li> </ul> </li> <li>• Transport and storage General <ul style="list-style-type: none"> <li>- with 95% relative humidity -40 to +70 °C</li> <li>- with 95% relative humidity 25 to 55 °C</li> </ul> </li> </ul> |  |
| Isolation   |  |
| • 5/24 V DC circuits  | Test voltage 500 V AC  |
| • 115/230 V AC circuits to ground   | Test voltage 1500 V AC   |
| • 115/230 V AC circuits to 115/230 V AC circuits  | Test voltage 1500 V AC   |
| • 230 V AC circuits to 5/24 V DC circuits   | Test voltage 1500 V AC   |
| • 115 V AC circuits to 5/24 V DC circuits   | Test voltage 1500 V AC   |
| Electromagnetic compatibility   | Requirements of EMC law  |
| • Noise immunity to EN 50082-2  | Tested according to: IEC 801-2, IEC 801-3, IEC 801-4, EN 50141, EN 50204, IEC 801-5, VDE 0160  |
| • Emitted interference according to EN 50081-1 and EN 50081-2   | Tested according to EN 55011, Class A, Group 1 and EN 55011, Class B, Group 1  |
| Mechanical rating   |  |
| • Vibrations, tested according to/tested with   | IEC 68, Part 2-6: 10 to 57 Hz; constant amplitude 0.3 mm; 58 to 150 Hz; constant acceleration 1 g (mounted on DIN rail) or 2 g (mounted in control cabinet); type of vibration: frequency cycles with a rate of change of 1 octave/minute; vibration duration: 10 frequency cycles per axis in each direction of the 3 mutually perpendicular axes |
| • Shock, tested according to/tested with  | IEC 68, Part 2-27/half-sine: shock strength 15 g (peak value), duration 11 ms, 6 shocks on each of the 3 mutually perpendicular axes   |

#### General Technical specifications SIPLUS S7-200

|  |   |
|--|---|
| <b>Ambient temperature</b>                 |   |
| Temperature                                | Horizontal mounting: -25 °C to 70 °C<br>Vertical mounting: -25 °C to 50 °C  |
| Relative humidity                          | 5 to 95%; transient condensation permissible, corresponding to relative humidity (RH-) stress grade 2 according to IEC 1131-2 and IEC 721 3-3 Cl. 3K5   |
| Transient icing                            | -25 °C to 0 °C<br>IEC 721 3-3 Cl. 3K5   |
| Atmospheric pressure                       | 1080 to 795 hPa corresponding to a height of -1000 to 2000 m  |
| Pollutant concentration                    | SO <sub>2</sub> : < 0,5 ppm; relative humidity <60% Test: 10 ppm, 4 days<br>H <sub>2</sub> S: < 0,1 ppm; relative humidity <60% Test: 1 ppm, 4 days (according to IEC 721 3-3; Class 3C3)   |
| <b>Mechanical environmental conditions</b> |   |
| Vibrations                                 | Type of vibration: frequency progressions changing at 1 octave per minute.<br>2 Hz ≤ f ≤ 9 Hz, constant amplitude 3,0 mm 9 Hz ≤ f ≤ 150 Hz, constant acceleration 1 g;<br>Duration of vibration: 10 frequency progressions per axis in each direction of the three mutually perpendicular axes;<br>Vibration testing according to IEC 68 section 2-6 (Sinus) and IEC 721 3-3, Class 3M4 |
| Shock                                      | Type of shock: semisinusoidal shock strength: 15 g peak value, duration shock direction 11 ms: 3 shocks each in +/- direction on each of the mutually perpendicular axes<br>Shock testing according to IEC 68 section 2-27  |
| Conformity                                 | EN 50155 (railroad applications - electronic device on rail vehicles)   |

# SIMATIC S7-200

## Central processing units

CPU 221, 222, 224, 224 XP, 226

### Overview

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- The smart compact solution
- With 10 inputs/outputs on board
- Not expandable



- The compact high-performance CPU
- With 24 inputs/outputs on board
- Expandable with up to 7 expansion modules

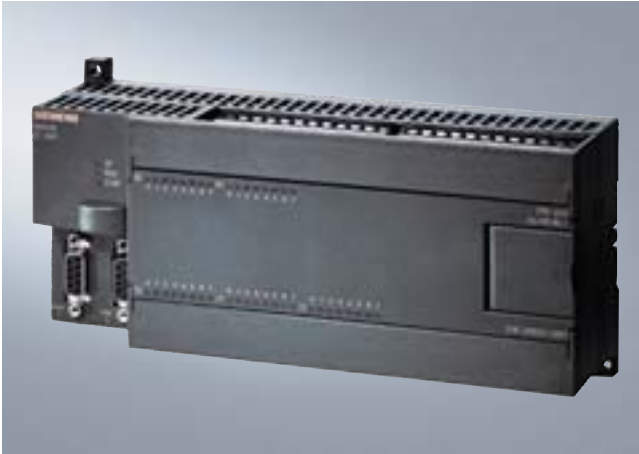


- The superior compact solution
- With 14 inputs/outputs on board
- Expandable with up to 2 expansion modules



- The power CPU
- With 24 digital and 3 analog inputs/outputs onboard
- Expandable with up to 7 expansion modules

## Overview



- The high-performance package for complex technical tasks
- With additional PPI port for added flexibility and communication options
- With 40 inputs/outputs on board
- Expansion capability for max. 7 expansion racks

## Technical specifications

|  | 6ES7 211-0AA23-0XB0  | 6ES7 211-0BA23-0XB0   | 6ES7 212-1AB23-0XB0  | 6ES7 212-1BB23-0XB0   |
|--|----------------------|---|--|---|
| <b>Supply voltages</b>                     |                      |   |  |   |
| Rated value                                |                      |   |  |   |
| - 24 V DC                                  | Yes                  |   | Yes  |   |
| - permissible range, lower limit (DC)      | 20.4 V               |   | 20.4 V   |   |
| - permissible range, upper limit (DC)      | 28.8 V               |   | 28.8 V   |   |
| - 120 V AC                                 |                      | Yes   |  | Yes   |
| - 230 V AC                                 |                      | Yes   |  | Yes   |
| - permissible range, lower limit (AC)      |                      | 85 V  |  | 85 V  |
| - permissible range, upper limit (AC)      |                      | 264 V   |  | 264 V   |
| - permissible frequency range, lower limit |                      | 47 Hz   |  | 47 Hz   |
| - permissible frequency range, upper limit |                      | 63 Hz   |  | 63 Hz   |
| <b>Voltages and currents</b>               |                      |   |  |   |
| Load voltage L+                            |                      |   |  |   |
| - Rated value (DC)                         | 24 V                 | 24 V  | 24 V   | 24 V  |
| - permissible range, lower limit (DC)      | 20.4 V               | 5 V   | 20.4 V   | 5 V   |
| - permissible range, upper limit (DC)      | 28.8 V               | 30 V  | 28.8 V   | 30 V  |
| Load voltage L1                            |                      |   |  |   |
| - Rated value (AC)                         |                      | 100 V; 100 to 230 V AC  |  | 100 V; 100 to 230 V AC  |
| - permissible range, lower limit (AC)      |                      | 5 V   |  | 5 V   |
| - permissible range, upper limit (AC)      |                      | 250 V   |  | 250 V   |
| - permissible frequency range, lower limit |                      | 47 Hz   |  | 47 Hz   |
| - permissible frequency range, upper limit |                      | 63 Hz   |  | 63 Hz   |
| <b>Current consumption</b>                 |                      |   |  |   |
| • Inrush current, max.                     | 10 A; at 28.8 V      | 20 A; at 264 V  | 10 A; at 28.8 V  | 20 A; at 264 V  |
| • from supply voltage L+, max.             | 450 mA; 80 to 450 mA |   | 500 mA; 85 to 500 mA, output current for expansion modules (5 V DC) 340 mA |   |
| • from supply voltage L1, max.             |                      | 120 mA; 15 to 60 mA (240 V), 30 to 120 mA (120 V); output current for expansion modules (5 V DC) 340 mA |  | 140 mA; 20 to 70 mA (240 V), 40 to 140 mA (120 V); output current for expansion modules (5 V DC) 340 mA |

# SIMATIC S7-200

## Central processing units

CPU 221, 222, 224, 224 XP, 226

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### Technical specifications (continued)

|   | 6ES7 211-0AA23-0XB0  | 6ES7 211-0BA23-0XB0  | 6ES7 212-1AB23-0XB0  | 6ES7 212-1BB23-0XB0  |
|---|--|--|--|--|
| back-up battery<br>- Backup time  | 50 h; (min. 8 h at 40 °C);<br>200 days (typ.) with<br>optional battery module  | 50 h; (min. 8 h at 40 °C);<br>200 days (typ.) with<br>optional battery module  | 50 h; (min. 8 h at 40 °C);<br>200 days (typ.) with<br>optional battery module  | 50 h; (min. 8 h at 40 °C);<br>200 days (typ.) with<br>optional battery module  |
| <b>Memory/backup</b>  |  |  |  |  |
| Memory<br>- Number of memory modules<br>(optional)                                  | 1; pluggable memory<br>module, content<br>identical to integral<br>EEPROM, in addition,<br>recipes, data logs and<br>other files can be saved.   | 1; pluggable memory<br>module, content<br>identical to integral<br>EEPROM, in addition,<br>recipes, data logs and<br>other files can be saved.   | 1; pluggable memory<br>module, content<br>identical to integral<br>EEPROM, in addition,<br>recipes, data logs and<br>other files can be saved.   | 1; pluggable memory<br>module, content<br>identical to integral<br>EEPROM, in addition,<br>recipes, data logs and<br>other files can be saved.   |
| •Data memory<br>and program memory<br>- Data memory, max.<br>- Program memory, max. | 2 KByte<br>4 KByte   | 2 KByte<br>4 KByte   | 2 KByte<br>4 KByte   | 2 KByte<br>4 KByte   |
| Backup<br>- available   | Yes; Program: entire<br>program maintenance-<br>free in integral EEPROM,<br>programmable via CPU;<br>data: entire DB 1 loaded<br>from PG/PC<br>maintenance-free in<br>integral EEPROM,<br>current values of DB 1 in<br>RAM, retentive flags,<br>timers, counters etc.,<br>maintenance free via<br>super capacitor;<br>optional battery | Yes; Program: entire<br>program maintenance-<br>free in integral EEPROM,<br>programmable via CPU;<br>data: entire DB 1 loaded<br>from PG/PC<br>maintenance-free in<br>integral EEPROM,<br>current values of DB 1 in<br>RAM, retentive flags,<br>timers, counters etc.,<br>maintenance free via<br>super capacitor;<br>optional battery | Yes; Program: entire<br>program maintenance-<br>free in integral EEPROM,<br>programmable via CPU;<br>data: entire DB 1 loaded<br>from PG/PC<br>maintenance-free in<br>integral EEPROM,<br>current values of DB 1 in<br>RAM, retentive flags,<br>timers, counters etc.,<br>maintenance free via<br>super capacitor;<br>optional battery | Yes; Program: entire<br>program maintenance-<br>free in integral EEPROM,<br>programmable via CPU;<br>data: entire DB 1 loaded<br>from PG/PC<br>maintenance-free in<br>integral EEPROM,<br>current values of DB 1 in<br>RAM, retentive flags,<br>timers, counters etc.,<br>maintenance free via<br>super capacitor;<br>optional battery |
| <b>CPU/processing times</b><br>•for bit instruction, max.                           | 0,22 µs  | 0,22 µs  | 0,22 µs  | 0,22 µs  |
| <b>Timers/counters and their reten-<br/>tive characteristics</b>                    |  |  |  |  |
| S7 counter<br>- Number  | 256  | 256  | 256  | 256  |
| •of which retentive with battery<br>- adjustable                                    | Yes; via super capacitor<br>or battery   | Yes; via super capacitor<br>or battery   | Yes; via super capacitor<br>or battery   | Yes; via super capacitor<br>or battery   |
| - lower limit   | 1  | 1  | 1  | 1  |
| - upper limit   | 256  | 256  | 256  | 256  |
| •Counting range<br>- lower limit  | 0  | 0  | 0  | 0  |
| - upper limit   | 32.767   | 32.767   | 32.767   | 32.767   |
| S7 times<br>- Number  | 256  | 256  | 256  | 256  |
| •of which retentive with battery<br>- adjustable                                    | Yes; via super capacitor<br>or battery   | Yes; via super capacitor<br>or battery   | Yes; via super capacitor<br>or battery   | Yes; via super capacitor<br>or battery   |
| - upper limit   | 64   | 64   | 64   | 64   |
| •Timing range<br>- lower limit  | 1 ms   | 1 ms   | 1 ms   | 1 ms   |
| - upper limit   | 54 min; 4 times,<br>1 ms to 30 s 16 times,<br>10 ms to 5 min<br>236 times,<br>100 ms to 54 min   | 54 min; 4 times,<br>1 ms to 30 s 16 times,<br>10 ms to 5 min<br>236 times,<br>100 ms to 54 min   | 54 min; 4 times,<br>1 ms to 30 s 16 times,<br>10 ms to 5 min<br>236 times,<br>100 ms to 54 min   | 54 min; 4 times,<br>1 ms to 30 s 16 times,<br>10 ms to 5 min<br>236 times,<br>100 ms to 54 min   |

#### Technical specifications (continued)

|   | 6ES7 211-0AA23-0XB0   | 6ES7 211-0BA23-0XB0   | 6ES7 212-1AB23-0XB0   | 6ES7 212-1BB23-0XB0   |
|---|---|---|---|---|
| <b>Data areas and their retentive characteristics</b> |   |   |   |   |
| Flags   |   |   |   |   |
| - Number  | 32 Byte   | 32 Byte   | 32 Byte   | 32 Byte   |
| - adjustable retentivity                              | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  |
| - of which retentive with battery                     | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  |
| - of which retentive without battery                  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  |
| <b>Configuration</b>                                  |   |   |   |   |
| •Connectable programming devices/PCs                  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  |
| •Central units/expansion units, max.                  |   |   | 2 expansion modules. Only expansion modules of the S7-22x series can be used. Because of the limited output current, the use of expansion modules may be subject to restrictions.   | 2 expansion modules. Only expansion modules of the S7-22x series can be used (because of the limited output current, the use of expansion modules may be subject to restrictions.)  |
| <b>I/O expansions</b>                                 |   |   |   |   |
| - Analog inputs/outputs, max.                         |   |   | 10; max. 8 inputs and 2 outputs (EM) or max. 0 inputs and 4 outputs (EM)  | 10; max. 8 inputs and 2 outputs (EM) or max. 0 inputs and 4 outputs (EM)  |
| - Digital inputs/outputs, max.                        |   |   | 78; max. 40 inputs and 38 outputs (CPU+EM)  | 78; max. 40 inputs and 38 outputs (CPU+EM)  |
| - AS interface inputs/outputs, max.                   |   |   | 31; AS interface slaves (CP 243-2)  | 31; AS interface slaves (CP 243-2)  |
| <b>Connection system</b>                              |   |   |   |   |
| •Pluggable I/O terminals                              | No  | No  | No  | No  |
| <b>1st interface</b>                                  |   |   |   |   |
| •Type of interface                                    | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   |
| •Physical   | RS 485  | RS 485  | RS 485  | RS 485  |
| <b>Functionality</b>                                  |   |   |   |   |
| - MPI   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   |
| - PPI   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   |
| - Serial data transmission                            | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter |

# SIMATIC S7-200

## Central processing units

CPU 221, 222, 224, 224 XP, 226

### Technical specifications (continued)

|   | 6ES7 211-0AA23-0XB0  | 6ES7 211-0BA23-0XB0  | 6ES7 212-1AB23-0XB0  | 6ES7 212-1BB23-0XB0  |
|---|--|--|--|--|
| MPI   |  |  |  |  |
| - Transmission rates, max.                        | 187.5 kBit/s   | 187.5 kBit/s   | 187.5 kBit/s   | 187.5 kBit/s   |
| - Transmission rates, min.                        | 19.2 kBit/s  | 19.2 kBit/s  | 19.2 kBit/s  | 19.2 kBit/s  |
| <b>CPU/ programming</b>                           |  |  |  |  |
| Programming language                              |  |  |  |  |
| - LAD   | Yes  | Yes  | Yes  | Yes  |
| - FBD   | Yes  | Yes  | Yes  | Yes  |
| - STL   | Yes  | Yes  | Yes  | Yes  |
| •Instruction set                                  | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions |
| •User program protection/password protection      | Yes; 3-stage password protection   | Yes; 3-stage password protection   | Yes; 3-stage password protection   | Yes; 3-stage password protection   |
| •Program execution                                | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   |
| •Program organization                             | 1 OB, 1 DB, 1 SDB sub-programs with/without parameter transfer   | 1 OB, 1 DB, 1 SDB sub-programs with/without parameter transfer   | 1 OB, 1 DB, 1 SDB sub-programs with/without parameter transfer   | 1 OB, 1 DB, 1 SDB sub-programs with/without parameter transfer   |
| •Number of sub-programs, max.                     | 64   | 64   | 64   | 64   |
| <b>Digital inputs</b>                             |  |  |  |  |
| •Number of digital inputs                         | 6; integrated  | 6; integrated  | 8  | 8  |
| Length of cable                                   |  |  |  |  |
| - Length of cable shielded, max                   | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  |
| - Length of cable unshielded, max                 | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  |
| •m/p reading                                      | Yes; optional, per group   | Yes; optional, per group   | Yes; optional, per group   | Yes; optional, per group   |
| Input voltage                                     |  |  |  |  |
| - Rated value, DC                                 | 24 V   | 24 V   | 24 V   | 24 V   |
| - for signal "0"                                  | 0 to 5 V   | 0 to 5 V   | 0 to 5 V   | 0 to 5 V   |
| - for signal "1"                                  | min. 15 V  | min. 15 V  | min. 15 V  | min. 15 V  |
| Input current                                     |  |  |  |  |
| - for 1 signal, typical                           | 2.5 mA   | 2.5 mA   | 2.5 mA   | 2.5 mA   |
| Input delay (at rated value of the input voltage) |  |  |  |  |
| •For standard inputs                              |  |  |  |  |
| - Parameterizable                                 | Yes; all   | Yes; all   | Yes; all   | Yes; all   |
| - at 0 after 1, min.                              | 0.2 ms   | 0.2 ms   | 0.2 ms   | 0.2 ms   |
| - at 0 after 1, max.                              | 12.8 ms  | 12.8 ms  | 12.8 ms  | 12.8 ms  |
| •for alarm inputs                                 |  |  |  |  |
| - parameterizable                                 | Yes; I0.0 to I0.3  | Yes; I0.0 to I0.3  | Yes; I0.0 to I0.3  | Yes; I0.0 to I0.3  |
| •for counters/technological functions             |  |  |  |  |
| - parameterizable                                 | Yes; (E0.0 to E0.5) 30 kHz   | Yes; (E0.0 to E0.5) 30 kHz   | Yes; (E0.0 to E0.5) 30 kHz   | Yes; (E0.0 to E0.5) 30 kHz   |



#### Technical specifications (continued)

|   | 6ES7 211-0AA23-0XB0   | 6ES7 211-0BA23-0XB0  | 6ES7 212-1AB23-0XB0   | 6ES7 212-1BB23-0XB0  |
|---|---|--|---|--|
| <b>Digital outputs</b>                                    |   |  |   |  |
| •Number of digital outputs                                | 4; Transistor   | 4; Relay   | 6; Transistor   | 6; Relay   |
| •Length of cable shielded, max.                           | 500 m   | 500 m  | 500 m   | 500 m  |
| •Length of cable unshielded, max.                         | 150 m   | 150 m  | 150 m   | 150 m  |
| •Short-circuit protection of the output                   | No; provided externally   | No; provided externally  | No; provided externally   | No; provided externally  |
| •Limitation of voltage induced on circuit interruption to | 1 W   |  | 1 W   |  |
| Switching capacity of the outputs                         |   |  |   |  |
| - at resistive load, max.                                 | 0.75 A  | 2 A  | 0.75 A  | 2 A  |
| - at lamp load, max.                                      | 5 W   | 30 W DC, 200 W AC  | 5 W   | 30 W DC, 200 W AC  |
| Output voltage  |   |  |   |  |
| - for 1 signal  | 20 V DC   | L+/L1  | 20 V DC   | L+/L1  |
| Output current  |   |  |   |  |
| - for 1 signal rated value                                | 750 mA  | 2 A  | 750 mA  | 2 A  |
| - for 0 signal residual current, max.                     | 0.1 mA  | 0 mA   | 10 µA   | 0 mA   |
| Output delay at resistive load                            |   |  |   |  |
| - "0" after "1", max.                                     | 15 µs; of standard outputs, max. (A0.2 to A0.3)<br>15 µs; of pulse outputs, max. (A0.0 to A0.1) 2 µs    | 10 ms; all outputs   | 15 µs; of standard outputs, max. (A0.2 to A0.5)<br>15 µs; of pulse outputs, max. (A0.0 to A0.1) 2 µs    | 10 ms; all outputs   |
| - "1" after "0", max.                                     | 130 µs; of standard outputs, max. (A0.2 to A0.3)<br>100 µs; of pulse outputs, max. (A0.0 to A0.1) 10 µs | 10 ms; all outputs   | 130 µs; of standard outputs, max. (A0.2 to A0.5)<br>100 µs; of pulse outputs, max. (A0.0 to A0.1) 10 µs | 10 ms; all outputs   |
| Parallel switching of 2 outputs                           |   |  |   |  |
| - to increase power                                       | Yes   | No   | Yes   | No   |
| Switching frequency                                       |   |  |   |  |
| - of pulse outputs, at resistive load, max.               | 20 kHz; A0.0 to A0.1  |  | 20 kHz; A0.0 to A0.1  |  |
| Summation current of the outputs (per group)              |   |  |   |  |
| - up to 40 °C, max.                                       | 3 A   | 6 A  | 4.5 A   | 6 A  |
| - horizontal installation, up to 55 °C, max.              | 3 A   | 6 A  | 4.5 A   | 6 A  |
| <b>Relay outputs</b>                                      |   |  |   |  |
| •Number of operating cycles                               |   | 10,000,000; mechanical<br>10 million, at rated load<br>voltage 100,000 |   | 10,000,000; mechanical<br>10 million, at rated load<br>voltage 100,000 |
| <b>Analog inputs</b>                                      |   |  |   |  |
| •Number of analog potentiometers                          | 1; Analog potentiometer;<br>resolution 8 bits   | 1; Analog potentiometer;<br>resolution 8 bits                          | 1; Analog potentiometer;<br>resolution 8 bits   | 1; Analog potentiometer;<br>resolution 8 bits                          |
| <b>Sensor supply</b>                                      |   |  |   |  |
| 24 V - sensor supply                                      |   |  |   |  |
| - 24 V  | Yes; permissible range:<br>15.4 to 28.8 V   | Yes; permissible range:<br>20.4 to 28.8 V                              | Yes; permissible range:<br>15.4 to 28.8 V   | Yes; permissible range:<br>20.4 to 28.8 V                              |
| - Short-circuit protection                                | Yes; electronic at 600 mA   | Yes; electronic at 600 mA  | Yes; electronic at 600 mA   | Yes; electronic at 600 mA  |
| - Output current, max.                                    | 180 mA  | 180 mA   | 180 mA  | 180 mA   |
| <b>Sensor</b>   |   |  |   |  |
| Connectable encoders                                      |   |  |   |  |
| - 2-wire BERS   | Yes   | Yes  | Yes   | Yes  |
| - permissible closed-circuit current (2-wire BERS), max.  | 1 mA  | 1 mA   | 1 mA  | 1 mA   |

# SIMATIC S7-200

## Central processing units

CPU 221, 222, 224, 224 XP, 226

### Technical specifications (continued)

|  | 6ES7 211-0AA23-0XB0  | 6ES7 211-0BA23-0XB0  | 6ES7 212-1AB23-0XB0  | 6ES7 212-1BB23-0XB0  |
|--|--|--|--|--|
| <b>Integral functions</b>                    |  |  |  |  |
| •Number of counters                          | 4; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the set-point value is reached; change of count direction etc. | 4; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the set-point value is reached; change of count direction etc. | 4; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the set-point value is reached; change of count direction etc. | 4; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the set-point value is reached; change of count direction etc. |
| •Count frequency (counters) max.             | 30 kHz   | 30 kHz   | 30 kHz   | 30 kHz   |
| •Number of alarm inputs                      | 4; 4 rising edges and/or 4 falling edges   | 4; 4 rising edges and/or 4 falling edges   | 4; 4 rising edges and/or 4 falling edges   | 4; 4 rising edges and/or 4 falling edges   |
| •Number of pulse outputs                     | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation   | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation   | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation   | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation   |
| •Cut-off frequency (pulse)                   | 20 kHz   | 20 kHz   | 20 kHz   | 20 kHz   |
| <b>Potentials/ electrical isolation</b>      |  |  |  |  |
| Digital output functions                     |  |  |  |  |
| - between the channels                       | Yes; Optocoupler   | Yes; Relay   | Yes; Optocoupler   | Yes; Relay   |
| - between the channels, in groups of         | 4  | 1 and 3  | 6  | 3  |
| Digital input functions                      |  |  |  |  |
| - between the channels                       | Yes  | Yes  | Yes  | Yes  |
| - between the channels, in groups of         | 2 and 4  | 2 and 4  | 4  | 4  |
| <b>Permissible potential difference</b>      |  |  |  |  |
| •between different circuits                  | 500 V DC between 24 V DC and 5 V DC  | 500 V DC between 24 V DC and 5 V DC; 1500 V AC between 24 V DC and 230 V AC  | 500 V DC between 24 V DC and 5 V DC  | 500 V DC between 24 V DC and 5 V DC; 1500 V AC between 24 V DC and 230 V AC  |
| <b>Environmental requirements</b>            |  |  |  |  |
| •Environmental conditions                    | For other ambient conditions: see "S7-200 Programmable Controller, System Manual"  | For other ambient conditions: see "S7-200 Programmable Controller, System Manual"  | For other ambient conditions: see "S7-200 Programmable Controller, System Manual"  | For other ambient conditions: see "S7-200 Programmable Controller, System Manual"  |
| Operating temperature                        |  |  |  |  |
| - vertical mounting, min.                    | 0 °C   | 0 °C   | 0 °C   | 0 °C   |
| - vertical mounting, max.                    | 45 °C  | 45 °C  | 45 °C  | 45 °C  |
| - horizontal mounting, min.                  | 0 °C   | 0 °C   | 0 °C   | 0 °C   |
| - horizontal mounting, max.                  | 55 °C  | 55 °C  | 55 °C  | 55 °C  |
| Air pressure                                 |  |  |  |  |
| - permissible range, min                     | 860 hPa  | 860 hPa  | 860 hPa  | 860 hPa  |
| - permissible range, max                     | 1,080 hPa  | 1,080 hPa  | 1,080 hPa  | 1,080 hPa  |
| Relative humidity                            |  |  |  |  |
| - Operation, min.                            | 5 %  | 5 %  | 5 %  | 5 %  |
| - Operation, max.                            | 95 %; RH stressing level 2 in accordance with IEC 1131-2   | 95 %; RH stressing level 2 in accordance with IEC 1131-2   | 95 %; RH stressing level 2 in accordance with IEC 1131-2   | 95 %; RH stressing level 2 in accordance with IEC 1131-2   |
| Degree of protection and class of protection |  |  |  |  |
| - IP 20                                      | Yes  | Yes  | Yes  | Yes  |
| <b>Dimensions and weight</b>                 |  |  |  |  |
| •Weight, approx.                             | 270 g  | 310 g  | 270 g  | 310 g  |
| •Width                                       | 90 mm  | 90 mm  | 90 mm  | 90 mm  |
| •Height                                      | 80 mm  | 80 mm  | 80 mm  | 80 mm  |
| •Depth                                       | 62 mm  | 62 mm  | 62 mm  | 62 mm  |

#### Technical specifications (continued)

|  | 6ES7 214-1AD23-0XB0   | 6ES7 214-1BD23-0XB0  | 6ES7 214-2AD23-0XB0   | 6ES7 214-2BD23-0XB0  | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0   |
|--|---|--|---|--|---|---|
| <b>Supply voltages</b>                     |   |  |   |  |   |   |
| Rated value                                |   |  |   |  |   |   |
| - 24 V DC                                  | Yes   |  | Yes   |  | Yes   |   |
| - permissible range, lower limit (DC)      | 20.4 V  |  | 20.4 V  |  | 20.4 V  |   |
| - permissible range, upper limit (DC)      | 28.8 V  |  | 28.8 V  |  | 28.8 V  |   |
| - 120 V AC                                 |   | Yes  |   | Yes  |   | Yes   |
| - 230 V AC                                 |   | Yes  |   | Yes  |   | Yes   |
| - permissible range, lower limit (AC)      |   | 85 V   |   | 85 V   |   | 85 V  |
| - permissible range, upper limit (AC)      |   | 264 V  |   | 264 V  |   | 264 V   |
| - permissible frequency range, lower limit |   | 47 Hz  |   | 47 Hz  |   | 47 Hz   |
| - permissible frequency range, upper limit |   | 63 Hz  |   | 63 Hz  |   | 63 Hz   |
| <b>Voltages and currents</b>               |   |  |   |  |   |   |
| Load voltage L+                            |   |  |   |  |   |   |
| - Rated value (DC)                         | 24 V  | 24 V   | 24 V  | 24 V   | 24 V  | 24 V  |
| - permissible range, lower limit (DC)      | 20.4 V  | 5 V  | 20.4 V  | 5 V  | 20.4 V  | 5 V   |
| - permissible range, upper limit (DC)      | 28.8 V  | 30 V   | 28.8 V  | 30 V   | 28.8 V  | 30 V  |
| Load voltage L1                            |   |  |   |  |   |   |
| - Rated value (AC)                         |   | 100 V; 100 to 230 V AC   |   | 100 V; 100 to 230 V AC   |   | 100 V; 100 to 230 V AC  |
| - permissible range, lower limit (AC)      |   | 5 V  |   | 5 V  |   | 5 V   |
| - permissible range, upper limit (AC)      |   | 250 V  |   | 250 V  |   | 250 V   |
| - permissible frequency range, lower limit |   | 47 Hz  |   | 47 Hz  |   | 47 Hz   |
| - permissible frequency range, upper limit |   | 63 Hz  |   | 63 Hz  |   | 63 Hz   |
| <b>Current consumption</b>                 |   |  |   |  |   |   |
| • Inrush current, max.                     | 12 A; at 28.8 V   | 20 A; at 264 V   | 12 A; at 28.8 V   | 20 A; at 264 V   | 10 A; at 28.8 V   | 20 A; at 264 V  |
| • from supply voltage L+, max.             | 700 mA; 110 to 700 mA, output current for expansion modules (5 V DC) 660 mA |  | 900 mA; 120 to 900 mA, output current for expansion modules (5 V DC) 660 mA |  | 1,050 mA; 150 to 1050 mA, output current for expansion modules (5 V DC) 1000 mA |   |
| • from supply voltage L1, max.             |   | 200 mA; 30 to 100 mA (240 V), 60 to 200 mA (120 V); output current for expansion modules (5 V DC) 600 mA |   | 220 mA; 35 to 100 mA (240 V), 70 to 220 mA (120 V); output current for expansion modules (5 V DC) 600 mA |   | 320 mA; 40 to 160 mA (240 V), 80 to 320 mA (120 V); output current for expansion modules (5 V DC) 1000 mA |
| <b>back-up battery</b>                     |   |  |   |  |   |   |
| - Backup time                              | 100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module   | 100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module                                | 100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module   | 100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module                                | 100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module       | 100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module                                 |

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## Central processing units

CPU 221, 222, 224, 224 XP, 226

### Technical specifications (continued)

|  | 6ES7 214-1AD23-0XB0  | 6ES7 214-1BD23-0XB0  | 6ES7 214-2AD23-0XB0  | 6ES7 214-2BD23-0XB0  | 6ES7 216-2AD23-0XB0  | 6ES7 216-2BD23-0XB0  |
|--|--|--|--|--|--|--|
| <b>Memory/backup</b>                                       |  |  |  |  |  |  |
| Memory   |  |  |  |  |  |  |
| - Number of memory modules (optional)                      | 1; pluggable memory module, content identical to integral EEPROM, in addition, recipes, data logs and other files can be saved.  | 1; pluggable memory module, content identical to integral EEPROM, in addition, recipes, data logs and other files can be saved.  | 1; pluggable memory module, content identical to integral EEPROM, in addition, recipes, data logs and other files can be saved.  | 1; pluggable memory module, content identical to integral EEPROM, in addition, recipes, data logs and other files can be saved.  | 1; pluggable memory module, content identical to integral EEPROM, in addition, recipes, data logs and other files can be saved.  | 1; pluggable memory module, content identical to integral EEPROM, in addition, recipes, data logs and other files can be saved.  |
| •Data memory and program memory                            |  |  |  |  |  |  |
| - Data memory, max.  | 8 KByte  | 8 KByte  | 10 KByte   | 10 KByte   | 10 KByte   | 10 KByte   |
| - Program memory, max.                                     | 12 KByte;<br>8 Kbytes for active run-time edit   | 12 KByte;<br>8 Kbytes for active run-time edit   | 16 KByte;<br>12 Kbytes for active run-time edit  | 16 KByte;<br>12 Kbytes for active run-time edit  | 24 KByte;<br>16 Kbytes with active run-time edit   | 24 KByte;<br>16 Kbytes with active run-time edit   |
| Backup   |  |  |  |  |  |  |
| - available  | Yes; Program: entire program maintenance-free in integral EEPROM, programmable via CPU; data: entire DB 1 loaded from PG/PC maintenance-free in integral EEPROM, current values of DB 1 in RAM, retentive flags, timers, counters etc., maintenance free via super capacitor; optional battery | Yes; Program: entire program maintenance-free in integral EEPROM, programmable via CPU; data: entire DB 1 loaded from PG/PC maintenance-free in integral EEPROM, current values of DB 1 in RAM, retentive flags, timers, counters etc., maintenance free via super capacitor; optional battery | Yes; Program: entire program maintenance-free in integral EEPROM, programmable via CPU; data: entire DB 1 loaded from PG/PC maintenance-free in integral EEPROM, current values of DB 1 in RAM, retentive flags, timers, counters etc., maintenance free via super capacitor; optional battery | Yes; Program: entire program maintenance-free in integral EEPROM, programmable via CPU; data: entire DB 1 loaded from PG/PC maintenance-free in integral EEPROM, current values of DB 1 in RAM, retentive flags, timers, counters etc., maintenance free via super capacitor; optional battery | Yes; Program: entire program maintenance-free in integral EEPROM, programmable via CPU; data: entire DB 1 loaded from PG/PC maintenance-free in integral EEPROM, current values of DB 1 in RAM, retentive flags, timers, counters etc., maintenance free via super capacitor; optional battery | Yes; Program: entire program maintenance-free in integral EEPROM, programmable via CPU; data: entire DB 1 loaded from PG/PC maintenance-free in integral EEPROM, current values of DB 1 in RAM, retentive flags, timers, counters etc., maintenance free via super capacitor; optional battery |
| <b>CPU/processing times</b>                                |  |  |  |  |  |  |
| •for bit instruction, max.                                 | 0.22 µs  | 0.22 µs  | 0.22 µs  | 0.22 µs  | 0.22 µs  | 0.22 µs  |
| <b>Timers/counters and their retentive characteristics</b> |  |  |  |  |  |  |
| S7 counter   |  |  |  |  |  |  |
| - Number   | 256  | 256  | 256  | 256  | 256  | 256  |
| •of which retentive with battery                           |  |  |  |  |  |  |
| - adjustable   | Yes; via super capacitor or battery  | Yes; via super capacitor or battery  | Yes; via super capacitor or battery  | Yes; via super capacitor or battery  | Yes; via super capacitor or battery  | Yes; via super capacitor or battery  |
| - lower limit  | 1  | 1  | 1  | 1  | 1  | 1  |
| - upper limit  | 256  | 256  | 256  | 256  | 256  | 256  |
| •Counting range  |  |  |  |  |  |  |
| - lower limit  | 0  | 0  | 0  | 0  | 0  | 0  |
| - upper limit  | 32,767   | 32,767   | 32,767   | 32,767   | 32,767   | 32,767   |

#### Technical specifications (continued)

|   | 6ES7 214-1AD23-0XB0   | 6ES7 214-1BD23-0XB0   | 6ES7 214-2AD23-0XB0   | 6ES7 214-2BD23-0XB0   | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0   |
|---|---|---|---|---|---|---|
| S7 times  |   |   |   |   |   |   |
| - Number  | 256   | 256   | 256   | 256   | 256   | 256   |
| •of which retentive with battery                      |   |   |   |   |   |   |
| - adjustable  | Yes; via super capacitor or battery   | Yes; via super capacitor or battery   | Yes; via super capacitor or battery   | Yes; via super capacitor or battery   | Yes; via super capacitor or battery   | Yes; via super capacitor or battery   |
| - upper limit   | 64  | 64  | 64  | 64  | 64  | 64  |
| •Timing range   |   |   |   |   |   |   |
| - lower limit   | 1 ms  | 1 ms  | 1 ms  | 1 ms  | 1 ms  | 1 ms  |
| - upper limit   | 54 min; 4 times, 1 ms to 30 s<br>16 times, 10 ms to 5 min<br>236 times, 100 ms to 54 min  | 54 min; 4 times, 1 ms to 30 s<br>16 times, 10 ms to 5 min<br>236 times, 100 ms to 54 min  | 54 min; 4 times, 1 ms to 30 s<br>16 times, 10 ms to 5 min<br>236 times, 100 ms to 54 min  | 54 min; 4 times, 1 ms to 30 s<br>16 times, 10 ms to 5 min<br>236 times, 100 ms to 54 min  | 54 min; 4 times, 1 ms to 30 s<br>16 times, 10 ms to 5 min<br>236 times, 100 ms to 54 min  | 54 min; 4 times, 1 ms to 30 s<br>16 times, 10 ms to 5 min<br>236 times, 100 ms to 54 min  |
| <b>Data areas and their retentive characteristics</b> |   |   |   |   |   |   |
| Flags   |   |   |   |   |   |   |
| - Number  | 32 Byte   | 32 Byte   | 32 Byte   | 32 Byte   | 32 Byte   | 32 Byte   |
| - adjustable retentivity                              | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  | Yes; M0.0 to M31.7  |
| - of which retentive with battery                     | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  | 0 to 255, via super capacitor or battery, adjustable  |
| - of which retentive without battery                  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  | 0 to 112 in EEPROM, adjustable  |
| <b>Configuration</b>                                  |   |   |   |   |   |   |
| •Connectable programming devices/PCs                  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  | SIMATIC PG/PC, Standard PC  |
| •Central units/expansion units, max.                  | 7 expansion modules. Only expansion modules of the S7-22x series can be used. (Because of the limited output current, the use of expansion modules may be subject to restrictions.) | 7 expansion modules. Only expansion modules of the S7-22x series can be used. (Because of the limited output current, the use of expansion modules may be subject to restrictions.) | 7 expansion modules. Only expansion modules of the S7-22x series can be used. (Because of the limited output current, the use of expansion modules may be subject to restrictions.) | 7 expansion modules. Only expansion modules of the S7-22x series can be used. (Because of the limited output current, the use of expansion modules may be subject to restrictions.) | 7 expansion modules. Only expansion modules of the S7-22x series can be used. (Because of the limited output current, the use of expansion modules may be subject to restrictions.) | 7 expansion modules. Only expansion modules of the S7-22x series can be used. (Because of the limited output current, the use of expansion modules may be subject to restrictions.) |
| I/O expansions  |   |   |   |   |   |   |
| - Analog inputs/outputs, max.                         | 35; max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)  | 35; max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)  | 38; 2 on board inputs and one output, in addition max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)  | 38; 2 on board inputs and one output, in addition max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)  | 35; max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)  | 35; max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)  |
| - Digital inputs/outputs, max.                        | 168; max. 94 inputs and 74 outputs (CPU+EM)   | 168; max. 94 inputs and 74 outputs (CPU+EM)   | 168; max. 94 inputs and 74 outputs (CPU+EM)   | 168; max. 94 inputs and 74 outputs (CPU+EM)   | 148; max. 128 inputs and 120 outputs (CPU+EM)   | 148; max. 128 inputs and 120 outputs (CPU+EM)   |
| - AS interface inputs/outputs, max.                   | 62; AS interface A/B slaves (CP 243-2)  | 62; AS interface A/B slaves (CP 243-2)  | 62; AS interface A/B slaves (CP 243-2)  | 62; AS interface A/B slaves (CP 243-2)  | 62; AS interface A/B slaves (CP 243-2)  | 62; AS interface A/B slaves (CP 243-2)  |

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## Central processing units

CPU 221, 222, 224, 224 XP, 226

### Technical specifications (continued)

|                            | 6ES7 214-1AD23-0XB0   | 6ES7 214-1BD23-0XB0   | 6ES7 214-2AD23-0XB0   | 6ES7 214-2BD23-0XB0   | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0   |
|----------------------------|---|---|---|---|---|---|
| <b>Connection system</b>   |   |   |   |   |   |   |
| •Pluggable I/O terminals   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| <b>1st interface</b>       |   |   |   |   |   |   |
| •Type of interface         | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   |
| •Physical                  | RS 485  | RS 485  | RS 485  | RS 485  | RS 485  | RS 485  |
| <b>Functionality</b>       |   |   |   |   |   |   |
| - MPI                      | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   |
| - PPI                      | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   |
| - Serial data transmission | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter |
| <b>MPI</b>                 |   |   |   |   |   |   |
| - Transmission rates, max. | 187.5 kBit/s  | 187.5 kBit/s  | 187.5 kBit/s  | 187.5 kBit/s  | 187.5 kBit/s  | 187.5 kBit/s  |
| - Transmission rates, min. | 19.2 kBit/s   | 19.2 kBit/s   | 19.2 kBit/s   | 19.2 kBit/s   | 19.2 kBit/s   | 19.2 kBit/s   |

#### Technical specifications (continued)

|                            | 6ES7 214-1AD23-0XB0 | 6ES7 214-1BD23-0XB0 | 6ES7 214-2AD23-0XB0   | 6ES7 214-2BD23-0XB0   | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0   |
|----------------------------|---------------------|---------------------|---|---|---|---|
| <b>2nd interface</b>       |                     |                     |   |   |   |   |
| •Type of interface         |                     |                     | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   | integrated RS 485 interface   |
| •Physical                  |                     |                     | RS 485  | RS 485  | RS 485  | RS 485  |
| Functionality              |                     |                     |   |   |   |   |
| - MPI                      |                     |                     | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPU, OPs, TDs, Push Button Panels); internal S7-200 CPU/CPU communication is limited in the MPI network; transmission rates 19.2/187.5 kbit/s   |
| - PPI                      |                     |                     | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   | Yes; with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rates 9.6/19.2/187.5 kbit/s   |
| - Serial data transmission |                     |                     | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter | Yes; as a freely programmable interface with an interrupt option for serial data transmission with external units with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 converter |
| MPI                        |                     |                     |   |   |   |   |
| - Transmission rate, max.  |                     |                     | 187.5 kBit/s  | 187.5 kBit/s  | 187.5 kBit/s  | 187.5 kBit/s  |
| - Transmission rate, min.  |                     |                     | 19.2 kBit/s   | 19.2 kBit/s   | 19.2 kBit/s   | 19.2 kBit/s   |

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## Central processing units

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### Technical specifications (continued)

|   | 6ES7 214-1AD23-0XB0  | 6ES7 214-1BD23-0XB0  | 6ES7 214-2AD23-0XB0  | 6ES7 214-2BD23-0XB0  | 6ES7 216-2AD23-0XB0  | 6ES7 216-2BD23-0XB0  |
|---|--|--|--|--|--|--|
| <b>CPU/ programming</b>                       |  |  |  |  |  |  |
| Programming language                          |  |  |  |  |  |  |
| - LAD   | Yes  | Yes  | Yes  | Yes  | Yes  | Yes  |
| - FBD   | Yes  | Yes  | Yes  | Yes  | Yes  | Yes  |
| - STL   | Yes  | Yes  | Yes  | Yes  | Yes  | Yes  |
| • Instruction set                             | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions | Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, integer math instructions, floating-point math instructions, numeric functions, move instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions |
| • User program protection/password protection | Yes; 3-stage password protection   | Yes; 3-stage password protection   | Yes; 3-stage password protection   | Yes; 3-stage password protection   | Yes; 3-stage password protection   | Yes; 3-stage password protection   |
| • Program execution                           | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   | free cycle (OB 1), interrupt-driven, time-driven (1 to 255 ms)   |
| • Program organization                        | 1 OB, 1 DB, 1 SDB subprograms with/without parameter transfer  | 1 OB, 1 DB, 1 SDB subprograms with/without parameter transfer  | 1 OB, 1 DB, 1 SDB subprograms with/without parameter transfer  | 1 OB, 1 DB, 1 SDB subprograms with/without parameter transfer  | 1 OB, 1 DB, 1 SDB subprograms with/without parameter transfer  | 1 OB, 1 DB, 1 SDB subprograms with/without parameter transfer  |
| • Number of sub-programs, max.                | 64   | 64   | 64   | 64   | 64   | 64   |
| <b>Digital inputs</b>                         |  |  |  |  |  |  |
| • Number of digital inputs                    | 14   | 14   | 14   | 14   | 24   | 24   |
| Length of cable                               |  |  |  |  |  |  |
| - Length of cable shielded, max               | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  | 500 m; Standard input: 500m, fast counters: 50m  |
| - Length of cable unshielded, max             | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  | 300 m; not for high-speed signals  |
| • m/p reading                                 | Yes; optional, per group   | Yes; optional, per group   | Yes; optional, per group   | Yes; optional, per group   | Yes; optional, per group   | Yes; optional, per group   |
| Input voltage                                 |  |  |  |  |  |  |
| - Rated value, DC                             | 24 V   | 24 V   | 24 V   | 24 V   | 24 V   | 24 V   |
| - for signal "0"                              | 0 to 5 V   | 0 to 5 V   | 0 to 5 V; 0 to 1V (I0.3 to I0.5)   | 0 to 5 V0 to 1V (I0.3 to I0.5)   | 0 to 5 V   | 0 to 5 V   |
| - for signal "1"                              | min. 15 V  | min. 15 V  | min. 15 V; at least 4V (I0.3 to I0.5)  | min. 15 V at least 4V (I0.3 to I0.5)   | min. 15 V  | min. 15 V  |
| Input current                                 |  |  |  |  |  |  |
| - for 1 signal, typical                       | 2.5 mA   | 2.5 mA   | 2.5 mA; 8 mA for I0.3 to I0.5  | 2.5 mA; 8 mA for I0.3 to I0.5  | 2.5 mA   | 2.5 mA   |



#### Technical specifications (continued)

|   | 6ES7 214-1AD23-0XB0   | 6ES7 214-1BD23-0XB0        | 6ES7 214-2AD23-0XB0   | 6ES7 214-2BD23-0XB0               | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0        |
|---|---|----------------------------|---|-----------------------------------|---|----------------------------|
| Input delay (at rated value of the input voltage)         |   |                            |   |                                   |   |                            |
| •For standard inputs                                      |   |                            |   |                                   |   |                            |
| - Parameterizable   | Yes; all  | Yes; all                   | Yes; all  | Yes; all                          | Yes; all  | Yes; all                   |
| - at 0 after 1, min.                                      | 0.2 ms  | 0.2 ms                     | 0.2 ms  | 0.2 ms                            | 0.2 ms  | 0.2 ms                     |
| - at 0 after 1, max.                                      | 12.8 ms   | 12.8 ms                    | 12.8 ms   | 12.8 ms                           | 12.8 ms   | 12.8 ms                    |
| •for alarm inputs   |   |                            |   |                                   |   |                            |
| - parameterizable   | Yes; I0.0 to I0.3   | Yes; I0.0 to I0.3          | Yes; I0.0 to I0.3   | Yes; I0.0 to I0.3                 | Yes; I0.0 to I0.3   | Yes; I0.0 to I0.3          |
| •for counters/technological functions                     |   |                            |   |                                   |   |                            |
| - parameterizable   | Yes; (E0.0 to E1.5) 30 kHz  | Yes; (E0.0 to E1.5) 30 kHz | Yes; (E0.0 to E1.5) up to 200 kHz   | Yes; (E0.0 to E1.5) up to 200 kHz | Yes; (E0.0 to E1.5) 30 kHz  | Yes; (E0.0 to E1.5) 30 kHz |
| <b>Digital outputs</b>                                    |   |                            |   |                                   |   |                            |
| •Number of digital outputs                                | 10; Transistor  | 10; Relay                  | 10; Transistor  | 10; Relay                         | 16; Transistor  | 16; Relay                  |
| •Length of cable shielded, max.                           | 500 m   | 500 m                      | 500 m   | 500 m                             | 500 m   | 500 m                      |
| •Length of cable unshielded, max.                         | 150 m   | 150 m                      | 150 m   | 150 m                             | 150 m   | 150 m                      |
| •Short-circuit protection of the output                   | No; provided externally   | No; provided externally    | No; provided externally   | No; provided externally           | No; provided externally   | No; provided externally    |
| •Limitation of voltage induced on circuit interruption to | 1 W   |                            | 1 W   |                                   | 1 W   |                            |
| Switching capacity of the outputs                         |   |                            |   |                                   |   |                            |
| - at resistive load, max.                                 | 0.75 A  | 2 A                        | 0.75 A  | 2 A                               | 0.75 A  | 2 A                        |
| - at lamp load, max.                                      | 5 W   | 200 W; 30 W DC, 200 W AC   | 5 W   | 200 W; 30 W DC, 200 W AC          | 5 W   | 200 W; 30 W DC, 200 W AC   |
| Output voltage  |   |                            |   |                                   |   |                            |
| - for 1 signal  | 20 V DC   | L+/L1                      | L+ minus 0.4V (5V/20.4V for A0.0 to A0.4; 20.4V A0.5 to A1.1)   | L+/L1                             | 20 V DC   | L+/L1                      |
| Output current  |   |                            |   |                                   |   |                            |
| - for 1 signal rated value                                | 750 mA  | 2 A                        | 750 mA  | 2 A                               | 750 mA  | 2 A                        |
| - for 0 signal residual current, max.                     | 10 µA   | 0 mA                       | 10 µA   | 0 mA                              | 10 µA   | 0 mA                       |
| Output delay at resistive load                            |   |                            |   |                                   |   |                            |
| - "0" after "1", max.                                     | 15 µs; of the standard outputs, max. (A0.2 to A1.1) 2 µs; of the pulse outputs, max. (A0.0 to A0.1) 2 µs    | 10 ms; all outputs         | 15 µs; of the standard outputs, max. (A0.2 to A1.1) 15 µs; of the pulse outputs, max. (A0.0 to A0.1) 0.5 µs   | 10 ms; all outputs                | 15 µs; of the standard outputs, max. (A0.2 to A1.1) 2 µs; of the pulse outputs, max. (A0.0 to A0.1) 2 µs    | 10 ms; all outputs         |
| - "1" after "0", max.                                     | 130 µs; of the standard outputs, max. (A0.2 to A1.1) 10 µs; of the pulse outputs, max. (A0.0 to A0.1) 10 µs | 10 ms; all outputs         | 130 µs; of the standard outputs, max. (A0.2 to A1.1) 130 µs; of the pulse outputs, max. (A0.0 to A0.1) 1.5 µs | 10 ms; all outputs                | 130 µs; of the standard outputs, max. (A0.2 to A1.1) 10 µs; of the pulse outputs, max. (A0.0 to A0.1) 10 µs | 10 ms; all outputs         |
| Parallel switching of 2 outputs                           |   |                            |   |                                   |   |                            |
| - to increase power                                       | Yes   | No                         | Yes   | No                                | Yes   | No                         |
| Switching frequency                                       |   |                            |   |                                   |   |                            |
| - of pulse outputs, at resistive load, max.               | 20 kHz; A0.0 to A0.1  | 1 Hz                       | 100 kHz; A0.0 to A0.1   | 1 Hz                              | 20 kHz; A0.0 to A0.1  | 1 kHz                      |
| Summation current of the outputs (per group)              |   |                            |   |                                   |   |                            |
| - up to 40 °C, max.                                       | 6 A   | 10 A                       | 3.75 A  | 10 A                              | 6 A   | 10 A                       |
| - horizontal installation, up to 55 °C, max.              | 6 A   | 10 A                       | 3.75 A  | 10 A                              | 6 A   | 10 A                       |

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## Central processing units

CPU 221, 222, 224, 224 XP, 226

### Technical specifications (continued)

|   | 6ES7 214-1AD23-0XB0   | 6ES7 214-1BD23-0XB0   | 6ES7 214-2AD23-0XB0  | 6ES7 214-2BD23-0XB0  | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0   |
|---|---|---|--|--|---|---|
| <b>Relay outputs</b>                                      |   |   |  |  |   |   |
| •Number of operating cycles                               |   | 10,000,000; mechanical 10 million, at rated load voltage 100,000  |  | 10,000,000; mechanical 10 million, at rated load voltage 100,000   |   | 10,000,000; mechanical 10 million, at rated load voltage 100,000  |
| <b>Analog inputs</b>                                      |   |   |  |  |   |   |
| •Number of analog potentiometers                          | 2; Analog potentiometer; resolution 8 bits  | 2; Analog potentiometer; resolution 8 bits  | 2; Analog potentiometer; resolution 8 bits   | 2; Analog potentiometer; resolution 8 bits   | 2; Analog potentiometer; resolution 8 bits  | 2; Analog potentiometer; resolution 8 bits  |
| <b>Sensor supply</b>                                      |   |   |  |  |   |   |
| 24 V - sensor supply                                      |   |   |  |  |   |   |
| - 24 V  | Yes; permissible range: 15.4 to 28.8 V  | Yes; permissible range: 20.4 to 28.8 V  | Yes; permissible range: 15.4 to 28.8 V   | Yes; permissible range: 20.4 to 28.8 V   | Yes; permissible range: 15.4 to 28.8 V  | Yes; permissible range: 20.4 to 28.8 V  |
| - Short-circuit protection                                | Yes; electronic at 280 mA   | Yes; electronic at 280 mA   | Yes; electronic at 280 mA  | Yes; electronic at 280 mA  | Yes; electronic at 400 mA   | Yes; electronic at 400mA  |
| - Output current, max.                                    | 280 mA  | 280 mA  | 280 mA   | 280 mA   | 400 mA  | 400 mA  |
| <b>Sensor</b>   |   |   |  |  |   |   |
| Connectable encoders                                      |   |   |  |  |   |   |
| - 2-wire Beros  | Yes   | Yes   | Yes  | Yes  | Yes   | Yes   |
| - permissible closed-circuit current (2-wire Beros), max. | 1 mA  | 1 mA  | 1 mA   | 1 mA   | 1 mA  | 1 mA  |
| <b>Integral functions</b>                                 |   |   |  |  |   |   |
| •Number of counters                                       | 6; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 4 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc. | 6; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 4 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc. | 6; fast counters (2 to 200 kHz and 4 to 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 1 to 100 kHz and 3 to 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc. | 6; fast counters (2 to 200 kHz and 4 to 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 1 to 100 kHz and 3 to 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc. | 6; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 4 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc. | 6; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 4 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc. |
| •Count frequency (counters) max.                          | 30 kHz  | 30 kHz  | 200 kHz  | 200 kHz  | 30 kHz  | 30 kHz  |
| •Number of alarm inputs                                   | 4; 4 rising edges and/or 4 falling edges  | 4; 4 rising edges and/or 4 falling edges  | 4; 4 rising edges and/or 4 falling edges   | 4; 4 rising edges and/or 4 falling edges   | 4; 4 rising edges and/or 4 falling edges  | 4; 4 rising edges and/or 4 falling edges  |
| •Number of pulse outputs                                  | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation  | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation  | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation   | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation   | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation  | 2; fast outputs, 20 kHz, with interrupt option; pulse width and frequency modulation  |
| •Cut-off frequency (pulse)                                | 20 kHz  | 20 kHz  | 20 kHz   | 20 kHz   | 20 kHz  | 20 kHz  |

#### Technical specifications (continued)

|  | 6ES7 214-1AD23-0XB0   | 6ES7 214-1BD23-0XB0   | 6ES7 214-2AD23-0XB0   | 6ES7 214-2BD23-0XB0   | 6ES7 216-2AD23-0XB0   | 6ES7 216-2BD23-0XB0   |
|--|---|---|---|---|---|---|
| <b>Potentials/ electrical isolation</b>      |   |   |   |   |   |   |
| Digital output functions                     |   |   |   |   |   |   |
| - between the channels                       | Yes;<br>Optocoupler   | Yes; Relay  | Yes;<br>Optocoupler   | Yes; Relay  | Yes;<br>Optocoupler   | Yes; Relay  |
| - between the channels, in groups of         | 5   | 3, 3 and 4  | 5   | 3, 3 and 4  | 8 and 8   | 4, 5 and 7  |
| Digital input functions                      |   |   |   |   |   |   |
| - between the channels                       | Yes   | Yes   | Yes   | Yes   | Yes   | Yes;<br>Optocoupler   |
| - between the channels, in groups of         | 6 and 8   | 6 and 8   | 6 and 8   | 6 and 8   | 13 and 11   | 13 and 11   |
| <b>Permissible potential difference</b>      |   |   |   |   |   |   |
| •between different circuits                  | 500 V DC between 24 V DC and 5 V DC   | 500 V DC between 24 V DC and 5 V DC; 1500 V AC between 24 V DC and 230 V AC       | 500 V DC between 24 V DC and 5 V DC   | 500 V DC between 24 V DC and 5 V DC; 1500 V AC between 24 V DC and 230 V AC       | 500 V DC between 24 V DC and 5 V DC   | 500 V DC between 24 V DC and 5 V DC; 1500 V AC between 24 V DC and 230 V AC       |
| <b>Environmental requirements</b>            |   |   |   |   |   |   |
| •Environmental conditions                    | For other ambient conditions: see "S7-200 Programmable Controller, System Manual" | For other ambient conditions: see "S7-200 Programmable Controller, System Manual" | For other ambient conditions: see "S7-200 Programmable Controller, System Manual" | For other ambient conditions: see "S7-200 Programmable Controller, System Manual" | For other ambient conditions: see "S7-200 Programmable Controller, System Manual" | For other ambient conditions: see "S7-200 Programmable Controller, System Manual" |
| Operating temperature                        |   |   |   |   |   |   |
| - vertical mounting, min.                    | 0 °C  | 0 °C  | 0 °C  | 0 °C  | 0 °C  | 0 °C  |
| - vertical mounting, max.                    | 45 °C   | 45 °C   | 45 °C   | 45 °C   | 45 °C   | 45 °C   |
| - horizontal mounting, min.                  | 0 °C  | 0 °C  | 0 °C  | 0 °C  | 0 °C  | 0 °C  |
| - horizontal mounting, max.                  | 55 °C   | 55 °C   | 55 °C   | 55 °C   | 55 °C   | 55 °C   |
| Air pressure                                 |   |   |   |   |   |   |
| - permissible range, min                     | 860 hPa   | 860 hPa   | 860 hPa   | 860 hPa   | 860 hPa   | 860 hPa   |
| - permissible range, max                     | 1,080 hPa   | 1,080 hPa   | 1,080 hPa   | 1,080 hPa   | 1,080 hPa   | 1,080 hPa   |
| Relative humidity                            |   |   |   |   |   |   |
| - Operation, min.                            | 5 %   | 5 %   | 5 %   | 5 %   | 5 %   | 5 %   |
| - Operation, max.                            | 95 %;<br>RH stressing level 2 in accordance with IEC 1131-2                       | 95 %;<br>RH stressing level 2 in accordance with IEC 1131-2                       | 95 %;<br>RH stressing level 2 in accordance with IEC 1131-2                       | 95 %;<br>RH stressing level 2 in accordance with IEC 1131-2                       | 95 %;<br>RH stressing level 2 in accordance with IEC 1131-2                       | 95 %;<br>RH stressing level 2 in accordance with IEC 1131-2                       |
| Degree of protection and class of protection |   |   |   |   |   |   |
| - IP 20                                      | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| <b>Dimensions and weight</b>                 |   |   |   |   |   |   |
| •Weight, approx.                             | 360 g   | 410 g   | 390 g   | 440 g   | 550 g   | 660 g   |
| •Width                                       | 120.5 mm  | 120.5 mm  | 140 mm  | 140 mm  | 196 mm  | 196 mm  |
| •Height                                      | 80 mm   | 80 mm   | 80 mm   | 80 mm   | 80 mm   | 80 mm   |
| •Depth                                       | 62 mm   | 62 mm   | 62 mm   | 62 mm   | 62 mm   | 62 mm   |

# SIMATIC S7-200

## Central processing units

CPU 221, 222, 224, 224 XP, 226

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| Ordering Data   | Order No.  | Order No.   |
|---|--|---|
| <b>CPU 221</b><br>Compact CPU, 4 KB RAM, 24 V DC supply voltage, 6 DI/4 DO integrated <sup>A)</sup><br><br>Compact CPU, 4 KB RAM, 100 to 230 V AC supply voltage, 6 DI/4 DO integrated, relay outputs <sup>A)</sup>   | <b>6ES7 211-0AA23-0XB0</b><br><br><b>6ES7 211-0BA23-0XB0</b> | <b>S7-200 True Power Box</b><br>Complete package consisting of CPU 222, STEP 7 Micro/WIN V3, combined clock and battery modules, intelligent RS 232/PPI multimaster cable, manual; delivered in a practical box<br><br>German <sup>C)</sup> <b>6ES7 298-0AA20-0AA2</b><br>English <sup>C)</sup> <b>6ES7 298-0AA20-0BA2</b><br>French <sup>C)</sup> <b>6ES7 298-0AA20-0CA2</b><br>Spanish <sup>C)</sup> <b>6ES7 298-0AA20-0DA2</b><br>Italian <sup>C)</sup> <b>6ES7 298-0AA20-0EA2</b> |
| <b>CPU 222</b><br>Compact CPU, expandable, 4 KB RAM, 24 V DC supply voltage, 8 DI/6 DO integrated <sup>A)</sup><br><br>Compact CPU, expandable, 4 KB RAM, 100-230 V AC, 8 DI/6 DO integrated, relay outputs <sup>A)</sup>   | <b>6ES7 212-1AB23-0XB0</b><br><br><b>6ES7 212-1BB23-0XB0</b> | <b>Memory module MC 291, EEPROM <sup>A)</sup></b><br>for CPU 221/222/224/224 XP/226 <b>6ES7 291-8GE20-0XA0</b>  |
| <b>CPU 224</b><br>Compact CPU, expandable, 8/12 KB RAM for program, 8 KB RAM for data, 24 V DC supply voltage, 14 DI/10 DO, integrated <sup>A)</sup><br><br>Compact CPU, expandable, 8/12 KB RAM for program, 8 KB RAM for data, 100 - 230 V AC supply voltage, 14 DI/10 DO, integrated, relay outputs <sup>A)</sup>                            | <b>6ES7 214-1AD23-0XB0</b><br><br><b>6ES7 214-1BD23-0XB0</b> | <b>Memory module MC 291, EEPROM</b><br>for CPU 221/222/224/224 XP/226<br>64 KB <sup>A)</sup> <b>6ES7 291-8GF23-0XA0</b><br>256 KB <sup>A)</sup> <b>6ES7 291-8GH23-0XA0</b>  |
| <b>CPU 224 XP</b><br>Compact CPU, expandable, 12/16 KB RAM for program, 10 KB RAM for data, 24 V DC supply voltage, 14 DI/10 DO/ 2 AI/1 AO integrated <sup>A)</sup><br><br>Compact CPU, expandable, 12/16 KB RAM for program, 10 KB RAM for data, 100 - 230 V AC supply voltage, 14 DI/10 DO (relay outputs) 2 AI/1 AO integrated <sup>A)</sup> | <b>6ES7 214-2AD23-0XB0</b><br><br><b>6ES7 214-2BD23-0XB0</b> | <b>Grounding terminal</b><br>10 items <b>6ES5 728-8MA11</b><br><br><b>Front flap set <sup>A)</sup></b><br>contains different covering flaps for CPU and EM; Spare part <b>6ES7 291-3AX20-0XA0</b>   |
| <b>CPU 226</b><br>Compact CPU, expandable, 16/24 KB RAM for program, 10 KB RAM for data, 24 V DC supply voltage, 24 DI/16 DO, integrated <sup>A)</sup><br><br>Compact CPU, expandable, 16/24 KB RAM for program, 10 KB RAM for data, 100 - 230 V AC supply voltage, 24 DI/16 DO, integrated, relay outputs <sup>A)</sup>                        | <b>6ES7 216-2AD23-0XB0</b><br><br><b>6ES7 216-2BD23-0XB0</b> | <b>SIM 274 simulator (optional)</b><br>with 8 connection terminals for CPU 221/222 <sup>A)</sup> <b>6ES7 274-1XF00-0XA0</b><br>with 14 connection terminals for CPU 224/224 XP <sup>A)</sup> <b>6ES7 274-1XH00-0XA0</b><br>with 24 connection terminals for CPU 226 <sup>A)</sup> <b>6ES7 274-1XK00-0XA0</b>  |
|   |  | <b>Terminal block for field wiring (optional)</b><br>for CPU 221/222, 10 items <sup>A)</sup> <b>6ES7 290-2AA00-0XA0</b><br>for CPU 224, 10 items <sup>A)</sup> <b>6ES7 290-2BA00-0XA0</b>   |
|   |  | <b>Plug-in terminal block (spare part)</b><br>with 12 connections (for CPU 22x) <sup>A)</sup> <b>6ES7 292-1AE20-0AA0</b><br>with 18 connections (for CPU 224) <sup>A)</sup> <b>6ES7 292-1AG20-0AA0</b><br>with 14 connection terminals (for CPU 226/226 XM) <sup>A)</sup> <b>6ES7 292-1AF20-0AA0</b>  |
|   |  | <b>Intelligent RS 232/PPI multimaster cable <sup>A)</sup></b><br>for connecting devices with an RS 232 interface to the SIMATIC S7-200 or PPI network; master in the multimaster PPI network <b>6ES7 901-3CB30-0XA0</b>   |
|   |  | <b>Intelligent USB/PPI multimaster cable <sup>A)</sup></b><br>for connecting devices with an USB interface to the SIMATIC S7-200 or PPI network; master in the multimaster PPI network <b>6ES7 901-3DB30-0XA0</b>   |
|   |  | <b>MPI cable</b><br>5 m for connecting the S7-200 to the MPI <b>6ES7 901-0BF00-0AA0</b>   |

A) Subject to export regulations: AL: N and ECCN: EAR99H

C) Subject to export regulations: AL: N and ECCN: EAR99T

| Ordering Data   | Order No.                  | Order No.  |
|---|----------------------------|--|
| <b>Backplane bus expansion cable</b> <sup>A)</sup><br>for connecting the two equipment tiers in a two-tier configuration, for CPU 222/224/224 XP/226  | <b>6ES7 290-6AA20-0XA0</b> |  |
| <b>Optional battery module</b> <sup>A)</sup>  | <b>6ES7 291-8BA20-0XA0</b> |  |
| <b>Optional combined clock and battery module</b> <sup>A)</sup><br>for CPU 221/222 only   | <b>6ES7 297-1AA23-0XA0</b> |  |
| <b>S7-200 programmable controller, system manual</b><br>for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4  |                            |  |
| German  | <b>6ES7 298-8FA24-8AH0</b> |  |
| English   | <b>6ES7 298-8FA24-8BH0</b> |  |
| French  | <b>6ES7 298-8FA24-8CH0</b> |  |
| Spanish   | <b>6ES7 298-8FA24-8DH0</b> |  |
| Italian   | <b>6ES7 298-8FA24-8EH0</b> |  |
| Chinese   | <b>6ES7 298-8FA24-8FH0</b> |  |
| <b>SIMATIC Manual Collection</b> <sup>B)</sup><br>Electronic manuals on CD-ROM, 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, Engineering Software, Runtime Software, PCS 7, SIMATIC HMI, SIMATIC NET | <b>6ES7 998-8XC01-8YE0</b> |  |
| <b>SIMATIC Manual Collection update service for 1 year</b> <sup>B)</sup><br>Up-to-date Manual Collection CD as well as the three subsequent updates   | <b>6ES7 998-8XC01-8YE2</b> |  |
|   |                            | <b>STEP 7 Micro/WIN V4 programming software</b><br><i>Target system:</i><br>All CPUs of the SIMATIC S7-200 range<br><i>Requirements:</i><br>Windows 2000/XP on PG or PC<br><i>delivery type:</i><br>English, German, French, Spanish, Italian, Chinese; with online documentation<br><br>Single license <sup>B)</sup> <b>6ES7 810-2CC03-0YX0</b><br>Upgrade single license <sup>1) B)</sup> <b>6ES7 810-2CC03-0YX3</b> |
|   |                            | <b>PROFIBUS bus connector IP20 with 90° cable feeder</b><br>•without PG connection <b>6ES7 972-0BA12-0XA0</b><br>•with PG connection <b>6ES7 972-0BB12-0XA0</b>  |
|   |                            | <b>PROFIBUS bus connector IP20 with 35° cable feeder</b><br>•without PG connection <b>6ES7 972-0BA41-0XA0</b><br>•with PG connection <b>6ES7 972-0BB41-0XA0</b>  |
|   |                            | <b>PROFIBUS FC Standard Cable</b> <b>6XV1 830-0EH10</b><br>for connecting to PPI; standard type with special design for quick mounting, 2-wire, shielded, sold by the meter, up to 1000m, minimum order 20 m   |
|   |                            | <b>Repeater RS 485 for PROFIBUS</b> <b>6ES7 972-0AA01-0XA0</b>   |

1) Upgrade for all previous STEP 7 Micro/WIN and STEP 7 Micro/DOS versions

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

# SIMATIC S7-200

## SIPLUS central processing units

### SIPLUS central processing units

#### Overview

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- The SIPLUS S7-200 CPUs for use in the harshest environmental conditions
- With extended temperature range from -25 to +70°C
- Suitable for extraordinary medi al load (pollution gas atmosphere)
- Occasional short-term condensation and increased mechanical loading permissible
- With the proven PLC technology of the S7-200
- Convenient handling, programming, maintenance and service
- The alternative to expensive custom solutions

More Information you can find at:

<http://www.siemens.com/siplus>

### Overview



- Digital inputs/outputs to supplement the onboard I/Os of the CPUs
- For flexible adaptation of PLC to respective task
- For subsequent upgrading of the system with additional inputs  
Ordering Data

### Technical specifications EM 221

|   | 6ES7 221-1BH22-0XA0 | 6ES7 221-1BF22-0XA0 | 6ES7 221-1EF22-0XA0               |
|---|---------------------|---------------------|-----------------------------------|
| <b>Current consumption</b>                                |                     |                     |                                   |
| •from backplane bus 5 V DC, max.                          | 70 mA               | 30 mA               | 30 mA                             |
| •Power dissipation, typical                               | 3 W                 | 2 W                 | 3 W                               |
| <b>Connection system</b>                                  |                     |                     |                                   |
| •Pluggable I/O terminals                                  | Yes                 | Yes                 | Yes                               |
| <b>Digital inputs</b>                                     |                     |                     |                                   |
| •Number of digital inputs                                 | 16                  | 8                   | 8                                 |
| Length of cable   |                     |                     |                                   |
| - Length of cable shielded, max                           | 500 m               | 500 m               | 500 m                             |
| - Length of cable unshielded, max                         | 300 m               | 300 m               | 300 m                             |
| •m/p reading  | Yes                 | Yes                 |                                   |
| •Input characteristic to comply with IEC 1131, Type 1     | Yes                 |                     | Yes                               |
| Input voltage   |                     |                     |                                   |
| - Rated value, AC   |                     |                     | 230 V; 220/230 V AC (47 to 63 Hz) |
| - Rated value, DC   | 24 V                | 24 V                |                                   |
| - for signal "0"  | 0 to 5 V            | 0 to 5 V            | to 20 V AC                        |
| - for signal "1"  | 15 to 30 V          | 15 to 30 V          | 79 V AC ( at 2.5 mA min.)         |
| Input current   |                     |                     |                                   |
| - for 1 signal, typical                                   | 4 mA                | 4 mA                | 2.5 mA                            |
| Input delay (at rated value of the input voltage)         |                     |                     |                                   |
| •For standard inputs                                      |                     |                     |                                   |
| - at 0 after 1, max.                                      | 4.5 ms              | 4.5 ms              | 15 ms                             |
| <b>Sensor</b>   |                     |                     |                                   |
| Connectable encoders                                      |                     |                     |                                   |
| - 2-wire BEROs  | Yes                 | Yes                 | Yes                               |
| - permissible closed-circuit current (2-wire BEROs), max. | 1 mA                | 1 mA                | 1 mA                              |
| <b>Potentials/ electrical isolation</b>                   |                     |                     |                                   |
| Digital input functions                                   |                     |                     |                                   |
| - Electrical isolation, digital input functions           | Yes; Optocoupler    | Yes; Optocoupler    | Yes; Optocoupler                  |
| - between the channels, in groups of                      | 4                   | 4                   | 1; (8 groups)                     |
| <b>Dimensions and weight</b>                              |                     |                     |                                   |
| •Weight, approx.  | 160 g               | 150 g               | 160 g                             |
| •Width  | 71.2 mm             | 46 mm               | 71.2 mm                           |
| •Height   | 80 mm               | 80 mm               | 80 mm                             |
| •Depth  | 62 mm               | 62 mm               | 62 mm                             |

## Technical specifications EM 222

|   | 6ES7 222-1BD22-0XA0   | 6ES7 222-1BF22-0XA0   |
|---|---|---|
| <b>Voltages and currents</b>                              |   |   |
| Load voltage L+   |   |   |
| - Rated value (DC)  | 24 V  | 24 V  |
| - permissible range, lower limit (DC)                     | 20.4 V  | 20.4 V  |
| - permissible range, upper limit (DC)                     | 28.8 V  | 28.8 V  |
| <b>Current consumption</b>                                |   |   |
| Digital outputs   |   |   |
| •from backplane bus 5 V DC, max.                          | 40 mA   | 50 mA   |
| •Power dissipation, typical                               | 3 W   | 2 W   |
| <b>Connection system</b>                                  |   |   |
| •Pluggable I/O terminals                                  | Yes   | Yes   |
| <b>Digital outputs</b>                                    |   |   |
| •Number of digital outputs                                | 4   | 8   |
| •Length of cable shielded, max.                           | 500 m   | 500 m   |
| •Length of cable unshielded, max.                         | 150 m   | 150 m   |
| •Short-circuit protection of the output                   | No; provided externally (see manual package "Installing an S7-200") | No; provided externally (see manual package "Installing an S7-200") |
| •Limitation of voltage induced on circuit interruption to | L+ (-48 V)  | L+ (-48 V)  |
| Output voltage  |   |   |
| - for 1 signal  | 20 V DC   | 20 V  |
| Output current  |   |   |
| - for 1 signal permissible range for 0 to 55 °C, max.     | 5 A   | 750 mA  |
| - for 0 signal residual current, max.                     | 30 µA   | 10 µA   |
| Parallel switching of 2 outputs                           |   |   |
| - to increase power                                       |   | Yes   |
| Summation current of the outputs (per group)              |   |   |
| - up to 40 °C, max.                                       | 20 A  | 3 A   |
| - horizontal installation, up to 55 °C, max.              | 20 A  | 3 A   |
| - Maximum current per wire/group                          | 5 A   | 3 A   |
| <b>Relay outputs</b>                                      |   |   |
| Switching capacity of the contacts                        |   |   |
| - at inductive load, max.                                 | 5 A   | 0.75 A  |
| - at lamp load, max.                                      | 50 W  | 5 W   |
| - at resistive load, max.                                 | 5 A   | 0.75 A  |
| <b>Potentials/ electrical isolation</b>                   |   |   |
| Digital output functions                                  |   |   |
| - Electrical isolation, digital output functions          | Yes; Optocoupler  | Yes; Optocoupler  |
| - between the channels, in groups of                      | 1; 4 groups   | 4   |
| <b>Dimensions and weight</b>                              |   |   |
| •Weight, approx.  | 120 g   | 150 g   |
| •Width  | 45 mm   | 45 mm   |
| •Height   | 80 mm   | 80 mm   |
| •Depth  | 62 mm   | 62 mm   |



#### Technical specifications (continued)

|   | 6ES7 222-1HD22-0XA0   | 6ES7 222-1HF22-0XA0   | 6ES7 222-1EF22-0XA0   |
|---|---|---|---|
| <b>Voltages and currents</b>                              |   |   |   |
| Load voltage L+   |   |   |   |
| - Rated value (DC)  | 24 V  | 24 V  |   |
| - permissible range, lower limit (DC)                     | 12 V  | 5 V   |   |
| - permissible range, upper limit (DC)                     | 30 V  | 30 V  |   |
| Load voltage L1   |   |   |   |
| - Rated value (AC)  | 24 V; 24 to 230 V AC  | 24 V; 24 to 230 V AC  | 230 V; 220/230 V AC   |
| - permissible range, lower limit (AC)                     | 12 V  | 5 V   | 65 V  |
| - permissible range, upper limit (AC)                     | 250 V   | 250 V   | 264 V   |
| - permissible frequency range, lower limit                |   | 47 Hz   | 47 Hz   |
| - permissible frequency range, upper limit                |   | 63 Hz   | 63 Hz   |
| <b>Current consumption</b>                                |   |   |   |
| Digital outputs   |   |   |   |
| - from load voltage L+, max.                              | 80 mA; 20 mA per switched output                                    | 72 mA; 9 mA per switched output                                     |   |
| •from backplane bus 5 V DC, max.                          | 30 mA   | 40 mA   | 110 mA  |
| •Power dissipation, typical                               | 4 W   | 2 W   | 4 W   |
| <b>Connection system</b>                                  |   |   |   |
| •Pluggable I/O terminals                                  | Yes   | Yes   | Yes   |
| <b>Digital outputs</b>                                    |   |   |   |
| •Number of digital outputs                                | 4; Relay  | 8; Relay  | 8   |
| •Length of cable shielded, max.                           | 500 m   | 500 m   | 500 m   |
| •Length of cable unshielded, max.                         | 150 m   | 150 m   | 150 m   |
| •Short-circuit protection of the output                   | No; provided externally (see manual package "Installing an S7-200") | No; provided externally (see manual package "Installing an S7-200") | No; provided externally (see manual package "Installing an S7-200") |
| •Limitation of voltage induced on circuit interruption to | provided externally (see manual package "Installing an S7-200")     | provided externally (see manual package "Installing an S7-200")     | provided externally (see manual package "Installing an S7-200")     |
| Output voltage  |   |   |   |
| - for 1 signal  |   |   | L1 (-0.9 V)   |
| Output current  |   |   |   |
| - for 1 signal permissible range for 0 to 55 °C, max.     | 10 A  | 2 A   | 500 mA; AC  |
| - for 1 signal minimum load current                       |   |   | 50 mA   |
| - for 0 signal residual current, max.                     | 0 mA  | 0 mA  | 1.8 mA; at 264 V AC   |
| Summation current of the outputs (per group)              |   |   |   |
| - up to 40 °C, max.                                       | 40 mA   | 8 A   | 0.5 A   |
| - horizontal installation, up to 55 °C, max.              | 20 mA   | 8 A   | 0.5 A   |
| - Maximum current per wire/group                          | 10 A  | 8 A   | 0.5 A   |
| <b>Relay outputs</b>                                      |   |   |   |
| •Number of operating cycles                               | 30,000,000; mechanical 30 million, at rated load voltage 30,000     | 10,000,000; mechanical 10 million, at rated load voltage 100,000    |   |
| Switching capacity of the contacts                        |   |   |   |
| - at inductive load, max.                                 | 3 A; 2 A (DC), 3 A (AC)   | 2 A   | 0.5 A   |
| - at lamp load, max.                                      | 1,000 W; 100/1000 W (DC/AC)   | 200 W; 30/200 W (DC/AC)   | 60 W  |
| - at resistive load, max.                                 | 10 A  | 2 A   | 0.5 A   |

#### Technical specifications (continued)

|  | 6ES7 222-1HD22-0XA0 | 6ES7 222-1HF22-0XA0 | 6ES7 222-1EF22-0XA0 |
|--|---------------------|---------------------|---------------------|
| <b>Potentials/ electrical isolation</b>          |                     |                     |                     |
| Digital output functions                         |                     |                     |                     |
| - Electrical isolation, digital output functions | Yes; Relay          | Yes; Relay          | Yes; Optocoupler    |
| - between the channels, in groups of             | 1; 4 groups         | 4                   | 1; 8 groups         |
| <b>Dimensions and weight</b>                     |                     |                     |                     |
| •Weight, approx.                                 | 150 g               | 170 g               | 170 g               |
| •Width   | 45 mm               | 45 mm               | 71.2 mm             |
| •Height  | 80 mm               | 80 mm               | 80 mm               |
| •Depth   | 62 mm               | 62 mm               | 62 mm               |

#### Technical specifications EM 223

|   | 6ES7 223-1BF22-0XA0     | 6ES7 223-1BH22-0XA0     | 6ES7 223-1BL22-0XA0     |
|---|-------------------------|-------------------------|-------------------------|
| <b>Voltages and currents</b>                              |                         |                         |                         |
| Load voltage L+   |                         |                         |                         |
| - Rated value (DC)  | 24 V                    | 24 V                    | 24 V                    |
| - permissible range, lower limit (DC)                     | 20.4 V                  | 20.4 V                  | 20.4 V                  |
| - permissible range, upper limit (DC)                     | 28.8 V                  | 28.8 V                  | 28.8 V                  |
| <b>Current consumption</b>                                |                         |                         |                         |
| •from backplane bus 5 V DC, max.                          | 40 mA                   | 80 mA                   | 160 mA                  |
| •Power dissipation, typical                               | 2 W                     | 3 W                     | 6 W                     |
| <b>Connection system</b>                                  |                         |                         |                         |
| •Pluggable I/O terminals                                  | Yes                     | Yes                     | Yes                     |
| <b>Digital inputs</b>                                     |                         |                         |                         |
| •Number of digital inputs                                 | 4                       | 8                       | 16                      |
| Input voltage   |                         |                         |                         |
| - Rated value, DC   | 24 V                    | 24 V                    | 24 V                    |
| - for signal "0"  | 0 to 5 V                | 0 to 5 V                | 0 to 5 V                |
| - for signal "1"  | 15 to 30 V DC           | 15 to 30 V DC           | 15 to 30 V DC           |
| Input current   |                         |                         |                         |
| - for 1 signal, typical                                   | 4 mA                    | 4 mA                    | 4 mA                    |
| Input delay (at rated value of the input voltage)         |                         |                         |                         |
| •For standard inputs                                      |                         |                         |                         |
| - at 0 after 1, max.                                      | 4.5 ms                  | 4.5 ms                  | 4.5 ms                  |
| <b>Digital outputs</b>                                    |                         |                         |                         |
| •Number of digital outputs                                | 4                       | 8                       | 16                      |
| •Length of cable shielded, max.                           | 500 m                   | 500 m                   | 500 m                   |
| •Length of cable unshielded, max.                         | 150 m                   | 150 m                   | 150 m                   |
| •Short-circuit protection of the output                   | No; provided externally | No; provided externally | No; provided externally |
| •Limitation of voltage induced on circuit interruption to | L+ (-48 V)              | L+ (-48 V)              | L+ (-48 V)              |
| Output voltage  |                         |                         |                         |
| - for 0 signal (DC), max.                                 | 0.1 V                   | 0.1 V                   | 0.1 V                   |
| - for 1 signal  | 20 V                    | 20 V                    | 20 V                    |
| Output current  |                         |                         |                         |
| - for 1 signal rated value                                | 750 mA                  | 750 mA                  | 750 mA                  |
| Summation current of the outputs (per group)              |                         |                         |                         |
| - Maximum current per wire/group                          | 3 A                     | 3 A                     | 3 A; 3/3/6              |

#### Technical specifications (continued)

|   | 6ES7 223-1BF22-0XA0             | 6ES7 223-1BH22-0XA0             | 6ES7 223-1BL22-0XA0             |
|---|---------------------------------|---------------------------------|---------------------------------|
| <b>Relay outputs</b>                                      |                                 |                                 |                                 |
| Switching capacity of the contacts                        |                                 |                                 |                                 |
| - at inductive load, max.                                 | 0.75 A; per output              | 0.75 A; per output              | 0.75 A; per output              |
| - at lamp load, max.                                      | 5 W                             | 5 W                             | 5 W                             |
| - at resistive load, max.                                 | 0.75 A; per output              | 0.75 A; per output              | 0.75 A; per output              |
| <b>Sensor</b>   |                                 |                                 |                                 |
| Connectable encoders                                      |                                 |                                 |                                 |
| - 2-wire Beros  | Yes                             | Yes                             | Yes                             |
| - permissible closed-circuit current (2-wire Beros), max. | 1 mA                            | 1 mA                            | 1 mA                            |
| <b>Insulation</b>   |                                 |                                 |                                 |
| •Insulation tested with                                   | 500 V AC                        | 500 V AC                        | 500 V AC                        |
| <b>Potentials/ electrical isolation</b>                   |                                 |                                 |                                 |
| Digital output functions                                  |                                 |                                 |                                 |
| - Electrical isolation, digital output functions          | Yes; Optocoupler                | Yes; Optocoupler                | Yes; Optocoupler                |
| - between the channels, in groups of                      | 4                               | 4                               | 4; 4 / 4 / 8                    |
| Digital input functions                                   |                                 |                                 |                                 |
| - Electrical isolation, digital input functions           | Yes; Optocoupler                | Yes; Optocoupler                | Yes; Optocoupler                |
| - between the channels, in groups of                      | 4                               | 4                               | 4                               |
| <b>Dimensions and weight</b>                              |                                 |                                 |                                 |
| •Weight, approx.  | 160 g                           | 200 g                           | 360 g                           |
| •Width  | 46 mm                           | 71.2 mm                         | 137.5 mm                        |
| •Height   | 80 mm                           | 80 mm                           | 80 mm                           |
| •Depth  | 62 mm                           | 62 mm                           | 62 mm                           |
| <b>6ES7 223-1HF22-0XA0</b>                                |                                 |                                 |                                 |
| <b>6ES7 223-1PH22-0XA0</b>                                |                                 |                                 |                                 |
| <b>6ES7 223-1PL22-0XA0</b>                                |                                 |                                 |                                 |
| <b>Voltages and currents</b>                              |                                 |                                 |                                 |
| Load voltage L+   |                                 |                                 |                                 |
| - Rated value (DC)  | 24 V                            | 24 V                            | 24 V                            |
| - permissible range, lower limit (DC)                     | 5 V                             | 5 V                             | 5 V                             |
| - permissible range, upper limit (DC)                     | 30 V                            | 30 V                            | 30 V                            |
| Load voltage L1   |                                 |                                 |                                 |
| - Rated value (AC)  | 230 V; 24 to 230 V AC           | 230 V; 24 to 230 V AC           | 230 V; 24 to 230 V AC           |
| - permissible range, lower limit (AC)                     | 5 V                             | 5 V                             | 5 V                             |
| - permissible range, upper limit (AC)                     | 250 V                           | 250 V                           | 250 V                           |
| <b>Current consumption</b>                                |                                 |                                 |                                 |
| •from backplane bus 5 V DC, max.                          | 40 mA                           | 80 mA                           | 150 mA                          |
| •from coil current, max.                                  | 9 mA; per output for signal "1" | 9 mA; per output for signal "1" | 9 mA; per output for signal "1" |
| •from sensor current or ext. power supply (24 V DC), max. | 72 mA                           | 72 mA                           | 72 mA                           |
| •Power dissipation, typical                               | 2 W                             | 3 W                             | 6 W                             |
| <b>Connection system</b>                                  |                                 |                                 |                                 |
| •Pluggable I/O terminals                                  | Yes                             | Yes                             | Yes                             |

# SIMATIC S7-200

## Digital modules

### Digital modules

#### Technical specifications (continued)

|   | 6ES7 223-1HF22-0XA0  | 6ES7 223-1PH22-0XA0  | 6ES7 223-1PL22-0XA0  |
|---|--|--|--|
| <b>Digital inputs</b>                                     |  |  |  |
| •Number of digital inputs                                 | 4  | 8  | 16   |
| Input voltage   |  |  |  |
| - Rated value, DC   | 24 V   | 24 V   | 24 V   |
| - for signal "0"  | 0 to 5 V   | 0 to 5 V   | 0 to 5 V   |
| - for signal "1"  | 15 to 30 V DC  | 15 to 30 V DC  | 15 to 30 V DC  |
| Input current   |  |  |  |
| - for 1 signal, typical                                   | 4 mA   | 4 mA   | 4 mA   |
| Input delay (at rated value of the input voltage)         |  |  |  |
| •For standard inputs                                      |  |  |  |
| - at 0 after 1, max.                                      | 4.5 ms   | 4.5 ms   | 4.5 ms   |
| <b>Digital outputs</b>                                    |  |  |  |
| •Number of digital outputs                                | 4; Relay   | 8; Relay   | 16; Relay  |
| •Length of cable shielded, max.                           | 500 m  | 500 m  | 500 m  |
| •Length of cable unshielded, max.                         | 150 m  | 150 m  | 150 m  |
| •Short-circuit protection of the output                   | No; provided externally  | No; provided externally  | No; provided externally  |
| Output voltage  |  |  |  |
| - for 0 signal (DC), max.                                 | 0.1 V; with 10 kOhm load   | 0.1 V; with 10 kOhm load   | 0.1 V; with 10 kOhm load   |
| - for 1 signal  | L+/L1  | L+/L1  | L+/L1  |
| Output current  |  |  |  |
| - for 1 signal rated value                                | 2,000 mA   | 2,000 mA   | 2,000 mA   |
| Summation current of the outputs (per group)              |  |  |  |
| - Maximum current per wire/group                          | 8 A  | 8 A  | 8 A  |
| <b>Relay outputs</b>                                      |  |  |  |
| •Number of operating cycles                               | 10,000,000; mechanical:<br>10 million, at rated load voltage:<br>100.000 | 10,000,000; mechanical:<br>10 million, at rated load voltage:<br>100.000 | 10,000,000; mechanical:<br>10 million, at rated load voltage:<br>100.000 |
| Switching capacity of the contacts                        |  |  |  |
| - at inductive load, max.                                 | 0.75 A; per output   | 0.75 A; per output   | 0.75 A; per output   |
| - at lamp load, max.                                      | 200 W; 30/200 W (DC/AC)  | 200 W; 30/200 W (DC/AC)  | 200 W; 30/200 W (DC/AC)  |
| - at resistive load, max.                                 | 0.75 A; per output   | 0.75 A; per output   | 0.75 A; per output   |
| <b>Sensor</b>   |  |  |  |
| Connectable encoders                                      |  |  |  |
| - 2-wire BEROS  | Yes  | Yes  | Yes  |
| - permissible closed-circuit current (2-wire BEROS), max. | 1 mA   | 1 mA   | 1 mA   |
| <b>Insulation</b>   |  |  |  |
| •Insulation tested with                                   | 500 V AC   | 500 V AC   | 500 V AC   |
| <b>Potentials/ electrical isolation</b>                   |  |  |  |
| Digital output functions                                  |  |  |  |
| - Electrical isolation, digital output functions          | Yes; Relay   | Yes; Relay   | Yes; Relay   |
| - between the channels, in groups of                      | 4  | 4  | 4  |
| Digital input functions                                   |  |  |  |
| - Electrical isolation, digital input functions           | Yes; Optocoupler   | Yes; Optocoupler   | Yes; Optocoupler   |
| - between the channels, in groups of                      | 4  | 4  | 8  |
| <b>Dimensions and weight</b>                              |  |  |  |
| •Weight, approx.  | 160 g  | 300 g  | 400 g  |
| •Width  | 46 mm  | 71.2 mm  | 137.5 mm   |
| •Height   | 80 mm  | 80 mm  | 80 mm  |
| •Depth  | 62 mm  | 62 mm  | 62 mm  |

| Ordering Data   | Order No.  | Order No.   |
|---|--|---|
| <b>Digital input module EM 221</b><br>For CPU 221/222/224/224 XP/226<br><ul style="list-style-type: none"> <li>• 8 inputs, 24 V DC, galvanically isolated, source/sink switching <sup>A)</sup></li> <li>• 16 inputs, 24 V DC, galvanically isolated, source/sink switching <sup>A)</sup></li> <li>• 8 inputs, 120/230 V AC, galvanically isolated, source/sink switching <sup>A)</sup></li> </ul>   | <b>6ES7 221-1BF22-0XA0</b><br><br><b>6ES7 221-1BH22-0XA0</b><br><br><b>6ES7 221-1EF22-0XA0</b>   | <b>Front flap set <sup>A)</sup></b><br>contains different covering flaps for CPU and EM; Spare part<br><b>6ES7 291-3AX20-0XA0</b><br><br><b>Plug-in terminal block (spare part)</b><br><ul style="list-style-type: none"> <li>• with 7 connection terminals (for EM 221/222) <sup>A)</sup></li> <li>• with 12 connection terminals (for EM 223) <sup>A)</sup></li> </ul> <b>6ES7 292-1AD20-0AA0</b><br><br><b>6ES7 292-1AE20-0AA0</b><br><br><b>SIM 274 simulator (optional) <sup>A)</sup></b><br>with 8 connection terminals for EM 221 and EM 223<br><b>6ES7 274-1XF00-0XA0</b> |
| <b>Digital output module EM 222</b><br>For CPU 221/222/224/224 XP/226<br><ul style="list-style-type: none"> <li>• 4 outputs, 24 V DC; 5 A, galvanically isolated <sup>A)</sup></li> <li>• 8 outputs, 24 V DC; 0,75 A, galvanically isolated <sup>A)</sup></li> <li>• 4 outputs, 24 V DC/24 V AC up to 230 V; 10 A, galvanically isolated, relay outputs <sup>A)</sup></li> <li>• 8 outputs, 24 V DC/24 V AC up to 230 V; 2 A, galvanically isolated, relay outputs <sup>A)</sup></li> <li>• 8 outputs, AC 12 0/230 V; 0.5 A, galvanically isolated <sup>A)</sup></li> </ul>                         | <b>6ES7 222-1BD22-0XA0</b><br><br><b>6ES7 222-1BF22-0XA0</b><br><br><b>6ES7 222-1HD22-0XA0</b><br><br><b>6ES7 222-1HF22-0XA0</b><br><br><b>6ES7 222-1EF22-0XA0</b>                                   | <b>S7-200 programmable controller, system manual</b><br>for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4<br>German<br>English<br>French<br>Spanish<br>Italian<br>Chinese<br><br><b>6ES7 298-8FA24-8AH0</b><br><b>6ES7 298-8FA24-8BH0</b><br><b>6ES7 298-8FA24-8CH0</b><br><b>6ES7 298-8FA24-8DH0</b><br><b>6ES7 298-8FA24-8EH0</b><br><b>6ES7 298-8FA24-8FH0</b>  |
| <b>Digital input/output module EM 223</b><br>For CPU 221/222/224/224 XP/226<br><ul style="list-style-type: none"> <li>• 4 inputs 24 V DC, 4 outputs 24 V DC; 0,75 A, galvanically isolated <sup>A)</sup></li> <li>• 8 inputs 24 V DC, 8 outputs 24 V DC; 0,75 A, galvanically isolated <sup>A)</sup></li> <li>• 16 inputs 24 V DC, 16 outputs 24 V DC; 0,75 A, galvanically isolated <sup>A)</sup></li> <li>• 4 inputs 24 V DC, 4 outputs, relay <sup>A)</sup></li> <li>• 8 inputs 24 V DC, 8 outputs, relay <sup>A)</sup></li> <li>• 16 inputs 24 V DC, 16 outputs, relay <sup>A)</sup></li> </ul> | <b>6ES7 223-1BF22-0XA0</b><br><br><b>6ES7 223-1BH22-0XA0</b><br><br><b>6ES7 223-1BL22-0XA0</b><br><br><b>6ES7 223-1HF22-0XA0</b><br><br><b>6ES7 223-1PH22-0XA0</b><br><br><b>6ES7 223-1PL22-0XA0</b> |   |

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200 SIPLUS digital modules

## SIPLUS digital modules

### Overview

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- Digital inputs/outputs to supplement the integral I/Os of the CPUs
- For flexible adaptation of the controller to the task
- For subsequent upgrading of the system with additional inputs and outputs

*These modules are designed for*

- *an ambient range of  $-25\text{ °C}$  to  $+70\text{ °C}$ , condensation permissible*
- *extraordinary medial load (for example by chloric and sulphuric atmospheres)*

### Technical specifications

|                            |                         |
|----------------------------|-------------------------|
| <b>6AG1 221-1BF22-2XB0</b> | see 6ES7 221-1BF22-0XA0 |
| <b>6AG1 221-1BH22-2XA0</b> | see 6ES7 221-1BH22-0XA0 |
| <b>6AG1 222-1BF22-2XB0</b> | see 6ES7 222-1BF22-0XA0 |
| <b>6AG1 222-1HF22-2XB0</b> | see 6ES7 222-1HF22-0XA0 |
| <b>6AG1 223-1BF22-2XB0</b> | see 6ES7 223-1BF22-0XA0 |
| <b>6AG1 223-1BH22-2XB0</b> | see 6ES7 223-1BH22-0XA0 |
| <b>6AG1 223-1BL22-2XB0</b> | see 6ES7 223-1BL22-0XA0 |
| <b>6AG1 223-1HF22-2XB0</b> | see 6ES7 223-1HF22-0XA0 |
| <b>6AG1 223-1PH22-2XB0</b> | see 6ES7 223-1PH22-0XA0 |
| <b>6AG1 223-1PL22-2XB0</b> | see 6ES7 223-1PL22-0XA0 |

### Ordering Data

### Order No.

#### SIPLUS EM 221 digital input module

(extended temperature range)  
for CPU 222/224/224 XP/226

- 8 inputs, 24 V DC, electrically isolated, P-M switching <sup>A)</sup>

**6AG1 221-1BF22-2XB0**

- 16 inputs, 24 V DC, electrically isolated, P-M switching <sup>A)</sup>

**6AG1 221-1BH22-2XA0**

#### SIPLUS EM 222 digital output module

(extended temperature range)  
for CPU 222/224/224 XP/226

- 8 outputs, 24 V DC; 0,75 A, electrically isolated <sup>A)</sup>
- 8 outputs, 24 V DC / 24 to 230 V AC; 2 A, electrically isolated, relay outputs <sup>A)</sup>

**6AG1 222-1BF22-2XB0**

**6AG1 222-1HF22-2XB0**

#### EM 223 digital input/output module

(extended temperature range)  
for CPU 222/224/224 XP/226

- 4 inputs, 24 V DC, 4 outputs, 24 V DC; 0,75 A, electrically isolated <sup>A)</sup>
- 8 inputs, 24 V DC, 8 outputs, 24 V DC; 0,75 A, electrically isolated <sup>A)</sup>
- 16 inputs, 24 V DC, 16 outputs, 24 V DC; 0,75 A, electrically isolated <sup>A)</sup>
- 4 inputs, 24 V DC, 4 outputs, relays <sup>A)</sup>
- 8 inputs, 24 V DC, 8 outputs, relays <sup>A)</sup>
- 16 inputs, 24 V DC, 16 outputs, relays <sup>A)</sup>

**6AG1 223-1BF22-2XB0**

**6AG1 223-1BH22-2XB0**

**6AG1 223-1BL22-2XB0**

**6AG1 223-1HF22-2XB0**

**6AG1 223-1PH22-2XB0**

**6AG1 223-1PL22-2XB0**

#### Accessories

see ordering data for S7-200 digital modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

### Overview



- Analog inputs and outputs for the SIMATIC S7-200
- With extremely short conversion times
- For connections of analog sensors and actuators without additional amplifier
- For solving the more complex automation tasks

### Technical specifications EM 231

|  | 6ES7 231-0HC22-0XA0 |
|--|---------------------|
| <b>Current consumption</b>   |                     |
| •from load voltage L+ (no load), max.                                      | 60 mA               |
| •from backplane bus 5 V DC, max.   | 20 mA               |
| •Power dissipation, typical  | 2 W                 |
| <b>Connection system</b>   |                     |
| •Pluggable I/O terminals   | No                  |
| <b>Analog inputs</b>   |                     |
| •Number of analog inputs   | 4; Differential     |
| •Length of cable shielded, max   | 100 m; to sensor    |
| •Permissible input voltage for the voltage input (destruction limit), max. | 30 V                |
| •Permissible input voltage for the current input (destruction limit), max. | 32 mA               |
| Input ranges (rated values), voltages                                      |                     |
| - 0 to +5 V  | Yes                 |
| - 0 to +10 V   | Yes                 |
| - -2.5 V to +2.5 V   | Yes                 |
| - -5 V to +5 V   | Yes                 |
| Input ranges (rated values), currents                                      |                     |
| - 0 to 20 mA   | Yes                 |
| Characteristic curve linearization   |                     |
| - for voltage measurement  | no                  |
| - for current measurement  | no                  |
| Temperature compensation   |                     |
| - parameterizable  | No                  |

|  | 6ES7 231-0HC22-0XA0  |
|--|--|
| <b>Analog value formation</b>  |  |
| Integration and conversion time/triggering per channel                 |  |
| - with over-range (bits incl. sign), max                               | 12 Bit   |
| - Interference voltage suppression for interference frequency f1 in Hz | 40 dB, DC up to 60 V for interference frequency 50 / 60 Hz |
| - Conversion time (per channel)  | 250 µs   |
| Displayable conversion value range                                     |  |
| - bipolar signals  | -32,000 to +32,000   |
| - unipolar signals   | 0 to 32000   |
| <b>Error/accuracies</b>  |  |
| Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$      |  |
| - Common-mode voltage, max.  | 12 V   |
| <b>Potentials/ electrical isolation</b>                                |  |
| Analog output functions  |  |
| - Electrical isolation, analog inputs                                  | No   |
| <b>Dimensions and weight</b>   |  |
| •Weight, approx.   | 183 g  |
| •Width   | 71.2 mm  |
| •Height  | 80 mm  |
| •Depth   | 62 mm  |

## Technical specifications EM 232

| 6ES7 232-0HB22-0XA0   |                      |
|---|----------------------|
| <b>Current consumption</b>  |                      |
| •from backplane bus 5 V DC, max.  | 20 mA                |
| •from sensor current or ext. power supply (24 V DC), max.                   | 70 mA                |
| •Power dissipation, typical   | 2 W                  |
| <b>Connection system</b>  |                      |
| •Pluggable I/O terminals  | No                   |
| <b>Analog outputs</b>   |                      |
| •Number of analog outputs   | 2                    |
| Output ranges, voltage<br>- -10 to +10 V                                    | Yes                  |
| Output ranges, current<br>- 4 to 20 mA                                      | Yes                  |
| Burden resistance<br>(in the nominal output range)                          |                      |
| - at voltage outputs, min.  | 5 k $\Omega$         |
| - at current outputs, max.  | 0.5 k $\Omega$       |
| <b>Analog value formation</b>   |                      |
| Integration and conversion time/triggering per channel<br>- with over-range | U/12 bits, I/11 bits |
| Settling time   |                      |
| - for voltage output function   | 100 $\mu$ s          |
| - for current output function   | 2 ms                 |
| Displayable conversion value range  |                      |
| - bipolar signals   | -32,000 to +32,000   |
| - unipolar signals  | 0 to 32,000          |
| <b>Error/accuracies</b>   |                      |
| Operational limit in the entire temperature range                           |                      |
| - Relative to the output range, voltage                                     | +/- 2 %              |
| - Relative to the output range, current                                     | +/- 2 %              |
| Basic error limit (operational limit at 25 °C)                              |                      |
| - relative to the output range, voltage                                     | +/- 0.5 %            |
| - relative to the output range, current                                     | +/- 0.5 %            |
| <b>Potentials/ electrical isolation</b>                                     |                      |
| Analog output functions<br>- Electrical isolation, analog output functions  | No                   |
| <b>Dimensions and weight</b>  |                      |
| •Weight, approx.  | 148 g                |
| •Width  | 46 mm                |
| •Height   | 80 mm                |
| •Depth  | 62 mm                |

## Technical specifications EM 235

| 6ES7 235-0KD22-0XA0  |                 |
|--|-----------------|
| <b>Current consumption</b>   |                 |
| •from backplane bus 5 V DC, max.   | 30 mA           |
| •from sensor current or ext. power supply (24 V DC), max.                  | 60 mA           |
| •Power dissipation, typical  | 2 W             |
| <b>Connection system</b>   |                 |
| •Pluggable I/O terminals   | No              |
| <b>Analog inputs</b>   |                 |
| •Number of analog inputs   | 4; Differential |
| •Permissible input voltage for the voltage input (destruction limit), max. | 30 V            |
| •Permissible input voltage for the current input (destruction limit), max. | 32 mA           |
| Input ranges (rated values), voltages                                      |                 |
| - Voltage  | Yes             |
| - 0 to +50 mV  | Yes             |
| - 0 to +100 mV   | Yes             |
| - 0 to +500 mV   | Yes             |
| - 0 to +1 V  | Yes             |
| - 0 to +5 V  | Yes             |
| - 0 to +10 V   | Yes             |
| - -1 V to +1 V   | Yes             |
| - -10 V to +10 V   | Yes             |
| - -100 mV to +100 mV   | Yes             |
| - -2.5 V to +2.5 V   | Yes             |
| - -25 mV to +25 mV   | Yes             |
| - -250 mV to +250 mV   | Yes             |
| - -5 V to +5 V   | Yes             |
| - -50 mV to +50 mV   | Yes             |
| - -500 mV to +500 mV   | Yes             |
| Input ranges (rated values), currents                                      |                 |
| - Current  | Yes             |
| - 0 to 20 mA   | Yes             |
| Characteristic curve linearization   |                 |
| - for voltage measurement  | No              |
| - for current measurement  | No              |
| Temperature compensation<br>- parameterizable                              | No              |
| <b>Analog outputs</b>  |                 |
| •Number of analog outputs  | 1               |
| Output ranges, voltage<br>- -10 to +10 V                                   | Yes             |
| Output ranges, current<br>- 0 to 20 mA                                     | Yes             |
| Burden resistance<br>(in the nominal output range)                         |                 |
| - at voltage outputs, min.   | 5 k $\Omega$    |
| - at current outputs, max.   | 0.5 k $\Omega$  |



#### Technical specifications (continued)

|  | 6ES7 235-0KD22-0XA0              |
|--|----------------------------------|
| <b>Analog value formation</b>  |                                  |
| Integration and conversion time/triggering per channel                 | 12 Bit; 11 bits for power output |
| - with over-range (bits incl. sign), max                               |                                  |
| - Basic conversion time, ms  | < 0.25 ms                        |
| - Interference voltage suppression for interference frequency f1 in Hz | 40 dB, DC to 60 Hz               |
| <b>Settling time</b>   |                                  |
| - for voltage output function  | 100 µs                           |
| - for current output function  | 2 ms                             |
| <b>Displayable conversion value range</b>                              |                                  |
| - bipolar signals  | -32,000 to +32,000               |
| - unipolar signals   | 0 to 32,000                      |
| <b>Error/accuracies</b>  |                                  |
| Operational limit in the entire temperature range                      |                                  |
| - Relative to the output range, voltage                                | +/- 2 %                          |
| - Relative to the output range, current                                | +/- 2 %                          |
| <b>Basic error limit (operational limit at 25 °C)</b>                  |                                  |
| - relative to the output range, voltage                                | +/- 0.5 %                        |
| - relative to the output range, current                                | +/- 0.5 %                        |
| <b>Interference voltage suppression for f = n x (fl +/- 1 %)</b>       |                                  |
| - Common-mode voltage, max.  | 12 V                             |
| <b>Potentials/ electrical isolation</b>                                |                                  |
| Analog output functions  |                                  |
| - Electrical isolation, analog output functions                        | No                               |
| Analog input functions   |                                  |
| - Electrical isolation, analog inputs                                  | No                               |
| <b>Dimensions and weight</b>   |                                  |
| •Weight, approx.   | 186 g                            |
| •Width   | 71.2 mm                          |
| •Height  | 80 mm                            |
| •Depth   | 62 mm                            |

#### Ordering Data

#### Order No.

|  |                            |
|--|----------------------------|
| <b>EM 231 analog input module</b> <sup>A)</sup><br>for CPU 222/224/224 XP/226;<br>4 inputs, 0 - 10 V,<br>12-bit resolution           | <b>6ES7 231-0HC22-0XA0</b> |
| <b>EM 232 analog output module</b> <sup>A)</sup><br>for CPU 222/224/224 XP/226;<br>2 outputs, ± 10 V,<br>12-bit resolution           | <b>6ES7 232-0HB22-0XA0</b> |
| <b>EM 235 analog input/output</b> <sup>A)</sup><br>for CPU 222/224/224 XP/226;<br>4 inputs, 1 output, ±10 V DC,<br>12-bit resolution | <b>6ES7 235-0KD22-0XA0</b> |
| <b>Grounding terminal</b>  | <b>6ES5 728-8MA11</b>      |
| 10 items   |                            |
| <b>Front flap set</b> <sup>A)</sup><br>contains different covering flaps for CPU and EM;<br>Spare part                               | <b>6ES7 291-3AX20-0XA0</b> |
| <b>S7-200 programmable controller, system manual</b>   |                            |
| for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4   |                            |
| German   | <b>6ES7 298-8FA24-8AH0</b> |
| English  | <b>6ES7 298-8FA24-8BH0</b> |
| French   | <b>6ES7 298-8FA24-8CH0</b> |
| Spanish  | <b>6ES7 298-8FA24-8DH0</b> |
| Italian  | <b>6ES7 298-8FA24-8EH0</b> |
| Chinese  | <b>6ES7 298-8FA24-8FH0</b> |

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200

## Analog modules

### EM 231 thermocouple module

#### Overview

3



- For user-friendly, high precision temperature detection
- 7 standard types of thermocouple can be used
- For measuring low-level analog signals ( $\pm 80$  mV), as well
- Easy to install in an existing system

#### Technical specifications

|   | 6ES7 231-7PD22-0XA0 |
|---|---------------------|
| <b>Current consumption</b>  |                     |
| • from load voltage L+ (no load), max.                                      | 60 mA               |
| • from backplane bus 5 V DC, max.   | 87 mA               |
| • Power dissipation, typical  | 1.8 W               |
| <b>Connection system</b>  |                     |
| • Pluggable I/O terminals   | No                  |
| <b>Analog inputs</b>  |                     |
| • Number of analog inputs   | 4                   |
| • Length of cable shielded, max   | 100 m; to sensor    |
| • Permissible input voltage for the voltage input (destruction limit), max. | 30 V                |
| • Loop resistance line  | 100 $\Omega$        |
| • Update time (all channels)  | 405 ms              |
| Input ranges (rated values), voltages                                       |                     |
| - -80 mV to +80 mV  | Yes                 |
| Input ranges (rated values), thermocouples                                  |                     |
| - Type E  | Yes                 |
| - Type J  | Yes                 |
| - Type K  | Yes                 |
| - Type N  | Yes                 |
| - Type R  | Yes                 |
| - Type S  | Yes                 |
| - Type T  | Yes                 |

|  | 6ES7 231-7PD22-0XA0                                     |
|--|---|
| <b>Analog value formation</b>  |   |
| • Measuring principle  | Sigma-Delta   |
| Integration and conversion time/triggering per channel                                 |   |
| - with over-range (bits incl. sign), max   | 16 Bit; Temperature 0.1 $^{\circ}$ C / 0.1 $^{\circ}$ F |
| - Interference voltage suppression for interference frequency f1 in Hz                 | 85 dB at 50 / 60 / 400 Hz                               |
| Displayable conversion value range   |   |
| - bipolar signals  | -27,648 to +27,648                                      |
| <b>Error/accuracies</b>  |   |
| • Cold connection point  | $\pm 1.5$ $^{\circ}$ C                                  |
| • Repeatability in the settled state at 25 $^{\circ}$ C (relative to the output range) | $\pm 0.05$ %  |
| Operational limit in the entire temperature range                                      |   |
| - Relative to the output range, voltage  | $\pm 0.1$ %   |
| Interference voltage suppression for f = n x (f1 $\pm 1$ %)                            |   |
| - Common-mode voltage, max.  | 120 V; AC   |
| - Common-mode interference, min  | 120 dB; at 120 V AC                                     |
| <b>Potentials/ electrical isolation</b>  |   |
| Analog output functions  |   |
| - Electrical isolation, analog inputs  | Yes   |
| <b>Dimensions and weight</b>   |   |
| • Weight, approx.  | 210 g   |
| • Width  | 71.2 mm   |
| • Height   | 80 mm   |
| • Depth  | 62 mm   |

| Ordering Data  | Order No.                  |  | Order No.                  |
|--|----------------------------|--|----------------------------|
| <b>EM 231 thermocouple module</b> <sup>A)</sup><br>4 inputs +/- 80 mV, 15-bit resolution + sign, thermocouples type J, K, S, T, R, E, N              | <b>6ES7 231-7PD22-0XA0</b> | <b>S7-200 programmable controller, system manual</b><br>for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4 |                            |
| <b>Grounding terminal</b><br>10 items  | <b>6ES5 728-8MA11</b>      | German   | <b>6ES7 298-8FA24-8AH0</b> |
| <b>Backplane bus expansion cable</b> <sup>A)</sup><br>for connecting the two equipment tiers in a two-tier configuration, for CUP 222/224/224 XP/226 | <b>6ES7 290-6AA20-0XA0</b> | English  | <b>6ES7 298-8FA24-8BH0</b> |
|  |                            | French   | <b>6ES7 298-8FA24-8CH0</b> |
|  |                            | Spanish  | <b>6ES7 298-8FA24-8DH0</b> |
|  |                            | Italian  | <b>6ES7 298-8FA24-8EH0</b> |
|  |                            | Chinese  | <b>6ES7 298-8FA24-8FH0</b> |

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200

## Analog modules

### EM 231 RTD module

#### Overview

3



- For user-friendly, high precision temperature detection
- Supports 31 standard resistance temperature sensors
- Easy to install in an existing system

#### Technical specifications

|   | 6ES7 231-7PB22-0XA0                     |
|---|---|
| <b>Current consumption</b>  |   |
| • from load voltage L+ (no load), max.                                      | 60 mA                                   |
| • from backplane bus 5 V DC, max.   | 87 mA                                   |
| • Power dissipation, typical  | 1.8 W; Sensor: 1 mW                     |
| <b>Connection system</b>  |   |
| • Pluggable I/O terminals   | No                                      |
| <b>Analog inputs</b>  |   |
| • Number of analog inputs   | 2                                       |
| • Length of cable shielded, max   | 100 m; to sensor                        |
| • Permissible input voltage for the voltage input (destruction limit), max. | 30 V; 30 V DC (sensor), 5 V DC (source) |
| • Loop resistance line  | 20 Ω; max. 2.7 ohms for Cu              |
| • Update time (all channels)  | 405 ms; 700 ms at Pt 10000              |
| Input ranges (rated values), resistances                                    |   |
| - 0 to 150 ohms   | Yes                                     |
| - 0 to 300 ohms   | Yes                                     |
| - 0 to 600 ohms   | Yes                                     |
| Input ranges (rated values), resistance thermometer                         |   |
| - Cu 10   | Yes                                     |
| - Ni 10   | Yes                                     |
| - Ni 1000   | Yes                                     |
| - Ni 120  | Yes                                     |
| - Pt 100  | Yes                                     |
| - Pt 1000   | Yes                                     |
| - Pt 10000  | Yes                                     |
| - Pt 200  | Yes                                     |
| - Pt 500  | Yes                                     |

|   | 6ES7 231-7PB22-0XA0                 |
|---|-------------------------------------|
| <b>Analog value formation</b>   |                                     |
| • Measuring principle   | Sigma-Delta                         |
| Integration and conversion time/triggering per channel                      |                                     |
| - with over-range (bits incl. sign), max                                    | 16 Bit; Temperature 0.1 °C / 0.1 °F |
| - Interference voltage suppression for interference frequency f1 in Hz      | 85 dB at 50 / 60 / 400 Hz           |
| Displayable conversion value range  |                                     |
| - bipolar signals   | -27,648 to +27,648                  |
| <b>Error/accuracies</b>   |                                     |
| • Repeatability in the settled state at 25°C (relative to the output range) | +/- 0.05 %                          |
| Operational limit in the entire temperature range                           |                                     |
| - Relative to the output range, voltage                                     | +/- 0.1 %                           |
| Interference voltage suppression for f = n x (fl +/- 1 %)                   |                                     |
| - Common-mode voltage, max.   | 0 V                                 |
| - Common-mode interference, min   | 120 dB; at 120 V AC                 |
| <b>Potentials/ electrical isolation</b>                                     |                                     |
| Analog output functions   |                                     |
| - Electrical isolation, analog inputs                                       | Yes                                 |
| <b>Dimensions and weight</b>  |                                     |
| • Weight, approx.   | 210 g                               |
| • Width   | 71.2 mm                             |
| • Height  | 80 mm                               |
| • Depth   | 62 mm                               |

| Ordering Data  | Order No.                  | Order No.   |
|--|----------------------------|---|
| <b>EM 231 RTD module <sup>A)</sup></b><br>2 inputs for thermistors<br>Pt100/200/500/1000/10000,<br>Ni100/120/1000, Cu10;<br>resistance 150/300/600 Ohms,<br>15-bit resolution + sign | <b>6ES7 231-7PB22-0XA0</b> | <b>S7-200 programmable controller, system manual</b><br>for CPU 221/222/224/224 XP/226<br>and STEP 7-Micro/Win V4<br><br>German<br>English<br>French<br>Spanish<br>Italian<br>Chinese |
| <b>Grounding terminal</b><br>10 items  | <b>6ES5 728-8MA11</b>      |   |
| <b>Backplane bus expansion cable <sup>A)</sup></b><br>for connecting the two equipment tiers in a two-tier configuration, for CUP 222/224/224 XP/226                                 | <b>6ES7 290-6AA20-0XA0</b> |   |

- 6ES7 298-8FA24-8AH0**
- 6ES7 298-8FA24-8BH0**
- 6ES7 298-8FA24-8CH0**
- 6ES7 298-8FA24-8DH0**
- 6ES7 298-8FA24-8EH0**
- 6ES7 298-8FA24-8FH0**

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200 SIPLUS analog modules

## SIPLUS analog modules

### Overview



- Analog inputs and outputs for the SIMATIC S7-200
- With extremely short conversion times
- For connections of analog sensors and actuators without additional amplifier
- For solving the more complex automation tasks

*These modules are designed for*

- *an ambient range of  $-25\text{ °C}$  to  $+70\text{ °C}$ , condensation permissible*
- *extraordinary medial load (for example by chloric and sulphuric atmospheres)*

### Technical specifications

|                            |                         |
|----------------------------|-------------------------|
| <b>6AG1 231-0HC22-2XB0</b> | see 6ES7 231-0HC22-0XA0 |
| <b>6AG1 232-0HB22-2XB0</b> | see 6ES7 232-0HB22-0XA0 |
| <b>6AG1 235-0KD22-2XB0</b> | see 6ES7 235-0KD22-0XA0 |

### Ordering Data

### Order No.

|  |                            |
|--|----------------------------|
| <b>SIPLUS EM 231 analog input module <sup>A)</sup></b> | <b>6AG1 231-0HC22-2XB0</b> |
|--|----------------------------|

(extended temperature range)  
for CPU 222/224/224 XP/226;  
4 inputs, 0-10 V, resolution 12 bit

|   |                            |
|---|----------------------------|
| <b>SIPLUS EM 232 analog output module <sup>A)</sup></b> | <b>6AG1 232-0HB22-2XB0</b> |
|---|----------------------------|

(extended temperature range)  
for CPU 222/224/224 XP/226;  
2 outputs,  $\pm 10\text{ V}$ , resolution 12 bit

|   |                            |
|---|----------------------------|
| <b>SIPLUS EM 235 analog input/output module <sup>A)</sup></b> | <b>6AG1 235-0KD22-2XB0</b> |
|---|----------------------------|

(extended temperature range)  
for CPU 222/224/224 XP/226;  
4 inputs, 1 output,  $\pm 10\text{ V DC}$ ,  
resolution 12 bit

### Accessories

siehe Ordering Data for S7-200 analog modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

### Overview



- Function modules for simple positioning tasks (1 axis)
- Stepper motors and servo motors from the Micro Stepper to the high-performance servo drive can be connected
- Flexible connection possibilities
- Full support from STEP 7-Micro/WIN with parameterization and startup

### Technical specifications

| 6ES7 253-1AA22-0XA0                               |   |
|---|---|
| <b>Supply voltages</b>                            |   |
| Rated value                                       |   |
| - permissible range, lower limit (DC)             | 11 V  |
| - permissible range, upper limit (DC)             | 30 V  |
| <b>Current consumption</b>                        |   |
| • from backplane bus 5 V DC, max.                 | 190 mA  |
| • from supply voltage L+, max.                    | 300 mA; from 12 V DC, 130 mA from 24 V DC   |
| <b>Configuration</b>                              |   |
| • Number of modules per CPU                       | max. 5 with CPU 226/226XM, max. 3 with CPU 224, max. 1 with CPU 222   |
| <b>Digital inputs</b>                             |   |
| • Number of digital inputs                        | 5   |
| • Functions                                       | Stop (STP), reference point switch (RPS), upper limit switch (LMT+), lower limit switch (LMT-), zero point (ZP) |
| Length of cable                                   |   |
| - Length of cable shielded, max                   | 100 m; STP, RPS, LMT+, LMT- 100 m, ZP 10 m  |
| - Length of cable unshielded, max                 | 30 m; STP, RPS, LMT+, LMT- 30 m, ZP not advisable   |
| • Type  | IEC Type 1, p-reading   |
| Input voltage                                     |   |
| - Rated value, DC                                 | 24 V  |
| - for signal "0"                                  | STP, RPS, LMT+, LMT- DC 5 V; ZP DC 1 V  |
| - for signal "1"                                  | STP, RPS, LMT+, LMT- DC 15 V; ZP DC 3 V   |
| Input delay (at rated value of the input voltage) |   |
| • For standard inputs                             |   |
| - Parameterizable                                 | Yes; STP, RPS, LMT+, LMT- 0.2 to 12.8 ms<br>ZP min 2 µs   |

#### Sensor

Connectable encoders

- 2-wire BEROs
- permissible closed-circuit current (2-wire BEROs), max.

Yes  
1 mA

#### Drive interface

Signal output I

- Number
- Type
- Differential output voltage, min.
- Pulse frequency
- Length of cable, max.

4; choice of RS422/RS485 or 5 V DC  
RS422/RS485 electrically isolated (P0+, P0-, P1+, P1-)  
2.8 V; RL=200 ohms  
200 kHz; P0+, P0-, P1+, P1-, P0, P1  
10 m; 10 m shielded; 1 m unshielded

Signal output III

- Type
- Output voltage
- Output current

5 V DC isolated (P0, P1, DIS, CLR)  
30 V DC  
50 mA; output delay (DIS, CLR) max. 30 µs

#### Potentials/ electrical isolation

Digital input functions

- between the channels
- between the channels, in groups of

Yes  
1 (STP, RPS, ZP),  
2 (LMT-, LMT+)

#### Dimensions and weight

- Weight, approx.
- Width
- Height
- Depth

190 g  
71.2 mm  
80 mm  
62 mm

# SIMATIC S7-200

## Function modules

### EM 253 positioning module

3

| Ordering Data  | Order No.                  |  | Order No.                  |
|--|----------------------------|--|----------------------------|
| <b>EM 253 positioning module</b> <sup>A)</sup><br>for activating stepper motors or servo drives  | <b>6ES7 253-1AA22-0XA0</b> | <b>S7-200 programmable controller, system manual</b><br>for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4 |                            |
| <b>Grounding terminal</b><br>10 items  | <b>6ES5 728-8MA11</b>      | German   | <b>6ES7 298-8FA24-8AH0</b> |
| <b>Backplane bus expansion cable</b> <sup>A)</sup><br>for connecting the two equipment tiers in a two-tier configuration, for CUP 222/224/224 XP/226 | <b>6ES7 290-6AA20-0XA0</b> | English  | <b>6ES7 298-8FA24-8BH0</b> |
|  |                            | French   | <b>6ES7 298-8FA24-8CH0</b> |
|  |                            | Spanish  | <b>6ES7 298-8FA24-8DH0</b> |
|  |                            | Italian  | <b>6ES7 298-8FA24-8EH0</b> |
|  |                            | Chinese  | <b>6ES7 298-8FA24-8FH0</b> |

A) Subject to export regulations: AL: N and ECCN: EAR99H



### Overview



- Modem expansion module for SIMATIC S7-200
- The Plug&Play solution for a II classical modem tasks in the PLC field
- Used for remote maintenance/ remote diagnostics, CPU-to-CPU/PC communication or SMS/pager messaging
- Minimal engineering outlay required
- Replaces external modems connected via the communications interface of the CPU
- Easy to retrofit

### Technical specifications

|  | 6ES7 241-1AA22-0XA0   |
|--|---|
| <b>Voltages and currents</b>           |   |
| Load voltage L+                        |   |
| - Rated value (DC)                     | 24 V  |
| - permissible range, lower limit (DC)  | 20.4 V  |
| - permissible range, upper limit (DC)  | 28.8 V  |
| <b>Current consumption</b>             |   |
| • from load voltage L+ (no load), max. | 70 mA   |
| • from backplane bus 5 V DC, max.      | 80 mA; from expansion bus   |
| • Power dissipation, typical           | 2.1 W   |
| <b>Communication functions</b>         |   |
| • Bus protocol/transfer protocol       | PPI, Modbus   |
| <b>Connection system</b>               |   |
| • Phone lines                          | RJ11 (4 cables, 6 contacts)   |
| <b>Modem</b>                           |   |
| • Standards                            | Bell 103, Bell 212, V. 21, V. 22, V. 22 bis, V. 23c, V. 32, V. 32 bis, V. 34 (preset) |
| • Tone dialing                         | Yes   |
| • Pulse dialing                        | Yes   |
| <b>Dimensions and weight</b>           |   |
| • Weight, approx.                      | 190 g   |
| • Width                                | 71.2 mm   |
| • Height                               | 80 mm   |
| • Depth                                | 62 mm   |

### Ordering Data

|  | Order No.                  |
|--|----------------------------|
| <b>EM 241 modem</b> <sup>A)</sup>  | <b>6ES7 241-1AA22-0XA0</b> |
| Analog modem for remote maintenance/remote diagnostics; CPU-to-CPU/PC communication, SMS/pager messaging |                            |
| <b>Grounding terminal</b>  | <b>6ES5 728-8MA11</b>      |
| 10 items   |                            |
| <b>S7-200 programmable controller, system manual</b>   |                            |
| for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4   |                            |
| German   | <b>6ES7 298-8FA24-8AH0</b> |
| English  | <b>6ES7 298-8FA24-8BH0</b> |
| French   | <b>6ES7 298-8FA24-8CH0</b> |
| Spanish  | <b>6ES7 298-8FA24-8DH0</b> |
| Italian  | <b>6ES7 298-8FA24-8EH0</b> |
| Chinese  | <b>6ES7 298-8FA24-8FH0</b> |

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200

## Communication

### EM 277 PROFIBUS DP module

#### Overview

3



- For connection of the S7-22x to PROFIBUS DP (as slave) and MPI
- Can be simultaneously operated as MPI slave and DP slave
- Transmission rate max. 12 Mbps
- Can be used with CPU from version 6ES7 22x-xxx 21-xxxx

#### Technical specifications

|  | 6ES7 277-0AA22-0XA0   |
|--|---|
| <b>Voltages and currents</b>                               |   |
| Load voltage L+  |   |
| - Rated value (DC)   | 24 V  |
| - permissible range, lower limit (DC)                      | 20.4 V  |
| - permissible range, upper limit (DC)                      | 28.8 V  |
| <b>Current consumption</b>                                 |   |
| • from backplane bus 5 V DC, max.                          | 150 mA  |
| • from sensor current or ext. power supply (24 V DC), max. | 180 mA; 30 to 180 mA  |
| • Power dissipation, typical                               | 2.5 W   |
| <b>Configuration</b>                                       |   |
| • Connectable stations                                     | TD 200 from V2.0, OP, TP, PG/PC, S7-300/400, PROFIBUS DP-Master |
| <b>Communication functions</b>                             |   |
| • Bus protocol/transfer protocol                           | PROFIBUS DP (Slave), MPI (Slave)                                |
| Number of connections                                      |   |
| - MPI connections, max.                                    | 6   |
| - MPI connections reserved for OP communication            | 1   |
| - MPI connections reserved for PG communication            | 1   |
| <b>Interfaces</b>  |   |
| • Number of RS485 interfaces                               | 1   |
| 5 V DC   |   |
| - Output current, max.                                     | 90 mA   |
| 24 V DC  |   |
| - Voltage range  | 20.4 to 28.8 V  |
| - Output current, max.                                     | 120 mA  |
| - Current limiting   | 0.7 to 2.4 A  |

|  | 6ES7 277-0AA22-0XA0  |
|--|--|
| <b>Connection system</b>                 |  |
| • Pluggable I/O terminals                | No   |
| <b>PROFIBUS DP</b>                       |  |
| • Transmission rate, max.                | 12 Mbit/s;<br>9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 kbit/s<br>1 / 1.5 / 3 / 6 / 12 Mbit/s |
| • Station addresses                      | 0 to 99, adjustable  |
| • Length of cable, max.                  | 1,200 m;<br>100 to 1200 m, depending on the transmission rate                                |
| • Number of stations in the system, max. | 126; of which max. 99 EM 277   |
| • Number of stations per segment, max.   | 32   |
| • Automatic transmission speed detection | Yes  |
| <b>Dimensions and weight</b>             |  |
| • Weight, approx.                        | 175 g  |
| • Width                                  | 71.2 mm  |
| • Height                                 | 80 mm  |
| • Depth                                  | 62 mm  |

#### Ordering Data

|  | Order No.                  |
|--|----------------------------|
| <b>PROFIBUS DP EM 277 input module<sup>A)</sup></b><br>for CPU 222/224/224 XP/226, for connecting to PROFIBUS DP (slave) and MPI | <b>6ES7 277-0AA22-0XA0</b> |

|   | Order No.                  |
|---|----------------------------|
| <b>SIPLUS PROFIBUS DP EM 277 input module (extended temperature range)</b><br>for CPU 222/224/224 XP/226, for connecting to PROFIBUS DP (slave) and MPI | <b>6AG1 277-0AA22-2XA0</b> |

A) Subject to export regulations: AL: N and ECCN: EAR99H

### Overview



The CP 243-2 is the AS-Interface master for the innovated generation of SIMATIC S7-200. The communications processor (6GK1 243-2AX01-0AX0) supports the extended AS-Interface specification V2.1 and has the following functions:

- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the extended AS-Interface specification V2.1)
- Supports all AS-Interface master functions in accordance with the extended AS-Interface specification V2.1
- Status displays for operating states and display of the functional readiness of connected slaves with LEDs in the front panel
- Indication of errors (incl. AS-Interface voltage errors, configuration errors) with LEDs in the front panel
- Compact enclosure designed to match the new generation of SIMATIC S7-200.

### Technical specifications

|                                |  |
|--------------------------------|--|
| AS-Interface specification     | V 2.1  |
| Interfaces                     |  |
| •Address space used in the PLC | Corresponding to 2 I/O modules (8 DI/8 DO and 8 AI/8 AO) |
| •AS-Interface connection       | Terminal   |
| Current consumption            |  |
| •Via AS-Interface              | Max. 100 mA  |
| •Through backplane bus         | Typ. 220 mA at DC 5 V                                    |
| Power loss                     | Approx. 2 W  |
| Perm. environmental conditions |  |
| •Operating temperature         |  |
| - Horizontal mounting          | 0 °C to +55 °C   |
| - Vertical mounting            | 0 °C to +45 °C   |
| •Transport/storage temperature | - 40 °C to +70 °C  |
| •Relative humidity             | Max. 95% at +25 °C                                       |
| Design                         |  |
| •Module format                 | S7-22x expansion module                                  |
| •Dimensions (W x H x D) in mm  | 71.2 x 80 x 62 (H+16 mm with holes for wall mounting)    |
| •Weight                        | Approx. 250 g  |
| •Space required                | 1 slot   |

### Ordering Data

### Order No.

#### CP 243-2 communications processor<sup>A)</sup>

**6GK7 243-2AX01-0XA0**

For connection of SIMATIC S7-200 (2<sup>nd</sup> generation) to AS-Interface with bus connector

#### Manual for CP 243-2

Including AS-Interface fundamentals and diskette with program examples paper version

- German
- English
- French
- Spanish
- Italian

**6GK7 243-2AX00-8AA0**

**6GK7 243-2AX00-8BA0**

**6GK7 243-2AX00-8CA0**

**6GK7 243-2AX00-8DA0**

**6GK7 243-2AX00-8EA0**

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200

## Communication

CP 243-1

### Overview



- Connection of SIMATIC S7-200 to Industrial Ethernet with
  - 10/100 Mbit/s
  - Half/full duplex
  - RJ 45 socket
  - TCP/IP
- Configuration, remote programming and service is possible with STEP 7-Micro/WIN through Industrial Ethernet (program upload and download, status)
- CPU/CPU communication is possible through Industrial Ethernet (Client + Server, 8 S7 connections + 1 PG connection)
- Thanks to integration in S7-OPC, further processing of PLC data in PC applications is possible
- Modules can be replaced without the need for a programming device

### Technical specifications

|                                       |  |
|---------------------------------------|--|
| Data transmission rate                | 10/100 Mbit/s autosensing                      |
| Interfaces                            |  |
| • 10 BaseT, 100 Base TX               | RJ45   |
| • Connection for power supply         | 24 V DC (± 5%)                                 |
| Current consumption                   |  |
| • From backplane bus                  | 55 mA  |
| • From external 24 V DC               | 60 mA  |
| Power loss at 24 V DC                 | 1.75 W   |
| Perm. environmental conditions        |  |
| • Operating temperature               |  |
| - Horizontal mounting                 | 0°C to +55°C                                   |
| - Vertical mounting                   | 0°C to +45°C                                   |
| • Transport/storage temperature       | -40 °C to +70 °C                               |
| • Relative humidity                   | Max. 95% at +25 °C                             |
| Design                                |  |
| • Dimensions (W x H x D) in mm        | 71.2 x 80 x 62                                 |
| • Weight                              | 150 g  |
| <b>Performance data</b>               |  |
| S7 communication/<br>PG communication |  |
| • Number of usable connections        | 8 S7 connections +<br>1 PG connection          |
| Configuration                         | With STEP 7-Micro/WIN<br>(V3.2 SP1 and higher) |

### Ordering Data

### Order No.

#### CP 243-1 communications processor<sup>D)</sup>

**6GK7 243-1EX00-0XE0**

for connection of SIMATIC S7-200 to Industrial Ethernet; for S7 communication, PG communication with electronic manual on CD-ROM, German, English, French, Italian, Spanish

#### Programming software STEP 7-Micro/WIN32 V3.2 for SP3 and higher

*Target system:*  
All CPUs of the SIMATIC S7-200

*Prerequisite:*  
Windows 95/98/NT/2000/XP on PG or PC with 80486 or Pentium processor

*delivery package:*  
German, English, French, Spanish, Italian; with online documentation

Single license<sup>B)</sup>

**6ES7 810-2CC03-0YX0**

Single license Upgrade<sup>1) B)</sup>

**6ES7 810-2CC03-0YX3**

1) Upgrade for all previous STEP 7-Micro/WIN and STEP 7-Micro/DOS versions

B) Subject to export regulations: AL: N and ECCN: EAR99S

D) Subject to export regulations: AL: N and ECCN: 5D992B1

### Overview



- Connection of SIMATIC S7-200 to Industrial Ethernet with
  - 10/100 Mbit/s
  - Half/full duplex
  - RJ45 socket
  - TCP/IP
- Configuration, remote programming and service is possible with STEP 7-Micro/WIN through Industrial Ethernet (program upload and download, status)
- CPU/CPU communication is possible through Industrial Ethernet (Client + Server, 8 S7 connections + 1 PG connection)
- IT communication
  - Web function
  - E-mail function
  - FTP Client function for program-controlled data exchange (e.g. DOS, UNIX, LINUX, embedded systems)
- FTP server with 8 Mbyte memory
- OPC enables further processing of PLC data in PC applications

### Technical specifications

|   |  |
|---|--|
| Data transmission rate                            | 10/100 Mbit/s autosensing                  |
| Interfaces  |  |
| • 10BaseT, 100BaseTX                              | RJ45                                       |
| • Connection for power supply                     | 24 V DC (± 5%)                             |
| Current consumption                               |  |
| • From backplane bus                              | 55 mA                                      |
| • From external 24 V DC                           | 60 mA                                      |
| Power loss at 24 V DC                             | 1.75 W                                     |
| Perm. environmental conditions                    |  |
| • Operating temperature                           |  |
| - Horizontal mounting                             | 0°C to +55°C                               |
| - Vertical mounting                               | 0°C to +45°C                               |
| • Transport/storage temperature                   | -40 °C to +70 °C                           |
| • Relative humidity                               | Max. 95% at +25 °C                         |
| Design  |  |
| • Dimensions (W x H x D) in mm                    | 71.2 x 80 x 62                             |
| • Weight  | 150 g                                      |
| <b>Performance data</b>                           |  |
| IT communication                                  |  |
| • Number of connections to an e-mail server       | 1  |
| • E-mail client                                   | 32 E-mails with max. 1024 characters       |
| • Number of FTP connections                       | 1  |
| • Number of HTTP connections                      | 4  |
| • Adjustable access enable program                | 8 users                                    |
| • Memory capacity of the Flash Memory file system | 8 MB                                       |
| • Service life of the Flash Memory cells          | 1,000,000 write cycles                     |
| S7 communication/<br>PG communication             |  |
| • Number of usable connections                    | 8 S7 connections + 1 PG connection         |
| Configuration                                     | With STEP 7-Micro/WIN, V3.2 SP3 and higher |

### Ordering Data

### Order No.

**CP 243-1 IT communications processor<sup>D)</sup>** **6GK7 243-1GX00-0XE0**

for connection of SIMATIC S7-200 to Industrial Ethernet; for S7 communication, PG communication E-mail and WWW server; with electronic manual on CD-ROM German, English, French, Italian, Spanish

**Programming software STEP 7-Micro/WIN32 V3.2 for SP3 and higher**

*Target system:*  
All CPUs of the SIMATIC S7-200

*Prerequisite:*  
Windows 95/98/NT/2000/XP on PG or PC with 80486 or Pentium processor

*Delivery package:*  
German, English, French, Spanish, Italian; with online documentation

Single license<sup>B)</sup>

**6ES7 810-2CC03-0YX0**

Single license Upgrade<sup>1) B)</sup>

**6ES7 810-2CC03-0YX3**

1) Upgrade for all previous STEP 7-Micro/WIN and STEP 7-Micro/DOS versions

B) Subject to export regulations: AL: N and ECCN: EAR99S

D) Subject to export regulations: AL: N and ECCN: 5D992B1

# SIMATIC S7-200

## Power supplies

### Power supplies

#### Overview

3



The regulated load power supply for the SIMATIC S7-200.

- Coordinated design and functionality, can be integrated easily into the PLC network.
- For reliably powering the controller, encoders and sensors with 24 V DC, 3.5 A.
- Flexible implementation, either in industry or in the domestic supply system

#### Technical specifications

| Type  | 3.5 A  |
|---|--|
| <b>Order No.</b>  | <b>6EP1 332-1SH31</b>  |
| <b>Input</b>  | Single-phase AC  |
| Rated voltage $V_{in \text{ rated}}$                      | <b>120/230 V AC</b><br>Settable using wire jumper                                  |
| Voltage range   | 93 to 132 V/187 to 264 V AC  |
| Overvoltage strength                                      | $2.3 \times V_{in \text{ rated}}$ , 1.3 ms   |
| Mains buffering $I_{out \text{ rated}}$                   | > 20 ms at $V_{in} = 187 \text{ V}$  |
| Rated line frequency; range                               | 50/60 Hz, 47 to 63 Hz  |
| Rated current $I_{in \text{ rated}}$                      | 1.65/0.95 A  |
| Inrush current limitation (+25 °C)                        | < 33 A, < 3 ms ( $V_{in} = 230 \text{ V}$ )  |
| $I^2t$  | < 1.0 A <sup>2</sup> s   |
| Integrated line-side fuse                                 | T 2.5 A/250 V (not accessible)   |
| Recommended circuit-breaker (EC 898) in mains supply line | Two-pole circuit-breaker from 10 A, Characteristic C or from 6 A, Characteristic D |
| <b>Output</b>   | Stabilized, floating direct voltage  |
| Rated voltage $V_{out \text{ rated}}$                     | <b>24 V DC</b>   |
| Total tolerance   | $\pm 5 \%$ (typ. $\pm 2 \%$ )  |
| •Stat. mains compensation                                 | Approx. $\pm 0.1 \%$   |
| •Stat. load compensation                                  | Approx. $\pm 0.2 \%$   |
| Residual ripple (clock frequency: approx. 50 kHz)         | < 150 mV <sub>pp</sub> (typ. 30 mV <sub>pp</sub> )                                 |
| Spikes (bandwidth: 20 MHz)                                | < 240 mV <sub>pp</sub> (typ. 110 mV <sub>pp</sub> )                                |
| Setting range   | -  |
| Status display  | -  |
| Power ON/OFF behavior                                     | No overshoot of $V_{out}$ (soft start)   |
| Starting delay/voltage rise                               | < 1 s/typ. 80 ms   |
| Rated current $I_{out \text{ rated}}$                     | <b>3.5 A</b>   |
| Current range   |  |
| •Up to +45 °C   | 0 to 3.5 A   |
| •Up to +60 °C   | 0 to 3.5 A   |
| Dyn. V/I with   |  |
| •Starting on short circuit                                | typ. 5 A for 100 ms  |
| •Short-circuit in operation                               | typ. 5 A for 100 ms  |
| Parallel connection for increased output                  | Yes, up to 5   |

| Type  | 3.5 A   |
|---|---|
| <b>Order No.</b>  | <b>6EP1 332-1SH31</b>   |
| <b>Efficiency</b>   |   |
| Efficiency at $V_{out \text{ rated}}$ , $I_{out \text{ rated}}$ | Approx. 84 %  |
| Power loss at $V_{out \text{ rated}}$ , $I_{out \text{ rated}}$ | Approx. 16 W  |
| <b>Control</b>  |   |
| Dyn. mains compensation ( $V_{in \text{ rated}} \pm 15 \%$ )    | $\pm 0.3 \%$ $V_{out}$  |
| Dyn. load compensation ( $I_{out}$ : 50/100/50 %)               | < $\pm 10 \%$ $V_{out}$ (typ. $\pm 3 \%$ $V_{out}$ )  |
| Settling time   |   |
| •Load step from 50 to 100%                                      | < 5 ms  |
| •Load step from 100 to 50%                                      | < 5 ms  |
| <b>Protection and monitoring</b>                                |   |
| Output overvoltage protection                                   |   |
| Current limitation  | 3.8 A   |
| Short-circuit protection  | Stabilized current characteristic to typ. 14 V, electronic shutdown below that, automatic restart |
| RMS sustained short-circuit current                             | < 4 A   |
| Overload/short-circuit indicator                                | -   |
| <b>Safety</b>   |   |
| Galvanic isolation primary/secondary                            | Yes, SELV output voltage $V_{out}$ acc. to EN 60950   |
| Protective class  | Class I   |
| Discharge current   | < 3.5 mA  |
| TÜV test  | Yes   |
| CE-marking  | Yes   |
| UL/cUL (CSA), approval  | Yes, cULus listed (UL 508, CSA 22.2 No. 14-M91), File E143289                                     |
| FM approval   | -   |
| Appr. for use in marine vessels                                 | -   |
| Degree of protection (EN 60529)                                 | IP20  |

#### Technical specifications (Continued)

|  |   |
|--|---|
| <b>Type</b>                                  | <b>3.5 A</b>  |
| <b>Order No.</b>                             | <b>6EP1 332-1SH31</b>   |
| <b>EMC</b>                                   |   |
| Interference emission                        | EN 55022 Class B  |
| Line harmonics limitation                    | EN 61000-3-2  |
| Interference immunity                        | EN 61000-6-2  |
| <b>Operating specifications</b>              |   |
| Ambient temperature range                    | 0 to +60°C with natural convection  |
| Transportation and storage temperature range | -25 to +85 °C   |
| Humidity rating                              | Climatic class 3K3 acc. to EN 60721, no condensation  |
| <b>Mechanical specifications</b>             |   |
| Connections                                  |   |
| •Mains input L, N, PE                        | One screw-type terminal each for 0.5 to 1 mm <sup>2</sup> finely stranded, 0.5 to 1.5 mm <sup>2</sup> single-core |
| •Output L+                                   | 1 screw-type terminal for 0.5 to 1 mm <sup>2</sup>  |
| •Output M                                    | 2 screw-type terminals for 0.5 to 1 mm <sup>2</sup>   |
| Dimensions (W x H x D) in mm                 | 160 x 80 x 62   |
| Weight approx.                               | 0.5 kg  |
| Mounting                                     | Snap-mounting on DIN rail EN 50022-35x15/7.5, wall mounting   |
| <b>Accessories</b>                           | Mounting bracket  |

#### Ordering Data

#### Order No.

|  |                       |
|--|-----------------------|
| <b>Stabilized load power supply SITOP power 3.5 A<sup>A)</sup></b><br>120/230 V AC, 24 V/3.5 A DC  | <b>6EP1 332-1SH31</b> |
| <b>Mounting bracket</b><br>for space-saving installation of power supply on the cabinet rear panel (the power supply is mounted with the side wall on the rear panel of the housing); for switchgear cabinets with a depth of 240 mm or more | <b>6EP1 971-1AA01</b> |

A) Subject to export regulations: AL: N and ECCN: EAR99H

# SIMATIC S7-200

## Human Machine Interface

### TD 200 text display

#### Overview



- The user-friendly text display for the S7-200
- For control and monitoring:  
Message text display, intervention in PLC program, setting of inputs and outputs
- Direct connection to CPU interface using supplied cable or incorporation into network (also via EM 277)
- No separate power supply required
- No separate parameterization software required
- Addressing and setting of contrast in supplied menu

#### Ordering Data

#### Order No.

##### Text Display TD 200

for connecting to SIMATIC S7-200; used with STEP 7 Micro/WIN V3.2 SP4 and higher.

**6ES7 272-0AA30-0YA0**

##### PROFIBUS bus connector IP20 with 90° cable feeder

- without PG connection
- with PG connection

**6ES7 972-0BA12-0XA0**

**6ES7 972-0BB12-0XA0**

##### PROFIBUS bus connector IP20 with 35° cable feeder

- without PG connection
- with PG connection

**6ES7 972-0BA41-0XA0**

**6ES7 972-0BB41-0XA0**

##### PROFIBUS FC Standard Cable

for connecting to PPI; standard type with special design for quick mounting, 2-wire, shielded, sold by the meter, up to 1000 m, minimum order 20 m

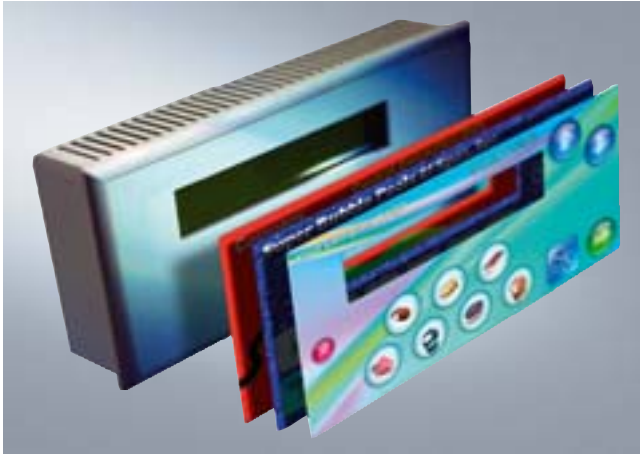
**6XV1 830-0EH10**

#### Technical specifications

| <b>6ES7 272-0AA30-0YA0</b>                   |   |
|--|---|
| <b>Power supply</b>                          |   |
| Input voltage                                | 24 V; Power supplied through the S7-200 communications interface or optional external power supply unit. The CPU sensor power supply (24 V DC) is not brought into load |
| - Rated value (DC)                           |   |
| Input current                                | 120 mA  |
| - Rated value at 24 V DC                     |   |
| <b>MPI</b>                                   |   |
| • Transmission rate (PPI), max.              | 187.5 kBit/s  |
| <b>1st interface</b>                         |   |
| • Physical                                   | RS 485  |
| Functionality                                |   |
| - PPI  | Yes   |
| PPI  |   |
| - Number of stations                         | 126; S7-200, OP, TP, TBP, PG/PC   |
| <b>Operator control and monitoring</b>       |   |
| Display                                      |   |
| - Type                                       | LCD backlit   |
| - Number of lines                            | 2   |
| - Number of characters per line              | 20; Chars/line:<br>ASCII, Cyrillic;<br>10 chars per line:<br>Chinese  |
| - Height of characters                       | 5 mm  |
| <b>Environmental requirements</b>            |   |
| Operating temperature                        |   |
| - min.                                       | 0 °C  |
| - max.                                       | 60 °C   |
| Storage/transportation temperature           |   |
| - min.                                       | -40 °C  |
| - max.                                       | 70 °C   |
| Degree of protection and class of protection |   |
| - IP 65                                      | Yes; frontal  |
| <b>Dimensions and weight</b>                 |   |
| • Weight, approx.                            | 250 g   |
| • Width                                      | 148 mm  |
| • Height                                     | 76 mm   |
| • Depth                                      | 27 mm   |
| • Installation cutout, width                 | 138 mm  |
| • Installation cutout, height                | 68 mm   |
| • Cabinet/control panel thickness            | 0.3 mm; 0.3 to 4 mm   |



### Overview



- The user-friendly text display for the S7-200 with customizable display
- For control and monitoring: Message text display, intervention in PLC program, setting of inputs and outputs
- Direct connection to CPU interface using supplied cable or incorporation into network (also via EM 277)
- No separate power supply required
- No separate parameterization software required
- Frontpanel design can be individually selected
- Addressing and setting of contrast in supplied menu

### Ordering Data

| Ordering Data   | Order No.  |
|---|--|
| <b>Text Display TD 200C<sup>A)</sup></b><br>With individually configurable control elements on the front of the device; for connecting to SIMATIC S7-200; can be used with STEP 7-Micro/WIN V4 and higher | <b>6ES7 272-1AA10-0YA0</b>                               |
| <b>PROFIBUS bus connector IP20 with 90° cable feeder</b><br>•without PG connection<br>•with PG connection   | <b>6ES7 972-0BA12-0XA0</b><br><b>6ES7 972-0BB12-0XA0</b> |
| <b>PROFIBUS bus connector IP20 with 35° cable feeder</b><br>•without PG connection<br>•with PG connection   | <b>6ES7 972-0BA41-0XA0</b><br><b>6ES7 972-0BB41-0XA0</b> |
| <b>PROFIBUS FC Standard Cable</b><br>for connecting to PPI; standard type with special design for quick mounting, 2-wire, shielded, sold by the meter, up to 1000 m, minimum order 20 m                   | <b>6XV1 830-0EH10</b>                                    |

A) Subject to export regulations: AL: N and ECCN: EAR99H

### Technical specifications

| 6ES7 272-1AA10-0YA0                                     |   |
|---|---|
| <b>Power supply</b>                                     |   |
| Input voltage<br>- Rated value (DC)                     | 24 V; Power supplied through the S7-200 communications interface or optional external power supply unit. The CPU sensor power supply (24 V DC) is not brought into load |
| Input current<br>- Rated value at 24 V DC               | 120 mA  |
| <b>MPI</b>  |   |
| •Transmission rate (PPI), max.                          | 187.5 kBit/s  |
| <b>1st interface</b>                                    |   |
| •Physical   | RS 485  |
| Functionality<br>- PPI                                  | Yes   |
| PPI<br>- Number of stations                             | 126; S7-200, OP, TP, TBP, PG/PC   |
| <b>Operator control and monitoring</b>                  |   |
| Display<br>- Type                                       | STN graphics display, LED backlighting  |
| - Number of lines                                       | 2   |
| - Number of characters per line                         | 20; Chars/line: ASCII, Cyrillic; 10 chars per line: Chinese   |
| - Height of characters                                  | 5 mm  |
| <b>Environmental requirements</b>                       |   |
| Operating temperature<br>- min.                         | 0 °C  |
| - max.  | 60 °C   |
| Storage/transportation temperature<br>- min.            | -20 °C  |
| - max.  | 70 °C   |
| Degree of protection and class of protection<br>- IP 65 | Yes; frontal  |
| <b>Dimensions and weight</b>                            |   |
| •Weight, approx.  | 200 g   |
| •Width  | 148 mm  |
| •Height   | 76 mm   |
| •Depth  | 28 mm   |
| •Installation cutout, width                             | 138 mm  |
| •Installation cutout, height                            | 68 mm   |
| •Cabinet/control panel thickness                        | 0.3 mm; 0.3 to 4 mm   |

# SIMATIC S7-200

## Human Machine Interface

### SIMATIC TP 177micro

#### Overview

3



- Touch panel for operator control and monitoring of small machines and plants
- Low-cost starter unit in the category of touch panels with graphics capability complete with all the basic functions required for simple tasks
- Pixel graphics 5.7" STN Touch Screen (analog/resistive), Blue-mode (4 levels)
- Specifically for SIMATIC S7-200:  
Communication to the PLC is performed via the integrated interface over a point-to-point connection
- Connected to the PLC via MPI or PROFIBUS DP cable
- The SIMATIC TP 177micro is the innovative successor to the SIMATIC TP 070/TP 170micro Touch Panels
- Ships end of 4th quarter 2004

#### Configuration

Configuring is carried out with the engineering software SIMATIC WinCC flexible Micro, Compact, Standard or Advanced (see HMI software/engineering software SIMATIC WinCC flexible).

The necessary HardwareSupportPackage (HSP) can be downloaded free of charge via the following link:

<http://www4.ad.siemens.de/WWW/view/en/19241467>

Importing of TP-Designer projects (TP 070) into WinCC flexible is not possible.

A PC/PPI adaptor cable is needed to download the configuration.

#### Technical specifications

| Type   | TP 177micro   |
|--|---|
| <b>Display</b>   | STN liquid crystal display (LCD)                    |
| •Size  | 5.7"  |
| •Resolution (W x H in pixels)                                      | 320 x 240 (240 x 320 with vertical design)          |
| •Colors  | 4 blue levels                                       |
| •MTBF backlighting (at 25 °C)                                      | Approx. 50,000 hours                                |
| <b>Control elements</b>  | Touch screen  |
| •Numeric/alphanumeric input  | Yes / Yes <sup>1)</sup>                             |
| <b>Processor</b>   | ARM CPU   |
| <b>Memory</b>  |   |
| •Type  | Flash / RAM   |
| •Usable memory for user data                                       | 256 KB  |
| <b>Ports</b>   | 1 x RS 485  |
| <b>Interface with PLC</b>  | S7-200  |
| <b>Power supply</b>  | 24 V DC   |
| •Permitted range   | +18 V to +30 V DC                                   |
| •Nominal current   | 0.24 A  |
| <b>Clock</b>   | Software clock, without battery backup              |
| <b>Degree of protection</b>  |   |
| •Front   | IP65 (in installed state), NEMA 4, NEMA 4x, NEMA 12 |
| •Rear  | IP20  |
| <b>Certification</b>   | Available soon: FM, cULus, CE, C-Tick               |
| <b>Dimensions</b>  |   |
| •Front W x H (mm)  | 212 x 156   |
| •Cut-out W x H (mm)  | 198 x 142   |
| <b>Weight</b>  | 0.7 kg  |
| <b>Ambient conditions</b>  |   |
| •Mounting position   | Vertical <sup>2)</sup>                              |
| - Max. permissible angle of inclination without forced ventilation |   |
| •Temperature   |   |
| - Operation (vertical installation)                                | 0 °C to +50 °C <sup>2)</sup>                        |
| - Operation (max. inclination)                                     | <sup>2)</sup>                                       |
| - Transport, storage   | -20 °C to +60 °C <sup>2)</sup>                      |
| •Max. relative humidity  | <sup>2)</sup>                                       |

1) English font only can be displayed

2) Status not yet established before going to print

3) Not battery-backed

#### Note:

All specified values are maximum values.  
The total number of configurable elements is limited by the size of the user memory.

| Type                                       | TP 177micro   |
|--|---|
| <b>Functions</b>                           |   |
| Message system                             |   |
| •No. of messages                           | 500   |
| •Bit messages                              | Yes   |
| •Analog messages                           | No  |
| •No. of process values per message         | 8   |
| •Message buffer                            | Circulating buffer, 128 entries each <sup>3)</sup>  |
| Process diagrams                           | 250   |
| •Text objects                              | 500 text elements   |
| •Variables per diagram                     | 20  |
| •Entries per diagram                       | 20  |
| •Graphics objects                          | Bitmaps, icons, background images   |
| •Dynamic objects                           | Bars  |
| - Directories                              | Yes   |
| Variables                                  | 250   |
| User administration (security)             | Yes   |
| Online languages                           | 5   |
| •Project languages (incl. system messages) | Danish, German, traditional Chinese, simplified Chinese, English, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Norwegian, Polish, Portuguese, Russian, Swedish, Spanish, Czech, Turkish, Hungarian |
| Character set                              | WinCC flexible, ideographic languages   |
| <b>Configuration tool</b>                  | From WinCC flexible 2004 Micro HSP for OP 73micro, OP 73, OP 77A, TP 177micro, TP 177A (to be ordered separately)   |
| •Configuration transfer                    | Serial via RS 485   |

# SIMATIC S7-200

## Human Machine Interface

### SIMATIC TP 177micro

3

| Ordering Data   | Order No.  |
|---|--|
| <b>SIMATIC TP 177micro</b> <sup>E)</sup><br>Touch Panel for connection to the SIMATIC S7-200, 5.7" STN display  | <b>6AV6 640-0CA11-0AX0</b>   |
| <b>Starter pack TP 177micro</b> <sup>E)</sup><br>comprising: <ul style="list-style-type: none"> <li>• TP 177micro touch panel</li> <li>• SIMATIC WinCC flexible Micro engineering software</li> <li>• SIMATIC HMI Manual Collection, 5 languages (English, German, French, Italian, Spanish) comprising all currently available user manuals, product manuals and communication manuals for SIMATIC HMI</li> <li>• MPI cable (5 m)</li> </ul> | <b>6AV6 650-0DA01-0AA0</b>   |
| <b>Configuration</b><br>with SIMATIC WinCC flexible HSP OP 73micro, OP 73, OP 77A, TP 177micro, TP 177A:<br><a href="http://www4.ad.siemens.de/WWW/view/en/19241467">http://www4.ad.siemens.de/WWW/view/en/19241467</a>   | see catalog ST 80  |
| <b>Documentation (to be ordered separately)</b><br><b>Instruction manual</b><br><b>OP 73micro, TP 177micro</b> <ul style="list-style-type: none"> <li>• German</li> <li>• English</li> <li>• French</li> <li>• Italian</li> <li>• Spanish</li> </ul>  | <b>6AV6 691-1DF01-0AA0</b><br><b>6AV6 691-1DF01-0AB0</b><br><b>6AV6 691-1DF01-0AC0</b><br><b>6AV6 691-1DF01-0AD0</b><br><b>6AV6 691-1DF01-0AE0</b> |
| <b>User manual</b><br><b>WinCC flexible Micro</b> <ul style="list-style-type: none"> <li>• German</li> <li>• English</li> <li>• French</li> <li>• Italian</li> <li>• Spanish</li> </ul>   | <b>6AV6 691-1AA01-0AA0</b><br><b>6AV6 691-1AA01-0AB0</b><br><b>6AV6 691-1AA01-0AC0</b><br><b>6AV6 691-1AA01-0AD0</b><br><b>6AV6 691-1AA01-0AE0</b> |
| <b>SIMATIC HMI Manual Collection</b><br>Electronic documentation, on CD-ROM<br>5 languages (English, French, German, Italian and Spanish) comprising all currently available user manuals, product manuals and communication manuals for SIMATIC HMI  | <b>6AV6 691-1SA01-0AX0</b>   |

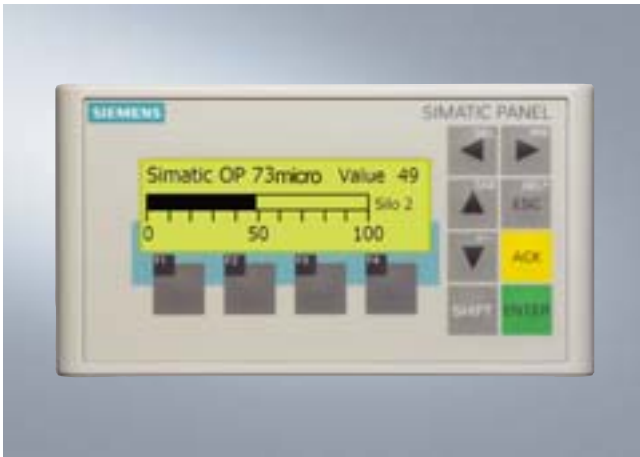
| Ordering Data  | Order No.                  |
|--|----------------------------|
| <b>Accessories for supplementary ordering</b>  |                            |
| <b>Protective foil</b><br>(pack of 10)   | <b>6AV6 671-2XC00-0AX0</b> |
| <b>Service package</b><br>comprising: <ul style="list-style-type: none"> <li>• Gaskets</li> <li>• Clamp-type terminals</li> <li>• Plug-in terminal strip (block of two)</li> </ul> | <b>6AV6 671-2XA00-4AX0</b> |
| <b>PC/PPI cable Multimaster</b> <sup>1) A)</sup><br>for connecting the S7-200 to serial PC/OP interface and for downloading the configuration for Micro Panels                     | <b>6ES7 901-3CB30-0XA0</b> |
| <b>PROFIBUS 830-1T connecting cable</b><br>For connection of data terminal, precut/preassembled with two sub D connectors, 9-pin, 3 m  | <b>6XV1 830-1CH30</b>      |
| <b>System interfaces</b>   | see catalog ST 80          |
| <b>Connecting cables</b>   | see catalog ST 80          |

1) The PC/PPI cable with Order No. 6ES7 901-3BF21-0XA0 can also still be used

A) Subject to export regulations AL: N and ECCN: EAR99H

E) Subject to export regulations AL: N and ECCN: 5D002ENC3A

### Overview



- Operator panel for operator control and monitoring of small machines and plants
- A new dimension in graphics: small and clever
- Pixel graphics 3" LCD, monochrome
- 8 system keys, 4 freely configurable function keys
- Specifically for SIMATIC S7-200:  
Communication with the controller is point-to-point using the integral interface
- Connected to the PLC via MPI or PROFIBUS DP cable
- Start of delivery approximately end of 4th quarter 2004

### Technical specifications

| Type                                   | OP 73micro  |
|--|---|
| <b>Display</b>                         | LCD   |
| •Size                                  | 3"  |
| •Resolution (W x H in pixels)          | 160 x 48  |
| •Colors                                | Monochrome (yellow-green)                         |
| •MTBF of background lighting (at 25°C) | Approx. 100,000 hours                             |
| <b>Control elements</b>                | Membrane keyboard                                 |
| •Function keys, programmable           | 4 function keys                                   |
| •System keys                           | 8   |
| •Numeric/alphanumeric input            | Yes/yes <sup>1)</sup>                             |
| <b>Processor</b>                       | ARM CPU   |
| <b>Memory</b>                          |   |
| •Type                                  | Flash   |
| •Usable memory for user data           | 128 KB  |
| <b>Ports</b>                           | 1 x RS 485  |
| <b>Interface with PLC</b>              | S7-200  |
| <b>Power supply</b>                    | 24 V DC   |
| •Permitted range                       | +18 to +30 V DC                                   |
| •Nominal current                       | 0.1 A   |
| <b>Clock</b>                           | Software clock, without battery backup            |
| <b>Degree of protection</b>            |   |
| •Front                                 | IP65 (in installed state) NEMA 12, NEMA 4x, NEMA4 |
| •Rear                                  | IP20  |
| <b>Certification</b>                   | Available soon: FM, cULus, CE, C-Tick             |
| <b>Dimensions</b>                      |   |
| •Front W x H (mm)                      | 154 x 84  |
| •Cut-out W x H (mm)                    | 138 x 68  |
| <b>Weight</b>                          | 0.3 kg  |

1) English font only can be displayed

2) Status not yet established before going to print

3) Not battery-backed

Note:

All specified values are maximum values.

The total number of configurable elements is limited by the size of the user memory.

| Type   | OP 73micro  |
|--|---|
| <b>Ambient conditions</b>  |   |
| •Mounting position   | Vertical <sup>2)</sup>  |
| - max. permissible angle of inclination without forced ventilation |   |
| •Temperature   |   |
| - Operation (vertical installation)                                | 0 °C to +50 °C  |
| - Operation (max. inclination)                                     | <sup>2)</sup>   |
| - Transport, storage   | -20 °C to +70 °C  |
| •Max. relative humidity  | <sup>2)</sup>   |
| <b>Functions</b>   |   |
| Message system   |   |
| •No. of messages   | 250   |
| •Bit messages  | Yes   |
| •Number of process values per message                              | 8   |
| •Message buffer  | Circulating buffer, 128 entries each <sup>3)</sup>  |
| Process diagrams   | 250   |
| •Text objects  | 1000 text elements  |
| •Variables per diagram   | 20  |
| •Fields per diagram  | 20  |
| •Graphics objects  | 250   |
| •Dynamic objects   | Bars  |
| - Directories  | Yes   |
| Variables  | 500   |
| User administration (security)                                     | Yes   |
| Online languages   | 5   |
| Project languages (incl. system messages)                          | Danish, German, traditional Chinese, simplified Chinese, English, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Norwegian, Polish, Portuguese, Russian, Swedish, Spanish, Czech, Turkish, Hungarian |
| Character set  | WinCC flexible, ideographic languages   |
| Help system  | Yes   |
| Task planner   | Yes   |
| <b>Configuration tool</b>  | From WinCC flexible 2004 Micro HSP for OP 73micro, OP 73, OP 77A, TP 177micro, TP 177A (to be ordered separately)   |
| •Transfer of the configuration                                     | Serially via RS485  |

# SIMATIC S7-200

## Human Machine Interface

### SIMATIC OP 73micro

3

| Ordering Data   | Order No.                  |
|---|----------------------------|
| <b>SIMATIC OP 73micro</b> <sup>E)</sup><br>Operator Panel for connecting to the SIMATIC S7-200, with 3" display, mono incl. installation accessories  | <b>6AV6 640-0BA11-0AX0</b> |
| <b>Starter pack OP 73micro</b> <sup>E)</sup><br>comprising: <ul style="list-style-type: none"> <li>• Operator Panel OP 73micro</li> <li>• SIMATIC WinCC flexible Micro engineering software</li> <li>• SIMATIC HMI Manual Collection, 5 languages (English, German, French, Italian, Spanish), comprising all currently available user manuals, product manuals and communication manuals for SIMATIC HMI</li> <li>• MPI cable (5 m)</li> </ul> | <b>6AV6 650-0BA01-0AA0</b> |
| <b>Configuration</b><br>with SIMATIC WinCC flexible<br>HSP OP 73micro, OP 73, OP 77A, TP 177micro, TP 177A:<br><a href="http://www4.ad.siemens.de/WW/view/en/19241467">http://www4.ad.siemens.de/WW/view/en/19241467</a>  | see catalog ST 80          |
| <b>Documentation (to be ordered separately)</b><br><b>Instruction manual OP 73micro/TP 177micro</b> <sup>1)</sup> <ul style="list-style-type: none"> <li>• German <b>6AV6 691-1DF01-0AA0</b></li> <li>• English <b>6AV6 691-1DF01-0AB0</b></li> <li>• French <b>6AV6 691-1DF01-0AC0</b></li> <li>• Italian <b>6AV6 691-1DF01-0AD0</b></li> <li>• Spanish <b>6AV6 691-1DF01-0AE0</b></li> </ul>  |                            |
| <b>User manual WinCC flexible Micro</b> <ul style="list-style-type: none"> <li>• German <b>6AV6 691-1AA01-0AA0</b></li> <li>• English <b>6AV6 691-1AA01-0AB0</b></li> <li>• French <b>6AV6 691-1AA01-0AC0</b></li> <li>• Italian <b>6AV6 691-1AA01-0AD0</b></li> <li>• Spanish <b>6AV6 691-1AA01-0AE0</b></li> </ul>  |                            |
| <b>SIMATIC HMI Manual Collection</b><br>Electronic documentation, on CD-ROM<br>5 languages (English, French, German, Italian and Spanish);<br>Comprising: all currently available user manuals, product manuals and communication manuals for SIMATIC HMI   | <b>6AV6 691-1SA01-0AX0</b> |

| Ordering Data  | Order No.                  |
|--|----------------------------|
| <b>Accessories for supplementary ordering</b><br><b>Service package</b><br>comprising: <ul style="list-style-type: none"> <li>• Gaskets</li> <li>• 5 clamps</li> <li>• Clamp-type terminal strip (block of two)</li> </ul> | <b>6AV6 671-1XA00-0AX0</b> |
| <b>PC/PPI Multimaster cable</b> <sup>1) A)</sup><br>For connecting the S7-200 to serial PC/OP interface and for downloading the configuration for Micro Panels   | <b>6ES7 901-3CB30-0XA0</b> |
| <b>PROFIBUS 830-1T connecting cable</b><br>For connection of data terminal, precut/preassembled with two sub D connectors, 9-pin, terminated at both ends, 3 m   | <b>6XV1 830-1CH30</b>      |
| <b>System interfaces</b>   | see catalog ST 80          |
| <b>Connecting cables</b>   | see catalog ST 80          |

1) The PC/PPI cable with Order No. 6ES7 901-3BF21-0XA0 can also still be used

A) Subject to export regulations AL: N and ECCN: EAR99H

E) Subject to export regulations AL: N and ECCN: 5D002ENC3A

### Overview

- Software for the SIMATIC S7-200
- Functions for all phases of an automation project:
  - Planning, configuring and parameterization of hardware and communication
  - Creation of a user program
  - Documentation
  - Testing, commissioning and service
  - Process control
  - Archiving

The following are available:

- STEP 7- Micro/WIN
- STEP 7 Micro/WIN command library
- WinCC flexible micro
- S7-200 PC-Access

For further information see section 7.

