# 3

# SIMATIC S7-200

**3**

## S7-200

### ■ Overview



### *SIMATIC S7-200*

- The micro PLC offers maximu m 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 auto-mation tasks
- All CPUs can be used in stan dalone 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 com-munication 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 hars hest environmental conditions
- With extended temperature range from -25 to +70℃
- Suitable for extraordinary medi al load (pollution gas atmos-phere)
- Occasional short-term conden sation and increased mechani-cal loading permissible
- With the proven PLC te chnology of the S7-200
- Convenient handling, programmi ng, maintenance and service
- Ideal for use in the automotive industry, environmental techno-logy, mining, chemical plants, production technology, food in-dustry etc.
- The alternative to expe nsive custom solutions

More Information you can find at:

*http://www.siemens.com/siplus*

**3**

## ◼ Technical specifications

### General Technical specifications SIMATIC S7-200

| | |
|---|---|
| Degree of protection | IP20 in accordance with IEC 529 |
| Ambient temperature | |
| •Operation (95% relative humidity) | |
| - With horizontal mounting | 0 to 55°C |
| - With vertical mounting | 0 to 45 °C |
| •Transport and storageGeneral | -40 to +70 °C |
| - with 95% relative humidity | 25 to 55 °C |
| 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

| **Ambient temperature** | |
|---|---|
| Temperature | Horizontal mounting: -25 °C to 70 °C 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 IEC 721 3-3 Cl. 3K5 |
| Atmospheric pressure | 1080 to 795 hPa corresponding to a height of -1000 to 2000 m |
| Pollutant concentration | SO2: < 0,5 ppm; relative humidity <60% Test: 10 ppm, 4 days |
| | H2S: < 0,1 ppm; relative humidity <60% Test: 1 ppm, 4 days (according to IEC 721 3-3; Class 3C3) |
| **Mechanical environmental conditions** | |
| Vibrations | Type of vibration: frequency progressions changing at 1 octave per minute. 2 Hz ≤ f ≤ 9 Hz, constant amplitude 3,0 mm 9 Hz ≤ f ≤ 150 Hz, constant acceleration 1 g; Duration of vibration: 10 frequency progressions per axis in each direction of the three mutually perpendicular axes; 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 Shock testing according to IEC 68 section 2-27 |
| Conformity | EN 50155 (railroad applications - electronic device on rail vehicles) |

**CPU 221, 222, 224, 224 XP, 226**

■**Overview**

**3**



• 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
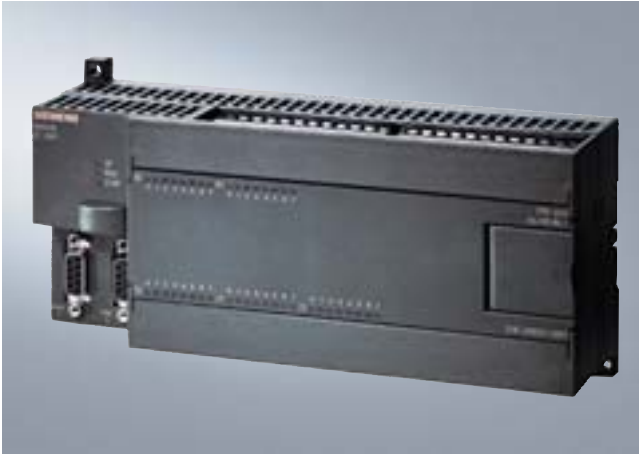


• The superior compact solution
• With 14 inputs/outputs on board
• Expandable with up to 2 expansion modules



• 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 |
|---|---|---|---|---|
| **Supply voltages** | | | | |
| 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 |
| **Voltages and currents** | | | | |
| 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 |
| **Current consumption** | | | | |
| • 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 |

**CPU 221, 222, 224, 224 XP, 226**

**3**

■ **Technical specifications** (continued)

| | 6ES7 211-0AA23-0XB0 | 6ES7 211-0BA23-0XB0 | 6ES7 212-1AB23-0XB0 | 6ES7 212-1BB23-0XB0 |
|---|---|---|---|---|
| back-up battery | | | | |
| - Backup time | 50 h; (min. 8 h at 40 ℃); 200 days (typ.) with optional battery module | 50 h; (min. 8 h at 40 ℃); 200 days (typ.) with optional battery module | 50 h; (min. 8 h at 40 ℃); 200 days (typ.) with optional battery module | 50 h; (min. 8 h at 40 ℃); 200 days (typ.) with optional battery module |
| **Memory/backup** | | | | |
| 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. |
| •Data memory and program memory | | | | |
| - Data memory, max. | 2 KByte | 2 KByte | 2 KByte | 2 KByte |
| - Program memory, max. | 4 KByte | 4 KByte | 4 KByte | 4 KByte |
| 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 |
| **CPU/processing times** | | | | |
| •for bit instruction, max. | 0,22 µs | 0,22 µs | 0,22 µs | 0,22 µs |
| **Timers/counters and their retentive characteristics** | | | | |
| S7 counter | | | | |
| - Number | 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 |
| - lower limit | 1 | 1 | 1 | 1 |
| - upper limit | 256 | 256 | 256 | 256 |
| •Counting range | | | | |
| - lower limit | 0 | 0 | 0 | 0 |
| - upper limit | 32.767 | 32.767 | 32.767 | 32.767 |
| S7 times | | | | |
| - Number | 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 |
| - upper limit | 64 | 64 | 64 | 64 |
| •Timing range | | | | |
| - lower limit | 1 ms | 1 ms | 1 ms | 1 ms |
| - upper limit | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min |

■ **Technical specifications** (continued)

| | 6ES7 211-0AA23-0XB0 | 6ES7 211-0BA23-0XB0 | 6ES7 212-1AB23-0XB0 | 6ES7 212-1BB23-0XB0 |
|---|---|---|---|---|
| **Data areas and their retentive characteristics** | | | | |
| 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 |
| **Configuration** | | | | |
| •Connectable programming devices/PCs | SIMATIC PG/PC, Standard PC | SIMATIC PG/PC, Standard PC | SIMATIC PG/PC, Standard PC | SIMATIC PG/PC, S tandard 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.) |
| I/O expansions | | | | |
| - 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) |
| **Connection system** | | | | |
| •Pluggable I/O terminals | No | No | No | No |
| **1st interface** | | | | |
| •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-CPUs, 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-CPUs, 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-CPUs, 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-CPUs, 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 ptotocol 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 ptotocol 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 ptotocol 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 ptotocol 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 |

■ **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 |
| **CPU/ programming** | | | | |
| 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 |
| **Digital inputs** | | | | |
| •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 |
|---|---|---|---|---|
| **Digital outputs** | | | | |
| •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) 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) 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) 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) 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 |
| **Relay outputs** | | | | |
| •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 |
| **Analog inputs** | | | | |
| •Number of analog potentiometers | 1; Analog potentiometer; resolution 8 bits | 1; Analog potentiometer; resolution 8 bits | 1; Analog potentiometer; resolution 8 bits | 1; Analog potentiometer; resolution 8 bits |
| **Sensor supply** | | | | |
| 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 |
| - 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 |
| **Sensor** | | | | |
| Connectable encoders | | | | |
| - 2-wire BEROS | Yes | Yes | Yes | Yes |
| - permissible closed-circuit current (2-wire BEROS), max. | 1 mA | 1 mA | 1 mA | 1 mA |

**3**

■ **Technical specifications** (continued)

| | 6ES7 211-0AA23-0XB0 | 6ES7 211-0BA23-0XB0 | 6ES7 212-1AB23-0XB0 | 6ES7 212-1BB23-0XB0 |
|---|---|---|---|---|
| **Integral functions** | | | | |
| •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 |
| **Potentials/ electrical isolation** | | | | |
| 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 |
| **Permissible potential difference** | | | | |
| •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 |
| **Environmental requirements** | | | | |
| •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 ℃ | 0 ℃ | 0 ℃ | 0 ℃ |
| - vertical mounting, max. | 45 ℃ | 45 ℃ | 45 ℃ | 45 ℃ |
| - horizontal mounting, min. | 0 ℃ | 0 ℃ | 0 ℃ | 0 ℃ |
| - horizontal mounting, max. | 55 ℃ | 55 ℃ | 55 ℃ | 55 ℃ |
| 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 |
| **Dimensions and weight** | | | | |
| •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 |
|---|---|---|---|---|---|---|
| **Supply voltages** | | | | | | |
| 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 |
| **Voltages and currents** | | | | | | |
| 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 |
| **Current consumption** | | | | | | |
| ● 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 |
| back-up battery | | | | | | |
| - Backup time | 100 h; (min. 70 h at 40 ℃); 200 days (typ.) with optional battery module | 100 h; (min. 70 h at 40 ℃); 200 days (typ.) with optional battery module | 100 h; (min. 70 h at 40 ℃); 200 days (typ.) with optional battery module | 100 h; (min. 70 h at 40 ℃); 200 days (typ.) with optional battery module | 100 h; (min. 70 h at 40 ℃); 200 days (typ.) with optional battery module | 100 h; (min. 70 h at 40 ℃); 200 days (typ.) with optional battery module |

**3**

■ **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 |
|---|---|---|---|---|---|---|
| **Memory/backup** | | | | | | |
| 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; 8 Kbytes for active run-time edit | 12 KByte; 8 Kbytes for active run-time edit | 16 KByte; 12 Kbytes for active run-time edit | 16 KByte; 12 Kbytes for active run-time edit | 24 KByte; 16 Kbytes with active run-time edit | 24 KByte; 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 |
| **CPU/processing times** | | | | | | |
| • for bit instruction, max. | 0.22 μs | 0.22 μs | 0.22 μs | 0.22 μs | 0.22 μs | 0.22 μs |
| **Timers/counters and their retentive characteristics** | | | | | | |
| 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 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min | 54 min; 4 times, 1 ms to 30 s 16 times, 10 ms to 5 min 236 times, 100 ms to 54 min |
| **Data areas and their retentive characteristics** | | | | | | |
| 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 |
| **Configuration** | | | | | | |
| • 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) |

**3**

**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 |
|---|---|---|---|---|---|---|
| **Connection system** | | | | | | |
| •Pluggable I/O terminals | Yes | Yes | Yes | Yes | Yes | Yes |
| **1st interface** | | | | | | |
| •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 |
| Functionality | | | | | | |
| - MPI | Yes; as MPI Slave for data exchange with MPI Masters (S7-300/S7-400-CPUs, 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-CPUs, 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-CPUs, 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-CPUs, 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-CPUs, 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-CPUs, 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 ptotocol 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 ptotocol 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 ptotocol 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 ptotocol 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 ptotocol 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 ptotocol 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 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 |
|---|---|---|---|---|---|---|
| **2nd interface** | | | | | | |
| • 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-CPUs, 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-CPUs, 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-CPUs, 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-CPUs, 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 ptotocol 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 ptotocol 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 ptotocol 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 ptotocol 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 |

# Central processing units

**3**

■ **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 |
|---|---|---|---|---|---|---|
| **CPU/ programming** | | | | | | |
| 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 |
| **Digital inputs** | | | | | | |
| •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 |
| **Digital outputs** | | | | | | |
| •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 ℃, max. | 6 A | 10 A | 3.75 A | 10 A | 6 A | 10 A |
| - horizontal installation, up to 55 ℃, max. | 6 A | 10 A | 3.75 A | 10 A | 6 A | 10 A |

**3**

**■ 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 |
|---|---|---|---|---|---|---|
| **Relay outputs** | | | | | | |
| •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 |
| **Analog inputs** | | | | | | |
| •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 |
| **Sensor supply** | | | | | | |
| 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 |
| **Sensor** | | | | | | |
| 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 |
| **Integral functions** | | | | | | |
| •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 subprogram 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 subprogram 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 subprogram 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 subprogram 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 subprogram 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 subprogram 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 |
|---|---|---|---|---|---|---|
| **Potentials/ electrical isolation** | | | | | | |
| Digital output functions | | | | | | |
| - between the channels | Yes; Optocoupler | Yes; Relay | Yes; Optocoupler | Yes; Relay | Yes; 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; 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 |
| **Permissible potential difference** | | | | | | |
| •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 |
| **Environmental requirements** | | | | | | |
| •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 %; 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 | 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 | Yes | Yes |
| **Dimensions and weight** | | | | | | |
| •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 |

**3**

## CPU 221, 222, 224, 224 XP, 226

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

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. |
|---|---|---|---|
| **Backplane bus expansion cable** A) | **6ES7 290-6AA20-0XA0** | **STEP 7 Micro/WIN V4 programming software** | |
| for connecting the two equipment tiers in a two-tier configuration, for CUP 222/224/224 XP/226 | | *Target system:* All CPUs of the SIMATIC S7-200 range | |
| **Optional battery module** A) | **6ES7 291-8BA20-0XA0** | *Requirements:* Windows 2000/XP on PG or PC | |
| **Optional combined clock and battery module** A) | **6ES7 297-1AA23-0XA0** | *delivery type:* English, German, French, Spanish, Italian, Chinese; with online documentation | |
| for CPU 221/222 only | | | |
| **S7-200 programmable controller, system manual** | | Single license B) | **6ES7 810-2CC03-0YX0** |
| for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4 | | Upgrade single license 1) B) | **6ES7 810-2CC03-0YX3** |
| German | **6ES7 298-8FA24-8AH0** | **PROFIBUS bus connector IP20 with 90° cable feeder** | |
| English | **6ES7 298-8FA24-8BH0** | •without PG connection | **6ES7 972-0BA12-0XA0** |
| French | **6ES7 298-8FA24-8CH0** | •with PG connection | **6ES7 972-0BB12-0XA0** |
| Spanish | **6ES7 298-8FA24-8DH0** | **PROFIBUS bus connector IP20 with 35° cable feeder** | |
| Italian | **6ES7 298-8FA24-8EH0** | •without PG connection | **6ES7 972-0BA41-0XA0** |
| Chinese | **6ES7 298-8FA24-8FH0** | •with PG connection | **6ES7 972-0BB41-0XA0** |
| **SIMATIC Manual Collection** B) | **6ES7 998-8XC01-8YE0** | **PROFIBUS FC Standard Cable** | **6XV1 830-0EH10** |
| 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 | | 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 | |
| **SIMATIC Manual Collection update service for 1 year** B) | **6ES7 998-8XC01-8YE2** | **Repeater RS 485 for PROFIBUS** | **6ES7 972-0AA01-0XA0** |
| Up-to-date Manual Collection CD as well as the three subsequent updates | | | |

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

**SIPLUS central processing units**

■ **Overview**

- The SIPLUS S7-200 CPUs for us e in the harshest environmen-tal conditions
- With extended temperature  range from -25 to +70℃
- Suitable for extraordinary medi al load (pollution gas atmos-phere)
- Occasional short-term conden sation and increased mechani-cal loading permissible
- With the proven PLC te chnology of the S7-200
- Convenient handling, programmi ng, maintenance and service
- The alternative to expe nsive custom solutions

More Information you can find at:

*http://www.siemens.com/siplus*

## Overview



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

## Technical specifications EM 221

| | 6ES7 221-1BH22-0XA0 | 6ES7 221-1BF22-0XA0 | 6ES7 221-1EF22-0XA0 |
|---|---|---|---|
| **Current consumption** | | | |
| •from backplane bus 5 V DC, max. | 70 mA | 30 mA | 30 mA |
| •Power dissipation, typical | 3 W | 2 W | 3 W |
| **Connection system** | | | |
| •Pluggable I/O terminals | Yes | Yes | Yes |
| **Digital inputs** | | | |
| •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 |
| **Sensor** | | | |
| Connectable encoders | | | |
| - 2-wire BEROS | Yes | Yes | Yes |
| - permissible closed-circuit current (2-wire BEROS), max. | 1 mA | 1 mA | 1 mA |
| **Potentials/ electrical isolation** | | | |
| 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) |
| **Dimensions and weight** | | | |
| •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 |

**Digital modules**

**3**

■ **Technical specifications EM 222**

| | 6ES7 222-1BD22-0XA0 | 6ES7 222-1BF22-0XA0 |
|---|---|---|
| **Voltages and currents** | | |
| 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 |
| **Current consumption** | | |
| Digital outputs | | |
| •from backplane bus 5 V DC, max. | 40 mA | 50 mA |
| •Power dissipation, typical | 3 W | 2 W |
| **Connection system** | | |
| •Pluggable I/O terminals | Yes | Yes |
| **Digital outputs** | | |
| •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 |
| **Relay outputs** | | |
| 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 |
| **Potentials/ electrical isolation** | | |
| Digital output functions | | |
| - Electrical isolation, digital output functions | Yes; Optocoupler | Yes; Optocoupler |
| - between the channels, in groups of | 1; 4 groups | 4 |
| **Dimensions and weight** | | |
| •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 |
|---|---|---|---|
| **Voltages and currents** | | | |
| 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 |
| **Current consumption** | | | |
| 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 |
| **Connection system** | | | |
| • Pluggable I/O terminals | Yes | Yes | Yes |
| **Digital outputs** | | | |
| • 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 |
| **Relay outputs** | | | |
| • 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 |

**3**

**Digital modules**

■ **Technical specifications** (continued)

| | 6ES7 222-1HD22-0XA0 | 6ES7 222-1HF22-0XA0 | 6ES7 222-1EF22-0XA0 |
|---|---|---|---|
| **Potentials/ electrical isolation** | | | |
| 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 |
| **Dimensions and weight** | | | |
| •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 |
|---|---|---|---|
| **Voltages and currents** | | | |
| 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 |
| **Current consumption** | | | |
| •from backplane bus 5 V DC, max. | 40 mA | 80 mA | 160 mA |
| •Power dissipation, typical | 2 W | 3 W | 6 W |
| **Connection system** | | | |
| •Pluggable I/O terminals | Yes | Yes | Yes |
| **Digital inputs** | | | |
| •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 |
| **Digital outputs** | | | |
| •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 |
|---|---|---|---|
| **Relay outputs** | | | |
| 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 |
| **Sensor** | | | |
| Connectable encoders | | | |
|   - 2-wire BEROS | Yes | Yes | Yes |
|   - permissible closed-circuit current (2-wire BEROS), max. | 1 mA | 1 mA | 1 mA |
| **Insulation** | | | |
| • Insulation tested with | 500 V AC | 500 V AC | 500 V AC |
| **Potentials/ electrical isolation** | | | |
| 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 |
| **Dimensions and weight** | | | |
| • 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 |

| | 6ES7 223-1HF22-0XA0 | 6ES7 223-1PH22-0XA0 | 6ES7 223-1PL22-0XA0 |
|---|---|---|---|
| **Voltages and currents** | | | |
| 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 |
| **Current consumption** | | | |
| • 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 |
| **Connection system** | | | |
| • Pluggable I/O terminals | Yes | Yes | Yes |

**Digital modules**

**3**

■ **Technical specifications** (continued)

| | 6ES7 223-1HF22-0XA0 | 6ES7 223-1PH22-0XA0 | 6ES7 223-1PL22-0XA0 |
|---|---|---|---|
| **Digital inputs** | | | |
| •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 |
| **Digital outputs** | | | |
| •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 |
| **Relay outputs** | | | |
| •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 |
| 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 |
| **Sensor** | | | |
| Connectable encoders | | | |
| - 2-wire BEROS | Yes | Yes | Yes |
| - permissible closed-circuit current (2-wire BEROS), max. | 1 mA | 1 mA | 1 mA |
| **Insulation** | | | |
| •Insulation tested with | 500 V AC | 500 V AC | 500 V AC |
| **Potentials/ electrical isolation** | | | |
| 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 |
| **Dimensions and weight** | | | |
| •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. |
|---|---|---|---|
| **Digital input module EM 221** | | **Front flap set** [A] | **6ES7 291-3AX20-0XA0** |
| For CPU 221/222/224/224 XP/226 | | contains different covering flaps for CPU and EM; Spare part | |
| •8 inputs, 24 V DC, galvanically isolated, source/sink switching [A] | **6ES7 221-1BF22-0XA0** | **Plug-in terminal block (spare part)** | |
| •16 inputs, 24 V DC, galvanically isolated, source/sink switching [A] | **6ES7 221-1BH22-0XA0** | •with 7 connection terminals (for EM 221/222) [A] | **6ES7 292-1AD20-0AA0** |
| •8 inputs, 120/230 V AC, galvanically isolated, source/sink switching [A] | **6ES7 221-1EF22-0XA0** | •with 12 connection terminals (for EM 223) [A] | **6ES7 292-1AE20-0AA0** |
| **Digital output module EM 222** | | **SIM 274 simulator (optional)** [A] | **6ES7 274-1XF00-0XA0** |
| For CPU 221/222/224/224 XP/226 | | with 8 connection terminals for EM 221 and EM 223 | |
| •4 outputs, 24 V DC; 5 A, galvanically isolated [A] | **6ES7 222-1BD22-0XA0** | **S7-200 programmable controller, system manual** | |
| •8 outputs, 24 V DC; 0.75 A, galvanically isolated [A] | **6ES7 222-1BF22-0XA0** | for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4 | |
| •4 outputs, 24 V DC/24 V AC up to 230 V; 10 A, galvanically isolated, relay outputs [A] | **6ES7 222-1HD22-0XA0** | German | **6ES7 298-8FA24-8AH0** |
| •8 outputs, 24 V DC/24 V AC up to 230 V; 2 A, galvanically isolated, relay outputs [A] | **6ES7 222-1HF22-0XA0** | English | **6ES7 298-8FA24-8BH0** |
| | | French | **6ES7 298-8FA24-8CH0** |
| •8 outputs, AC 12 0/230 V; 0.5 A, galvanically isolated [A] | **6ES7 222-1EF22-0XA0** | Spanish | **6ES7 298-8FA24-8DH0** |
| **Digital input/output module EM 223** | | Italian | **6ES7 298-8FA24-8EH0** |
| For CPU 221/222/224/224 XP/226 | | Chinese | **6ES7 298-8FA24-8FH0** |
| •4 inputs 24 V DC, 4 outputs 24 V DC; 0.75 A, galvanically isolated [A] | **6ES7 223-1BF22-0XA0** | | |
| •8 inputs 24 V DC, 8 outputs 24 V DC; 0.75 A, galvanically isolated [A] | **6ES7 223-1BH22-0XA0** | | |
| •16 inputs 24 V DC, 16 outputs 24 V DC; 0.75 A, galvanically isolated [A] | **6ES7 223-1BL22-0XA0** | | |
| •4 inputs 24 V DC, 4 outputs, relay [A] | **6ES7 223-1HF22-0XA0** | | |
| •8 inputs 24 V DC, 8 outputs, relay [A] | **6ES7 223-1PH22-0XA0** | | |
| •16 inputs 24 V DC, 16 outputs, relay [A] | **6ES7 223-1PL22-0XA0** | | |

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

**3**

**SIPLUS digital modules**

### ■ Overview



- 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 °C to +70 °C, condensation permissible*
- *extraordinary medial load (for example by chloric and sulphuric atmospheres)*

### ■ Technical specifications

| | |
|---|---|
| **6AG1 221-1BF22-2XB0** | see 6ES7 221-1BF22-0XA0 |
| **6AG1 221-1BH22-2XA0** | see 6ES7 221-1BH22-0XA0 |
| **6AG1 222-1BF22-2XB0** | see 6ES7 222-1BF22-0XA0 |
| **6AG1 222-1HF22-2XB0** | see 6ES7 222-1HF22-0XA0 |
| **6AG1 223-1BF22-2XB0** | see 6ES7 223-1BF22-0XA0 |
| **6AG1 223-1BH22-2XB0** | see 6ES7 223-1BH22-0XA0 |
| **6AG1 223-1BL22-2XB0** | see 6ES7 223-1BL22-0XA0 |
| **6AG1 223-1HF22-2XB0** | see 6ES7 223-1HF22-0XA0 |
| **6AG1 223-1PH22-2XB0** | see 6ES7 223-1PH22-0XA0 |
| **6AG1 223-1PL22-2XB0** | 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 [A)] | **6AG1 221-1BF22-2XB0** |
| • 16 inputs, 24 V DC, electrically isolated, P-M switching [A)] | **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 [A)] | **6AG1 222-1BF22-2XB0** |
| • 8 outputs, 24 V DC / 24 to 230 V AC; 2 A, electrically isolated, relay outputs [A)] | **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 [A)] | **6AG1 223-1BF22-2XB0** |
| • 8 inputs, 24 V DC, 8 outputs, 24 V DC; 0.75 A, electrically isolated [A)] | **6AG1 223-1BH22-2XB0** |
| • 16 inputs, 24 V DC, 16 outputs, 24 V DC; 0.75 A, electrically isolated [A)] | **6AG1 223-1BL22-2XB0** |
| • 4 inputs, 24 V DC, 4 outputs, relays [A)] | **6AG1 223-1HF22-2XB0** |
| • 8 inputs, 24 V DC, 8 outputs, relays [A)] | **6AG1 223-1PH22-2XB0** |
| • 16 inputs, 24 V DC, 16 outputs, relays [A)] | **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 |
|---|---|
| **Current consumption** | |
| •from load voltage  L+ (no load), max. | 60 mA |
| •from backplane bus 5 V DC, max. | 20 mA |
| •Power dissipation, typical | 2 W |
| **Connection system** | |
| •Pluggable I/O terminals | No |
| **Analog inputs** | |
| •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 |
|---|---|
| **Analog value formation** | |
| 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 |
| **Error/accuracies** | |
| Interference voltage suppression for f = n x (fl +/- 1 %) | |
| - Common-mode voltage, max. | 12 V |
| **Potentials/ electrical isolation** | |
| Analog output functions | |
| - Electrical isolation, analog inputs | No |
| **Dimensions and weight** | |
| •Weight, approx. | 183 g |
| •Width | 71.2 mm |
| •Height | 80 mm |
| •Depth | 62 mm |

**3**

## Analog modules

### ■ Technical specifications EM 232

| | 6ES7 232-0HB22-0XA0 |
|---|---|
| **Current consumption** | |
| • 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 |
| **Connection system** | |
| • Pluggable I/O terminals | No |
| **Analog outputs** | |
| • Number of analog outputs | 2 |
| Output ranges, voltage | |
| - -10 to +10 V | Yes |
| Output ranges, current | |
| - 4 to 20 mA | Yes |
| Burden resistance (in the nominal output range) | |
| - at voltage outputs, min. | 5 kΩ |
| - at current outputs, max. | 0.5 kΩ |
| **Analog value formation** | |
| Integration and conversion time/triggering per channel | |
| - with over-range | U/12 bits, I/11 bits |
| Settling time | |
| - for voltage output function | 100 µs |
| - for current output function | 2 ms |
| Displayable conversion value range | |
| - bipolar signals | -32,000 to +32,000 |
| - unipolar signals | 0 to 32,000 |
| **Error/accuracies** | |
| 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 % |
| **Potentials/ electrical isolation** | |
| Analog output functions | |
| - Electrical isolation, analog output functions | No |
| **Dimensions and weight** | |
| • Weight, approx. | 148 g |
| • Width | 46 mm |
| • Height | 80 mm |
| • Depth | 62 mm |

### ■ Technical specifications EM 235

| | 6ES7 235-0KD22-0XA0 |
|---|---|
| **Current consumption** | |
| • 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 |
| **Connection system** | |
| • Pluggable I/O terminals | No |
| **Analog inputs** | |
| • 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 | |
| - parameterizable | No |
| **Analog outputs** | |
| • Number of analog outputs | 1 |
| Output ranges, voltage | |
| - -10 to +10 V | Yes |
| Output ranges, current | |
| - 0 to 20 mA | Yes |
| Burden resistance (in the nominal output range) | |
| - at voltage outputs, min. | 5 kΩ |
| - at current outputs, max. | 0.5 kΩ |

## Technical specifications (continued)

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

## Ordering Data

| | Order No. |
|---|---|
| **EM 231 analog input module** [A] | **6ES7 231-0HC22-0XA0** |
| for CPU 222/224/224 XP/226; 4 inputs , 0 - 10 V, 12-bit resolution | |
| **EM 232 analog output module** [A] | **6ES7 232-0HB22-0XA0** |
| for CPU 222/224/224 XP/226; 2 outputs, ± 10 V, 12-bit resolution | |
| **EM 235 analog input/output** [A] | **6ES7 235-0KD22-0XA0** |
| for CPU 222/224/224 XP/226; 4 inputs, 1 output, ±10 V DC, 12-bit resolution | |
| **Grounding terminal** | **6ES5 728-8MA11** |
| 10 items | |
| **Front flap set** [A] | **6ES7 291-3AX20-0XA0** |
| contains different covering flaps for CPU and EM; Spare part | |
| **S7-200 programmable controller, system manual** | |
| for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4 | |
| German | **6ES7 298-8FA24-8AH0** |
| English | **6ES7 298-8FA24-8BH0** |
| French | **6ES7 298-8FA24-8CH0** |
| Spanish | **6ES7 298-8FA24-8DH0** |
| Italian | **6ES7 298-8FA24-8EH0** |
| Chinese | **6ES7 298-8FA24-8FH0** |

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

**EM 231 thermocouple module**

## ■ Overview



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

## ■ Technical specifications

| | 6ES7 231-7PD22-0XA0 |
|---|---|
| **Current consumption** | |
| •from load voltage  L+ (no load), max. | 60 mA |
| •from backplane bus 5 V DC, max. | 87 mA |
| •Power dissipation, typical | 1.8 W |
| **Connection system** | |
| •Pluggable I/O terminals | No |
| **Analog inputs** | |
| •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 Ω |
| •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 |
|---|---|
| **Analog value formation** | |
| •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 |
| **Error/accuracies** | |
| •Cold connection point | +/-1.5 °C |
| •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. | 120 V; AC |
| - Common-mode interference, min | 120 dB; at 120 V AC |
| **Potentials/ electrical isolation** | |
| Analog output functions | |
| - Electrical isolation, analog inputs | Yes |
| **Dimensions and weight** | |
| •Weight, approx. | 210 g |
| •Width | 71.2 mm |
| •Height | 80 mm |
| •Depth | 62 mm |

**3**

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

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

### EM 231 RTD module

■ **Overview**



- 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 |
|---|---|
| **Current consumption** | |
| •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 |
| **Connection system** | |
| •Pluggable I/O terminals | No |
| **Analog inputs** | |
| •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 |
|---|---|
| **Analog value formation** | |
| •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 |
| **Error/accuracies** | |
| •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 |
| **Potentials/ electrical isolation** | |
| Analog output functions | |
| - Electrical isolation, analog inputs | Yes |
| **Dimensions and weight** | |
| •Weight, approx. | 210 g |
| •Width | 71.2 mm |
| •Height | 80 mm |
| •Depth | 62 mm |

**3**

## Ordering Data

| | Order No. | | Order No. |
|---|---|---|---|
| **EM 231 RTD module** [A] | **6ES7 231-7PB22-0XA0** | **S7-200 programmable controller, system manual** | |
| 2 inputs for thermistors Pt100/200/500/1000/10000, Ni100/120/1000, Cu10; resistance 150/300/600 Ohms, 15-bit resolution + sign | | for CPU 221/222/224/224 XP/226 and STEP 7-Micro/Win V4 | |
| | | German | **6ES7 298-8FA24-8AH0** |
| **Grounding terminal** | **6ES5 728-8MA11** | English | **6ES7 298-8FA24-8BH0** |
| 10 items | | French | **6ES7 298-8FA24-8CH0** |
| **Backplane bus expansion cable** [A] | **6ES7 290-6AA20-0XA0** | Spanish | **6ES7 298-8FA24-8DH0** |
| | | Italian | **6ES7 298-8FA24-8EH0** |
| for connecting the two equipment tiers in a two-tier configuration, for CUP 222/224/224 XP/226 | | Chinese | **6ES7 298-8FA24-8FH0** |

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

## SIPLUS analog modules

**3**

### ■ 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 °C to + 70 °C, condensation permissible*
- *extraordinary medial load (for example by chloric and sulphuric atmospheres)*

### ■ Technical specifications

| | |
|---|---|
| **6AG1 231-0HC22-2XB0** | see 6ES7 231-0HC22-0XA0 |
| **6AG1 232-0HB22-2XB0** | see 6ES7 232-0HB22-0XA0 |
| **6AG1 235-0KD22-2XB0** | see 6ES7 235-0KD22-0XA0 |

### ■ Ordering Data

| Ordering Data | Order No. |
|---|---|
| **SIPLUS EM 231 analog input module** [A)] | **6AG1 231-0HC22-2XB0** |
| (extended temperature range) | |
| for CPU 222/224/224 XP/226; 4 inputs, 0-10 V, resolution 12 bit | |
| **SIPLUS EM 232 analog output module** [A)] | **6AG1 232-0HB22-2XB0** |
| (extended temperature range) | |
| for CPU 222/224/224 XP/226; 2 outputs, ± 10 V, resolution 12 bit | |
| **SIPLUS EM 235 analog input/output module** [A)] | **6AG1 235-0KD22-2XB0** |
| (extended temperature range) | |
| for CPU 222/224/224 XP/226; 4 inputs, 1 output, ±10 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 moto rs 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 |
|---|---|
| **Supply voltages** | |
| Rated value | |
| - permissible range, lower limit (DC) | 11 V |
| - permissible range, upper limit (DC) | 30 V |
| **Current consumption** | |
| • 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 |
| **Configuration** | |
| • Number of modules per CPU | max. 5 with CPU 226/226XM, max. 3 with CPU 224, max. 1 with CPU 222 |
| **Digital inputs** | |
| • 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 ZP min 2 μs |

| **Sensor** | |
|---|---|
| Connectable encoders | |
| - 2-wire BEROS | Yes |
| - permissible closed-circuit current (2-wire BEROS), max. | 1 mA |
| **Drive interface** | |
| Signal output I | |
| - Number | 4; choice of RS422/RS485 or 5 V DC |
| - Type | RS422/RS485 electrically isolated (P0+, P0-, P1+, P1-) |
| - Differential output voltage, min. | 2.8 V; RL=200 ohms |
| - Pulse frequency | 200 kHz; P0+, P0-, P1+, P1-, P0, P1 |
| - Length of cable, max. | 10 m; 10 m shielded; 1 m unshielded |
| Signal output III | |
| - Type | 5 V DC isolated (P0, P1, DIS, CLR) |
| - Output voltage | 30 V DC |
| - Output current | 50 mA; output delay (DIS, CLR) max. 30 μs |
| **Potentials/ electrical isolation** | |
| Digital input functions | |
| - between the channels | Yes |
| - between the channels, in groups of | 1 (STP, RPS, ZP), 2 (LMT-, LMT+) |
| **Dimensions and weight** | |
| • Weight, approx. | 190 g |
| • Width | 71.2 mm |
| • Height | 80 mm |
| • Depth | 62 mm |

**EM 253 positioning module**

**3**

### Ordering Data

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

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

## Overview



- Modem expansion modu le for SIMATIC S7-200
- The Plug&Play solution for a ll 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 communicati-ons interface of the CPU
- Easy to retrofit

## Technical specifications

| | 6ES7 241-1AA22-0XA0 |
|---|---|
| **Voltages and currents** | |
| Load voltage L+ | |
| - Rated value (DC) | 24 V |
| - permissible range, lower limit (DC) | 20.4 V |
| - permissible range, upper limit (DC) | 28.8 V |
| **Current consumption** | |
| •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 |
| **Communication functions** | |
| •Bus protocol/transfer protocol | PPI, Modbus |
| **Connection system** | |
| •Phone lines | RJ11 (4 cables, 6 contacts) |
| **Modem** | |
| •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 |
| **Dimensions and weight** | |
| •Weight, approx. | 190 g |
| •Width | 71.2 mm |
| •Height | 80 mm |
| •Depth | 62 mm |

## Ordering Data

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

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

**3**

## EM 277 PROFIBUS DP module

### ■ Overview



- For connection of the S7-22x to PROFIBUS DP (as slave) and MPI
- Can be simultaneously operat ed 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 |
|---|---|
| **Voltages and currents** | |
| Load voltage L+ | |
| - Rated value (DC) | 24 V |
| - permissible range, lower limit (DC) | 20.4 V |
| - permissible range, upper limit (DC) | 28.8 V |
| **Current consumption** | |
| •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 |
| **Configuration** | |
| •Connectable stations | TD 200 from V2.0, OP, TP, PG/PC, S7-300/400, PROFIBUS DP-Master |
| **Communication functions** | |
| •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 |
| **Interfaces** | |
| •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 |
|---|---|
| **Connection system** | |
| •Pluggable I/O terminals | No |
| **PROFIBUS DP** | |
| •Transmission rate, max. | 12 Mbit/s; 9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 kbit/s 1 / 1.5 / 3 / 6 / 12 Mbit/s |
| •Station addresses | 0 to 99, adjustable |
| •Length of cable, max. | 1,200 m; 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 |
| **Dimensions and weight** | |
| •Weight, approx. | 175 g |
| •Width | 71.2 mm |
| •Height | 80 mm |
| •Depth | 62 mm |

### ■ Ordering Data

| | Order No. | | Order No. |
|---|---|---|---|
| **PROFIBUS DP EM 277 input module** [A] for CPU 222/224/224 XP/226, for connecting to PROFIBUS DP (slave) and MPI | 6ES7 277-0AA22-0XA0 | **SIPLUS PROFIBUS DP EM 277 input module (extended temperature range)** for CPU 222/224/224 XP/226, for connecting to PROFIBUS DP (slave) and MPI | 6AG1 277-0AA22-2XA0 |

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 ℃ to +55 ℃ |
| - Vertical mounting | 0 ℃ to +45 ℃ |
| •Transport/storage temperature | - 40 ℃ to +70 ℃ |
| •Relative humidity | Max. 95% at +25 ℃ |
| 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** [A) ] | **6GK7 243-2AX01-0XA0** |
| For connection of SIMATIC S7-200 (2nd generation) to AS-Interface with bus connector | |
| **Manual for CP 243-2** | |
| Including AS-Interface fundamentals and diskette with program examples paper version | |
| •German | **6GK7 243-2AX00-8AA0** |
| •English | **6GK7 243-2AX00-8BA0** |
| •French | **6GK7 243-2AX00-8CA0** |
| •Spanish | **6GK7 243-2AX00-8DA0** |
| •Italian | **6GK7 243-2AX00-8EA0** |

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

**3**

## 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 programmi ng and service is possible with STEP 7-Micro/WIN through Industrial Ethernet (program upload and download, status)
- CPU/CPU communication is poss ible through Industrial Ethernet (Client + Server, 8 S7 connections + 1 PG connection)
- Thanks to integration in S7-O PC, further processing of PLC data in PC applications is possible
- Modules can be replaced with out 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℃ to +55℃ |
|   - Vertical mounting | 0℃ to +45℃ |
| • Transport/storage temperature | -40 ℃ to +70 ℃ |
| • Relative humidity | Max. 95% at +25 ℃ |
| Design | |
| • Dimensions (W x H x D) in mm | 71.2 x 80 x 62 |
| • Weight | 150 g |
| **Performance data** | |
| S7 communication/ PG communication | |
| • Number of usable connections | 8 S7 connections + 1 PG connection |
| Configuration | With STEP 7-Micro/WIN (V3.2 SP1 and higher) |

### Ordering Data

| | Order No. |
|---|---|
| **CP 243-1 communications pro-cessor** [D] | **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, Spa-nish, Italian; with online documen-tation | |
| Single license [B] | **6ES7 810-2CC03-0YX0** |
| Single license Upgrade [1] [B] | **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 programmi ng and service is possible with STEP 7-Micro/WIN through Industrial Ethernet (program upload and download, status)
- CPU/CPU communication is poss ible 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℃ to +55℃ |
|   - Vertical mounting | 0℃ to +45℃ |
| •Transport/storage temperature | -40 ℃ to +70 ℃ |
| •Relative humidity | Max. 95% at +25 ℃ |
| Design | |
| •Dimensions (W x H x D) in mm | 71.2 x 80 x 62 |
| •Weight | 150 g |
| **Performance data** | |
| 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/ 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** [D] | **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 [B] | **6ES7 810-2CC03-0YX0** |
| Single license Upgrade [1] [B] | **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

| Power supplies |
|---|

## ■ Overview



The regulated load power supply for the SIMATIC S7-200.
- Coordinated design and functiona lity, 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 |
|---|---|
| **Order No.** | **6EP1 332-1SH31** |
| **Input** | Single-phase AC |
| Rated voltage $V_{in\ rated}$ | **120/230 V AC** Settable using wire jumper |
| Voltage range | 93 to 132 V/187 to 264 V AC |
| Overvoltage strength | 2.3 x $V_{inrated}$, 1.3 ms |
| Mains buffering $I_{out\ rated}$ | > 20 ms at $V_{in}$ = 187 V |
| Rated line frequency; range | 50/60 Hz, 47 to 63 Hz |
| Rated current$I_{in\ rated}$ | 1.65/0.95 A |
| Inrush current limitation (+25 ℃) | < 33 A, < 3 ms ($V_{in}$ = 230 V) |
| $I^2t$ | < 1.0 $A^2s$ |
| 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 |
| **Output** | Stabilized, floating direct voltage |
| Rated voltage $V_{out\ rated}$ | **24 V DC** |
| Total tolerance | ± 5 % (typ. ± 2 %) |
| •Stat. mains compensation | Approx. ± 0.1 % |
| •Stat. load compensation | Approx. ± 0.2 % |
| Residual ripple (clock frequency: approx. 50 kHz) | < 150 $mV_{pp}$ (typ. 30 $mV_{pp}$) |
| Spikes (bandwidth: 20 MHz) | < 240 $mV_{pp}$ (typ. 110 $mV_{pp}$) |
| 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 $_{out\ rated}$ | **3.5 A** |
| Current range •Up to +45 ℃ •Up to +60 ℃ | 0 to 3.5 A 0 to 3.5 A |
| Dyn. V/I with •Starting on short circuit •Short-circuit in operation | typ. 5 A for 100 ms typ. 5 A for 100 ms |
| Parallel connection for increased output | Yes, up to 5 |

| Type | 3.5 A |
|---|---|
| **Order No.** | **6EP1 332-1SH31** |
| **Efficiency** | |
| Efficiency at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 84 % |
| Power loss at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 16 W |
| **Control** | |
| Dyn. mains compensation ($V_{in\ rated}$ ±15 %) | ± 0.3 % $V_{out}$ |
| Dyn. load compensation ($I_{out}$: 50/100/50 %) | < ± 10 % $V_{out}$ (typ. ± 3 % $V_{out}$) |
| Settling time •Load step from 50 to 100% •Load step from 100 to 50% | < 5 ms < 5 ms |
| **Protection and monitoring** | |
| 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 | - |
| **Safety** | |
| Galvanic isolation pri-mary/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)

| Type | 3.5 A |
|---|---|
| Order No. | 6EP1 332-1SH31 |
| **EMC** | |
| Interference emission | EN 55022 Class B |
| Line harmonics limitation | EN 61000-3-2 |
| Interference immunity | EN 61000-6-2 |
| Operating specifications | |
| 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 |
| **Mechanical specifications** | |
| Connections | |
| •Mains input L, N, PE | One screw-type terminal each for 0.5 to 1 mm$^2$ finely stranded, 0.5 to 1.5 mm$^2$ single-core |
| •Output L+ | 1 screw-type terminal for 0.5 to 1 mm$^2$ |
| •Output M | 2 screw-type terminals for 0.5 to 1 mm$^2$ |
| 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 |
| **Accessories** | Mounting bracket |

■ **Ordering Data**  **Order No.**

| | |
|---|---|
| **Stabilized load power supply SITOP power 3.5 A** [A)] <br> 120/230 V AC, 24 V/3.5 A DC | **6EP1 332-1SH31** |
| **Mounting bracket** <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 | **6EP1 971-1AA01** |

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

**3**

## 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 interf ace using supplied cable or in-corporation 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** | **6ES7 272-0AA30-0YA0** |
| for connecting to SIMATIC S7-200; used with STEP 7 Micro/WIN V3.2 SP4 and higher. | |
| **PROFIBUS bus connector IP20 with 90° cable feeder** | |
| •without PG connection | **6ES7 972-0BA12-0XA0** |
| •with PG connection | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS bus connector IP20 with 35° cable feeder** | |
| •without PG connection | **6ES7 972-0BA41-0XA0** |
| •with PG connection | **6ES7 972-0BB41-0XA0** |
| **PROFIBUS FC Standard Cable** | **6XV1 830-0EH10** |
| 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 | |

### ■ Technical specifications

| | 6ES7 272-0AA30-0YA0 |
|---|---|
| **Power supply** | |
| Input voltage | |
| - 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 | |
| - Rated value at 24 V DC | 120 mA |
| **MPI** | |
| •Transmission rate (PPI), max. | 187.5 kBit/s |
| **1st interface** | |
| •Physical | RS 485 |
| Functionality | |
| - PPI | Yes |
| PPI | |
| - Number of stations | 126; S7-200, OP, TP, TBP, PG/PC |
| **Operator control and monitoring** | |
| Display | |
| - Type | LCD backlit |
| - Number of lines | 2 |
| - Number of characters per line | 20; Chars/line: ASCII, Cyrillic; 10 chars per line: Chinese |
| - Height of characters | 5 mm |
| **Environmental requirements** | |
| 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 |
| **Dimensions and weight** | |
| •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
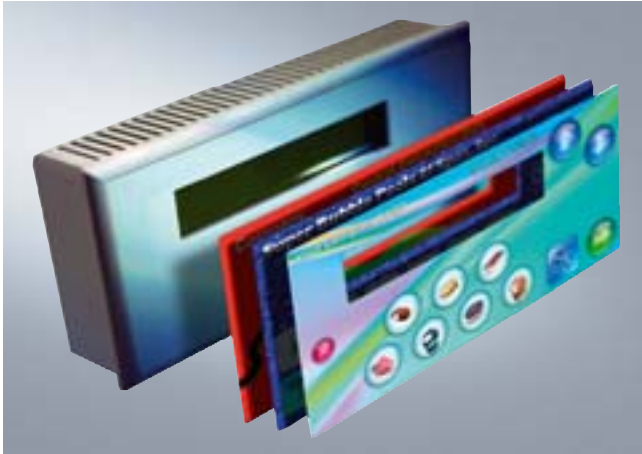


- The user-friendly text display fo r the S7-200 with customizable display
- For control and monitoring:
  Message text display, intervention in PLC program, setting of inputs and outputs
- Direct connection to CPU interf ace using supplied cable or in-corporation into network (also via EM 277)
- No 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

| | Order No. |
|---|---|
| **Text Display TD 200C** [A)] | **6ES7 272-1AA10-0YA0** |
| 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 | |
| **PROFIBUS bus connector IP20 with 90° cable feeder** | |
| •without PG connection | **6ES7 972-0BA12-0XA0** |
| •with PG connection | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS bus connector IP20 with 35° cable feeder** | |
| •without PG connection | **6ES7 972-0BA41-0XA0** |
| •with PG connection | **6ES7 972-0BB41-0XA0** |
| **PROFIBUS FC Standard Cable** | **6XV1 830-0EH10** |
| for connecting to PPI; standard type with special design for quick mounting, 2-wire, shielded, sold by the meter, up to 1000 m, mini-mum order 20 m | |

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

## Technical specifications

| | 6ES7 272-1AA10-0YA0 |
|---|---|
| **Power supply** | |
| Input voltage | |
| - 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 | |
| - Rated value at 24 V DC | 120 mA |
| **MPI** | |
| •Transmission rate (PPI), max. | 187.5 kBit/s |
| **1st interface** | |
| •Physical | RS 485 |
| Functionality | |
| - PPI | Yes |
| PPI | |
| - Number of stations | 126; S7-200, OP, TP, TBP, PG/PC |
| **Operator control and monitoring** | |
| Display | |
| - 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 |
| **Environmental requirements** | |
| Operating temperature | |
| - min. | 0 °C |
| - max. | 60 °C |
| Storage/transportation temperature | |
| - min. | -20 °C |
| - max. | 70 °C |
| Degree of protection and class of protection | |
| - IP 65 | Yes; frontal |
| **Dimensions and weight** | |
| •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 TP 177micro

**3**

■ **Overview**



- Touch panel for operator cont rol and monitoring of small machines and plants
- Low-cost starter unit in the cate gory 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 th e 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/WW/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.

**3**

## ■ Technical specifications

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

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 |
|---|---|
| **Functions** | |
| 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 [3] |
| 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 |
| **Configuration tool** | 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**

| Ordering Data | Order No. |
|---|---|
| **SIMATIC TP 177micro** [E] | **6AV6 640-0CA11-0AX0** |
| Touch Panel for connection to the SIMATIC S7-200, 5.7" STN display | |
| **Starter pack TP 177micro** [E] | **6AV6 650-0DA01-0AA0** |
| comprising: | |
| • TP 177micro touch panel | |
| • SIMATIC WinCC flexible Micro engineering software | |
| • 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 | |
| • MPI cable (5 m) | |
| *Configuration* | |
| with SIMATIC WinCC flexible | see catalog ST 80 |
| HSP OP 73micro, OP 73, OP 77A, TP 177micro, TP 177A: http://www4.ad.siemens.de/WW/view/en/19241467 | |
| *Documentation (to be ordered separately)* | |
| **Instruction manual OP 73micro, TP 177micro** | |
| • German | **6AV6 691-1DF01-0AA0** |
| • English | **6AV6 691-1DF01-0AB0** |
| • French | **6AV6 691-1DF01-0AC0** |
| • Italian | **6AV6 691-1DF01-0AD0** |
| • Spanish | **6AV6 691-1DF01-0AE0** |
| **User manual WinCC flexible Micro** | |
| • German | **6AV6 691-1AA01-0AA0** |
| • English | **6AV6 691-1AA01-0AB0** |
| • French | **6AV6 691-1AA01-0AC0** |
| • Italian | **6AV6 691-1AA01-0AD0** |
| • Spanish | **6AV6 691-1AA01-0AE0** |
| **SIMATIC HMI Manual Collection** | **6AV6 691-1SA01-0AX0** |
| Electronic documentation, on CD-ROM | |
| 5 languages (English, French, German, Italian and Spanish) comprising all currently available user manuals, product manuals and communication manuals for SIMATIC HMI | |

| | Order No. |
|---|---|
| *Accessories for supplementary ordering* | |
| **Protective foil** | **6AV6 671-2XC00-0AX0** |
| (pack of 10) | |
| **Service package** | **6AV6 671-2XA00-4AX0** |
| comprising: | |
| • Gaskets | |
| • Clamp-type terminals | |
| • Plug-in terminal strip (block of two) | |
| **PC/PPI cable Multimaster** [1] [A] | **6ES7 901-3CB30-0XA0** |
| for connecting the S7-200 to serial PC/OP interface and for downloading the configuration for Micro Panels | |
| **PROFIBUS 830-1T connecting cable** | **6XV1 830-1CH30** |
| For connection of data terminal, precut/preassembled with two sub D connectors, 9-pin, 3 m | |
| **System interfaces** | see catalog ST 80 |
| **Connecting cables** | 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
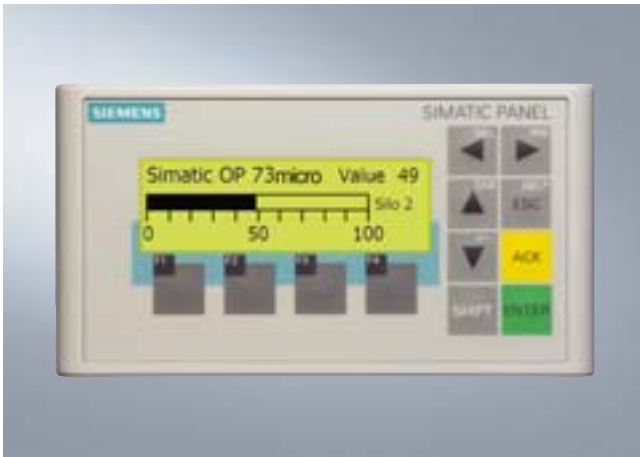


- Operator panel for operator control and monitoring of small machines and plants
- A new dimension in graphics: small and clever
- Pixel graphics 3" LCD, monochrome
- 8 system keys, 4 freely configurable function keys
- Specifically for SIMATIC S7-200: Communication with the controller is point-to-point 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 |
|---|---|
| **Display** | LCD |
| •Size | 3" |
| •Resolution (W x H in pixels) | 160 x 48 |
| •Colors | Monochrome (yellow-green) |
| •MTBF of background lighting (at 25℃) | Approx. 100,000 hours |
| **Control elements** | Membrane keyboard |
| •Function keys, programmable | 4 function keys |
| •System keys | 8 |
| •Numeric/alphanumeric input | Yes/yes [1] |
| **Processor** | ARM CPU |
| **Memory** | |
| •Type | Flash |
| •Usable memory for user data | 128 KB |
| **Ports** | 1 x RS 485 |
| **Interface with PLC** | S7-200 |
| **Power supply** | 24 V DC |
| •Permitted range | +18 to +30 V DC |
| •Nominal current | 0.1 A |
| **Clock** | Software clock, without battery backup |
| **Degree of protection** | |
| •Front | IP65 (in installed state) NEMA 12, NEMA 4x, NEMA4 |
| •Rear | IP20 |
| **Certification** | Available soon: FM, cULus, CE, C-Tick |
| **Dimensions** | |
| •Front W x H (mm) | 154 x 84 |
| •Cut-out W x H (mm) | 138 x 68 |
| **Weight** | 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 |
|---|---|
| **Ambient conditions** | |
| •Mounting position | Vertical [2] |
| - max. permissible angle of inclination without forced ventilation | |
| •Temperature | |
| - Operation (vertical installation) | 0 ℃ to +50 ℃ |
| - Operation (max. inclination) | [2] |
| - Transport, storage | -20 ℃ to +70 ℃ |
| •Max. relative humidity | [2] |
| **Functions** | |
| Message system | |
| •No. of messages | 250 |
| •Bit messages | Yes |
| •Number of process values per message | 8 |
| •Message buffer | Circulating buffer, 128 entries each [3] |
| 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 |
| **Configuration tool** | 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 |

**3**

### SIMATIC OP 73micro

■ **Ordering Data**

| | Order No. | | Order No. |
|---|---|---|---|
| **SIMATIC OP 73micro** [E] | **6AV6 640-0BA11-0AX0** | *Accessories for supplementary ordering* | |
| Operator Panel for connecting to the SIMATIC S7-200, with 3" display, mono incl. installation accessories | | **Service package** | **6AV6 671-1XA00-0AX0** |
| | | comprising: | |
| | | •Gaskets | |
| **Starter pack OP 73micro** [E] | **6AV6 650-0BA01-0AA0** | •5 clamps | |
| comprising: | | •Clamp-type terminal strip (block of two) | |
| •Operator Panel OP 73micro | | **PC/PPI Multimaster cable** [1] [A] | **6ES7 901-3CB30-0XA0** |
| •SIMATIC WinCC flexible Micro engineering software | | For connecting the S7-200 to serial PC/OP interface and for downloading the configuration for Micro Panels | |
| •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 | | **PROFIBUS 830-1T connecting cable** | **6XV1 830-1CH30** |
| •MPI cable (5 m) | | For connection of data terminal, precut/preassembled with two sub D connectors, 9-pin, terminated at both ends, 3 m | |
| *Configuration* | | **System interfaces** | see catalog ST 80 |
| with SIMATIC WinCC flexible | see catalog ST 80 | **Connecting cables** | see catalog ST 80 |
| HSP OP 73micro, OP 73, OP 77A, TP 177micro, TP 177A: http://www4.ad.siemens.de/ WW/view/en/19241467 | | | |

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

| *Documentation (to be ordered separately)* | |
|---|---|
| **Instruction manual OP 73micro/TP 177micro** [1] | |
| •German | **6AV6 691-1DF01-0AA0** |
| •English | **6AV6 691-1DF01-0AB0** |
| •French | **6AV6 691-1DF01-0AC0** |
| •Italian | **6AV6 691-1DF01-0AD0** |
| •Spanish | **6AV6 691-1DF01-0AE0** |
| **User manual WinCC flexible Micro** | |
| •German | **6AV6 691-1AA01-0AA0** |
| •English | **6AV6 691-1AA01-0AB0** |
| •French | **6AV6 691-1AA01-0AC0** |
| •Italian | **6AV6 691-1AA01-0AD0** |
| •Spanish | **6AV6 691-1AA01-0AE0** |
| **SIMATIC HMI Manual Collection** | **6AV6 691-1SA01-0AX0** |
| Electronic documentation, on CD-ROM | |
| 5 languages (English, French, German, Italian and Spanish); Comprising: all currently available user manuals, product manuals and communication manuals for SIMATIC HMI | |

■ **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.

**3**