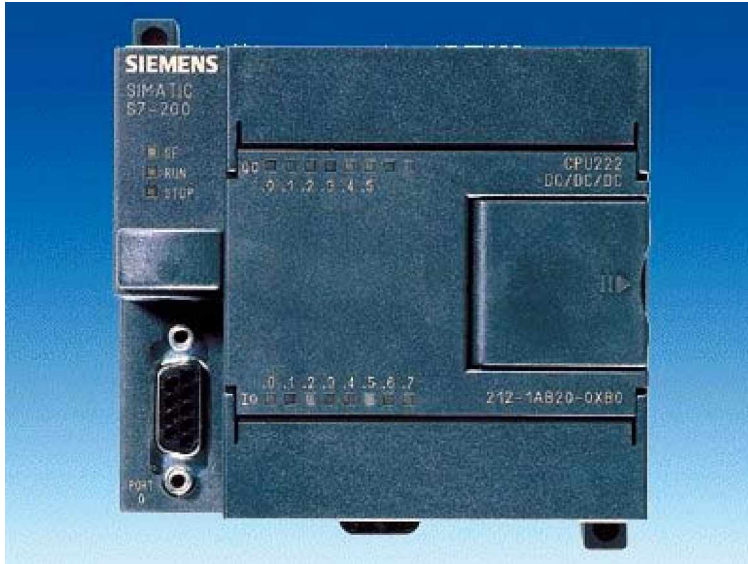


CPU_s - CPU 222



Overview

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

Area of application

The superior compact solution with 14 inputs/outputs on board, expandable with up to 2 expansion boards.

Design

The CPU 222 features:

- Integrated 24 V encoder/load power supply; for the direct connection of sensors and encoders. With 180 mA it can also be used as a load power supply.
- 2 device versions; with various supply and control voltages
- Integrated digital inputs/outputs; 8 inputs and 6 outputs
- 1 communication interface; optional
 - As PPI with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200-internal CPU/CPU communication (9,6/19,2/187,5 kbit/s) or as MPI slave for data exchange with MPI masters (S7-300/-400, OPs, TDs, Push Button Panels)
 - User-programmable interface (FreePort) with interrupt capability for serial data exchange with non-Siemens devices, e.g. at ASCII protocol baud rates of 0,3/0,6/1,2/2,4/4,8/9,6/19,2/38,4 kbit/s; PC/PPI cable can be used as RS 232/RS 485 adapter
- Expansion bus; connection of expansion modules (only EMs of the 22x series can be used)
- Interrupt inputs; allow the PLC to react with extremely high speed to the rising or falling edges of process signals

- High-speed counters; 4 high-speed counters (30 KHz), with parameterizable enable and reset input, simultaneously as up and down counters with 2 independent inputs; can be used for the connection of incremental encoders with 2 pulse sequences with 90° offset
- Trouble-free expandability through digital and analog expansion modules (EMs)
- Simulator (optional); for the simulation of integrated inputs and the testing of user programs
- Analog potentiometer; 1 analog potentiometer, can be used as a user-friendly setpoint adjuster during everyday operation, such as for setting timers
- Pulse outputs; 2 high-frequency pulse outputs (max. 20 kHz); For use in positioning tasks and the control of frequency-regulated motors and stepper motors via power circuits
- Real-time clock (can be inserted as optional module); for example for adding time stamps to messages, for registering machine running times or for the time-control of processes
- EEPROM cartridge (optional); allows rapid program change (even without a programming device) and additional program archiving
- Battery for long-term backup; for extending the backup period to typically 200 days. Without the battery module, user data (such as memory bit statuses, data blocks, timers, counters) are saved by an internal high-power capacitor for around 5 days. The program is always stored in non-volatile memory (maintenance-free).The battery module is inserted into the memory submodule port

| Device versions | | | | |
|-----------------|----------------|---------------|------------------------|-------------------|
| Version | Supply voltage | Input voltage | Output voltage | Output current |
| • DC outputs | 24 V DC | 24 V DC | 24 V DC | 0.75 A transistor |
| • Relay outputs | 85 to 264 V AC | 24 V DC | 24 V DC, 24 to230 V AC | 2 A, relay |

Functions

- Extensive set of instructions; a large number of
 - **basic operations** such as binary logic operations, result allocation, save, count, create times, load, transfer, compare, shift, rotate, create complement, call subprogram (with local variables),
 - **integrated communication commands** (such as S7-200 communication (Network read (NETR), Network write (NETW) or Freeport (Transmit XMT, Receive RCV)) and
 - **enhanced functions** such as pulse-duration modulation, pulse sequence function, arithmetic functions, floating point arithmetic, PID close-loop control, jump functions, loop functions and code conversions simplify the programming task
- Counting; user-friendly counting functions in conjunction with the integrated counters and special commands for high-speed counters open up new application areas for the user.
- Interrupt handling;
 - Edge-triggered interrupts (triggered by either rising or falling edges of process signals at interrupt inputs) permit extremely fast reactions to process interrupts
 - Time-controlled interrupts can be set in at 1 ms increments from 1 ms to 255 ms.
 - Counter interrupts can be triggered when a specified value is reached or if the counter direction changes.
 - Communication interrupts allow the rapid and easy exchange of information with peripheral devices such as printers or bar code readers
- Direct interrogation and driving of inputs/outputs; inputs and outputs can also be interrogated and set independently of the cycle. The controller can so react quickly to process events (direct resetting of outputs when interrupt occurs, for example).
- Password protection; the 3-level password protection concept safeguards effectively your know-how. The protection concept has the following options for access to the user program:
 - Full access: the program can be altered as desired.
 - Read only: the program is protected against unauthorized modification. Testing, setting of system parameters and copying of the program are supported.
 - Complete protection: the program is protected against modification and unauthorized readout and copying. Parameter settings are supported.
- Test and diagnostic functions; user-friendly functions support testing and diagnostics: the complete program is run over a predetermined number of cycles and analyzed. Internal parameters such as memory bits, timers or counters are logged at the same time over a maximum of 124 cycles.

“Forcing” of inputs and outputs in test and diagnostics modes; inputs and outputs can be set independently of cycle and

thus permanently, for example to test the user program.

Programming

The STEP 7-Micro/WIN32 V3 programming package permits complete programming of all S7-200 CPUs.

Note:

The CPU 222 cannot be programmed using STEP 7-Micro/DOS. For programming via the serial interface of the programming device/PC, a PC/PPI cable is required. When using the STEP 7-Micro/Win32 V3 programming software, programming is also possible via the SIMATIC CPs CP 5511 or CP 5611 (see SIMATIC NET) or the MPI interface of the programming device. This increases the maximum permissible transmission rate to 187.5 kbit/s.

Technical Specifications

| CPU 222 | |
|-----------------------------------|--|
| Program memory | 4 KB |
| Data memory | 2 KB |
| Memory cartridge (optional) | 1 memory module; content identical to integral EEPROM |
| Program backup | Entire program maintenance-free in the integral EEPROM, programmable via CPU |
| Data backup | Entire DB 1 loaded from PG/PC in integral EEPROM; maintenance-free |
| | Current value of DB 1 in the RAM, retentive bit memories, timers, counters etc. maintenance-free with high-intensity capacitor; optional battery for long-term backup |
| Backup time typ. | 50 h (min. 8 h at 40 °C); 200 days (typ.) with optional battery module |
| Programming language | LAD, CSF and STL |
| Program organization | 1 OB, 1 DB, 1 SDB subroutines with/without parameter transfer |
| Program execution | Free cycle (OB 1) <ul style="list-style-type: none"> • Interrupt-driven • Time-driven (1 to 255 ms) |
| Number of subroutines, max. | 64 |
| User program protection | 3-stage password protection |
| Operation set | Bit binary functions, comparison operations, timing operations, counter operations, clock operations, fixed-point arithmetic, floating-point arithmetic, numerical functions, transfer operations, table operations, binary functions, shift and rotate instructions, program control operations, interrupt and communication operations, stack operations |
| Execution time for bit operations | 0.37 µs |
| Cycle time monitoring | at 300 ms, can be retriggered |
| Bit memories | 256 |
| • Of which retentive | 0 to 112 in EEPROM, selectable; 0 to 256, via high-intensity capacitor or battery, selectable |
| Counters | 256 |
| • Of which retentive | 256, via high-intensity capacitor or battery, adjustable |
| • Counting range | 0 to 32767 |
| Timers | 256 |
| • Of which retentive | 64, via high-intensity capacitor or battery, adjustable |
| • Range | 4 timers, 1 ms to 30 s 16 timers, 10 ms to 5 min 236 timers, 100 ms to 54 min |
| Integral high-speed functions | |
| | |

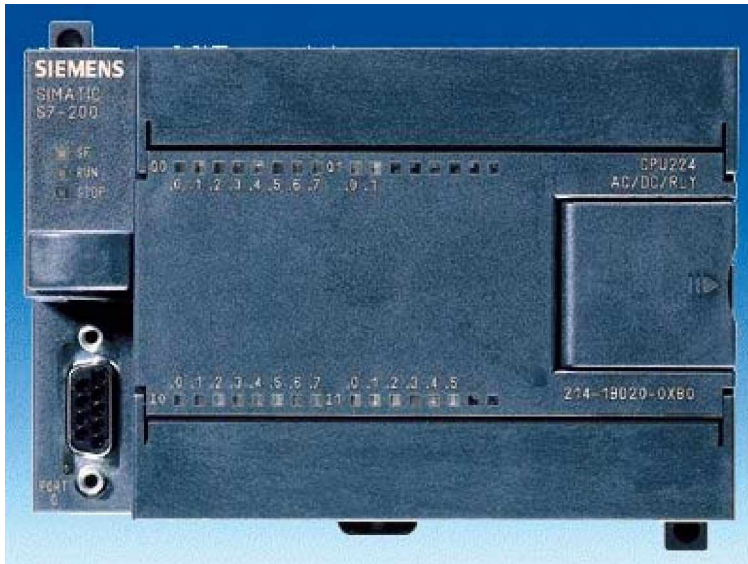
| | | |
|-------------------------------------|---|------------------------------|
| - Interrupt inputs | 4 (4 rising edges and/or 4 falling edges) | |
| - Counters | 4 quick counters (each 30 kHz), 32-bit (incl. sign), usable as up/down counter or to connect 2 incremental encoders with 2 pulse trains offset at a 90° angle (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt features (including calling of subroutine of random contents) upon reaching the setpoint; reversal of counting direction etc. | |
| • Pulse outputs | 2 high-speed outputs, 20 kHz, with interrupt option; pulse width and frequency modulation possible | |
| Interfaces | 1 RS 485 communications interface, optionally: | |
| | <p>As PPI interface with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rate 9.6/19.2/187.5 kbit/s</p> <ul style="list-style-type: none"> • or as MPI slave for data exchange with MPI masters (S7-300/S7-400 CPUs, OPs, TDs, Push Button Panels); S7-200 internal CPU/CPU communication is possible to a limited extent in the MPI network; transmission rates 19.2/187.5 kbit/s • or as freely programmable interface with interrupt possibility for serial data exchange with third-party devices with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as a RS232/RS485 adapter <p>Expansion bus</p> <ul style="list-style-type: none"> • Connection of expansion modules (EM)¹. Only EMs of the S7-22x series can be used | |
| Connectable programming units/PCs | SIMATIC programming units/PCs, standard PCs | |
| Integrated inputs/outputs | | |
| • Plug-in I/O terminals | No | |
| • Digital inputs | 8 | |
| • Digital outputs | 6 | |
| • Analog potentiometers | 1 analog potentiometer; resolution 8 bits | |
| Max. number of inputs /outputs | | |
| • Digital inputs/outputs | max. 40 inputs and 38 outputs (CPU and EM) | |
| • Analog inputs/outputs | max. 8 inputs and 2 outputs (EM) or max. 0 inputs and 4 outputs (EM) | |
| • AS-Interface inputs/outputs, max. | max. 31 AS-Interface slaves (CP 243-2) | |
| Expansion, max. | 2 expansion modules ¹ . Only expansion modules of the S7-22x series can be used | |
| Degree of protection | IP 20 in accordance with IEC 529 | |
| Ambient temperature | | |
| • With horizontal installation | 0 to 55°C | |
| • When mounted vertically | 0 to 45 °C | |
| Relative humidity | 5 to 95 % (RH severity level 2 in accordance with IEC 1131-2) | |
| Atmospheric pressure | 860 to 1080 hPa | |
| Additional environmental conditions | See "S7-200 automation system, system manual" | |
| | | |
| Power supply: | 24 V DC | 100 to 230 V AC |
| Inputs: | 24 V DC | 24 V DC |
| Outputs: | 24 V DC | Relay |
| Supply voltage L+/L1 | | |
| • Rated value | 24 V DC | 100 to 230 V AC |
| • Permissible range | 20.4 to 28.8 V | 85 to 264 V AC (47 to 63 Hz) |
| Input current | | |

| | | |
|---|---|--|
| • Max. incl. load | 10 A at 28.8 V | 20 A at 264 V |
| • Power consumption max. | 85 to 500 mA | 20 to 70 mA (24 V) 40 to 140 mA (120 V) |
| Output voltage for sensors | | |
| • Rated value | L+ (24 V DC) | 24 V DC |
| • Permissible range | 15.4 to 28.8 V | 20.4 to 28.8 V |
| Output current for sensors (24 V DC) | | |
| • Rated value | 180 mA | 180 mA |
| • Short-circuit protection | Electronic at 600 mA | Electronic at 600 mA |
| Output current for expansion modules (5 V DC) | 340 mA | 340 mA |
| Integrated inputs | 8 | 8 |
| • Type | Current sinking or sourcing | Current sinking or sourcing |
| Input voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • For "1" signal | 15 V | 15 V |
| • For "0" signal | 0 to 5 V | 0 to 5 V |
| Isolation | Optocoupler | Optocoupler |
| • In groups of | 4 | 4 |
| Input current | | |
| • Nominal value for "1" signal | 4 mA | 4 mA |
| Input delay (at rated value of the input voltage) | | |
| • For standard inputs | Every 0.2 to 12.8 ms (settable) | Every 0.2 to 12.8 ms (settable) |
| • For interrupt inputs | (10.0 to 10.3) - | (10.0 to 10.3) - |
| • For fast counters, max. | (10.0 to 10.5) 30 kHz | (10.0 to 10.5) 30 kHz |
| Connection of 2-wire BERO | | |
| • Permissible quiescent current, max. | 1 mA | 1 mA |
| Cable lengths | | |
| • Unshielded (not for high-speed signals) | 300 m | 300 m |
| • Shielded | | |
| - Standard input | 500 m | 500 m |
| - High-speed counters | 50 m | 50 m |
| On-board outputs | 6 (transistors) Can be switched in parallel for high output currents | 6 (relays) |
| Rated load voltage L+/L1 | 24 V DC | 24 V DC/ 24 to 230 V AC |
| • Permissible range | 20.4 to 28.8 V DC | 5 to 30 V DC / 5 to 250 V AC |
| Output voltage | | |
| • For "1" signal, min. | 20 V DC | L+/L1 |
| Isolation | Optocoupler | Relay |
| • In groups of | 6 | 3 |
| Output current, max. | | |
| • For "1" signal | | |
| - Rated value at 40 °C | 0.75 A | 2 A |

| | | |
|---|--------------------------|-----------------------------|
| - Rated value at 55 °C | 0.75 A | 2 A |
| - Min. current | - | - |
| • For "0" signal" | 10 µA | 0 mA |
| Sum of all output currents | | |
| • At 40 °C, max. | 4.5 A | 6.0 A |
| • At 55 °C, max. (horizontal installation) | 4.5 A | 6.0 A |
| ON delay | | |
| • Of the standard outputs, max. | (A0.2 to A0.5) 15 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (Q0.0 to Q0.1) 2 µs | - |
| OFF delay | | |
| • Of the standard outputs, max. | (A0.2 to A0.5) 100 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (A0.0 to A0.1) 10 µs | - |
| Operating frequency of pulse outputs | | |
| • For resistive load | 20 kHz | (Q0.0 to Q0.1) |
| Switching capacity of the outputs | | |
| • For resistive load | 0.75 A | 2 A |
| • For lamp load | 5 W | 30 W for DC 200 W for AC |
| Service life of the contacts (number of switching cycles to VDE 0660, Part 200) | | |
| • Mechanical | - | 10 mill. |
| • For rated load voltage | - | 100.000 |
| Voltage induced on current interruption, max. | 1 V | - |
| Short-circuit protection | Provide externally | Provide externally |
| Cable lengths | | |
| • Unshielded | 150 m | 150 m |
| • Shielded | 150 m | 500 m |
| Isolation | | |
| • Between 24 V DC and 5 V DC | 500 V DC | 500 V DC |
| • Between 24 V DC and 230 V AC | - | 1500 V AC |
| Dimensions (W x H x D) in mm | 90 x 80 x 62 | 90 x 80 x 62 |
| Weight, approx. | 270 g | 310 g |

Because of the limited output current, the use of expansion modules can be subject to restrictions

CPUs - CPU 224



Overview

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

Area of application

The compact high-performance CPU with 24 inputs/outputs on board, upgradable with up to 7 expansion boards;

Design

The CPU 224 features:

- Integrated 24 V encoder/load power supply; for the direct connection of sensors and encoders. With 280 mA it can also be used as a load power supply.
- 2 device versions; with various supply and control voltages
- Integrated digital inputs/outputs; 14 inputs and 10 outputs
- 1 communication interface; optional
 - As PPI with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200-internal CPU/CPU communication (9,6/19,2/187,5 kbit/s) or as MPI slave for data exchange with MPI masters (S7-300/-400, OPs, TDs, Push Button Panels)
 - User-programmable interface (FreePort) with interrupt capability for serial data exchange with non-Siemens devices, e.g. at ASCII protocol baud rates of 0,3/0,6/1,2/2,4/4,8/9,6/19,2/38,4 kbit/s; PC/PPI cable can be used as RS 232/RS 485 adapter
- Expansion bus connection of expansion modules (only EMs of the 22x series can be used)
- Interrupt inputs; allow the PLC to react with extremely high speed to the rising or falling edges of process signals

- High-speed counters; 6 high-speed counters (30 KHz), with parameterizable enable and reset input, simultaneously as up and down counters with 2 independent inputs; can be used for the connection of incremental encoders with 2 pulse sequences (20 kHz) having an offset of 90°
- Trouble-free expandability through digital and analog expansion modules (EM's, optional)
- Simulator (optional); for the simulation of integrated inputs and the testing of user programs
- Analog potentiometer; 2 analog potentiometers, can be used as a user-friendly setpoint adjuster during everyday operation, such as for setting timers
- Pulse outputs; 2 high-frequency pulse outputs (max. 20 kHz); for use in positioning tasks and the control of frequency-regulated motors and stepper motors via power circuits
- Real-time clock; for example for adding time stamps to messages, for registering machine running times or for the time-control of processes
- EEPROM memory module (optional); allows rapid program change (even without a programming device) and additional program archiving
- Battery for long-term backup; for extending the backup period to typically 200 days. Without the battery module, user data (such as memory bit statuses, data blocks, timers, counters) are saved by an internal high-power capacitor for around 5 days. The program is always stored in non-volatile memory (maintenance-free). The battery module is inserted into the memory module slot.

| Device versions | | | | |
|-----------------|----------------|---------------|-------------------------|-------------------|
| Version | Supply voltage | Input voltage | Output voltage | Output current |
| • DC outputs | 24 V DC | 24 V DC | 24 V DC | 0.75 A transistor |
| • Relay outputs | 85 to 264 V AC | 24 V DC | 24 V DC, 24 to 230 V AC | 2 A, relay |

Functions

- Extensive set of instructions; a large number of
 - **basic operations** such as binary logic operations, result allocation, save, count, create times, load, transfer, compare, shift, rotate, create complement, call subprogram (with local variables),
 - **integrated communication commands** (such as S7-200 communication (Network read (NETR), Network write (NETW) or Freeport (Transmit XMT, Receive RCV)) and
 - **enhanced functions** such as pulse-duration modulation, pulse sequence function, arithmetic functions, floating point arithmetic, PID close-loop control, jump functions, loop functions and code conversions simplify the programming task
- Counting; user-friendly counting functions in conjunction with the integrated counters and special commands for high-speed counters open up new application areas for the user.
- Interrupt handling;
 - Edge-triggered interrupts (triggered by either rising or falling edges of process signals at interrupt inputs) permit extremely fast reactions to process interrupts
 - Time-controlled interrupts can be set in at 1 ms increments from 1 ms to 255 ms.
 - Counter interrupts can be triggered when a specified value is reached or if the counter direction changes.
 - Communication interrupts allow the rapid and easy exchange of information with peripheral devices such as printers or bar code readers
- Direct interrogation and driving of inputs/outputs; inputs and outputs can also be interrogated and set independently of the cycle. The controller can so react quickly to process events (direct resetting of outputs when interrupt occurs, for example).
- Password protection; the 3-level password protection concept safeguards effectively your know-how. The protection concept has the following options for access to the user program:
 - Full access: the program can be altered as desired.
 - Read only: the program is protected against unauthorized modification. Testing, setting of system parameters and copying of the program are supported.
 - Complete protection: the program is protected against modification and unauthorized readout and copying. Parameter settings are supported.
- Test and diagnostic functions; user-friendly functions support testing and diagnostics: the complete program is run over a predetermined number of cycles and analyzed. Internal parameters such as memory bits, timers or counters are logged at the same time over a maximum of 124 cycles.
- "Forcing" of inputs and outputs in test and diagnostics modes; inputs and outputs can be set independently of cycle

and thus permanently, for example to test the user program.

- Runtime edit: In RUN mode, programs can be edited and modified programs can be loaded into the CPU at the click of a mouse, without the current program having to be interrupted
- Additional mathematical modules such as SIN, COS, TAN, LN, EXP

Programming

The STEP 7-Micro/WIN32 V3 programming package permits complete programming of all S7-200 CPUs.

Note:

The CPU 224 cannot be programmed using STEP 7-Micro/DOS. For programming via the serial interface of the programming device/PC, a PC/PPI cable is required. When using the STEP 7-Micro/Win32 V3 programming software, programming is also possible via the SIMATIC CPs CP 5511 or CP 5611 (see SIMATIC NET) or the MPI interface of the programming device. This increases the maximum permissible transmission rate to 187.5 kbit/s.

Technical Specifications

| CPU 224 | |
|-----------------------------------|--|
| Program memory | 8 KB |
| Data memory | 5 KB |
| Memory cartridge (optional) | 1 memory module; Content identical to integral EEPROM |
| Program backup | Entire program maintenance-free in the integral EEPROM, programmable via CPU |
| Data backup | Entire DB 1 loaded from PG/PC in integral EEPROM; maintenance-free |
| | Current value of DB 1 in the RAM, retentive bit memories, timers, counters etc. maintenance-free with high-intensity capacitor; optional battery for long-term backup |
| Backup time typ. | 190 h (min. 120 h at 40 °C); 200 days (typ.) with optional battery module |
| Programming language | LAD, CSF and STL |
| Program organization | 1 OB, 1 DB, 1 SDB subroutines with/without parameter transfer |
| Program execution | Free cycle (OB 1) <ul style="list-style-type: none"> • Interrupt-driven • Time-driven (1 to 255 ms) |
| Number of subroutines, max. | 64 |
| User program protection | 3-stage password protection |
| Operation set | Bit binary functions, comparison operations, timing operations, counter operations, clock operations, fixed-point arithmetic, floating-point arithmetic, numerical functions, transfer operations, table operations, binary functions, shift and rotate instructions, program control operations, interrupt and communication operations, stack operations |
| Execution time for bit operations | 0.37 µs |
| Cycle time monitoring | at 300 ms, can be retriggered |
| Bit memories | 256 <ul style="list-style-type: none"> • Of which retentive |
| | 0 to 112 in EEPROM, selectable; 0 to 256, via super capacitor or battery, selectable |
| Counters | 256 <ul style="list-style-type: none"> • Of which retentive |
| | 256, via high-intensity capacitor or battery, adjustable |
| | • Counting range |
| | 0 to 32767 |
| Timers | 256 |

| | | |
|-------------------------------------|---|-----------------|
| • Of which retentive | 64, via high-intensity capacitor or battery, adjustable | |
| • Range | 4 timers, 1 ms to 30 s 16 timers, 10 ms to 5 min 236 timers, 100 ms to 54 min | |
| Integral high-speed functions | | |
| • Interrupt inputs | 4 (4 rising edges and/or 4 falling edges) | |
| • Counters | 6 quick counters (each 30 kHz), 32-bit (incl. sign), usable as up/down counter or to connect 2 incremental encoders with 2 pulse trains offset at a 90° angle (max. 20 kHz (A/B counter)); programmable enable and reset input; interrupt features (including calling of subroutine of random contents) upon reaching the setpoint; reversal of counting direction etc. | |
| • Pulse outputs | 2 high-speed outputs, 20 kHz, with interrupt option; pulse width and frequency modulation possible | |
| Interfaces | 1 RS 485 communications interface, optionally: | |
| | <p>As PPI interface with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; baud rates 9.6/19.2/187.5 kbit/s</p> <ul style="list-style-type: none"> • or as MPI slave for data exchange with MPI masters (S7-300/S7-400 CPUs, OPs, TDs, Push Button Panels); S7 200 internal CPU/CPU communication can be limited on the MPI network; transmission rates 19.2/187.5 kbit/s • or as user-programmable interface with interrupt features for serial data exchange with non-Siemens devices with ASCII protocol; transmission 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 RS232/RS485 converter <p>Expansion bus</p> <ul style="list-style-type: none"> • Connection of expansion modules (EM)¹. Only EMs of the S7-22x series can be used | |
| Connectable programmer/ PC | SIMATIC programming units/PCs, standard PCs | |
| Integrated inputs/outputs | | |
| • Plug-in I/O terminals | Yes | |
| • Digital inputs | 14 | |
| • Digital outputs | 10 | |
| • Analog potentiometers | 2 analog potentiometers; resolution 8 bits | |
| Max. number of inputs /outputs | | |
| • Digital inputs/outputs | 94 inputs and 74 outputs | |
| • Analog inputs/outputs | 28 inputs and 7 outputs or 0 inputs and 14 outputs | |
| • AS-Interface inputs/outputs, max. | max. 31 AS-Interface slaves (CP 243-2) | |
| Expansion, max. | 7 expansion modules ¹). Only expansion modules of the S7-22x series can be used | |
| Degree of protection | IP 20 in accordance with IEC 529 | |
| Ambient temperature | | |
| • With horizontal installation | 0 to 55 °C | |
| • When mounted vertically | 0 to 45 °C | |
| Relative humidity | 5 to 95 % (RH severity level 2 in accordance with IEC 1131-2) | |
| Atmospheric pressure | 860 to 1080 hPa | |
| Additional environmental conditions | See "S7-200 automation system, system manual" | |
| Power supply: | 24 V DC | 100 to 230 V AC |
| Inputs: | 24 V DC | 24 V DC |
| Outputs: | 24 V DC | Relay |

| | | |
|---|---|--|
| Supply voltage L+/L1 | | |
| • Rated value | 24 V DC | 100 to 230 V AC |
| • Permissible range | 20.4 to 28.8 V | 85 to 264V AC (47 to 63 Hz) |
| Input current, typ. | | |
| • Max. incl. load | 10 A at 28.8 V | 20 A at 264 V |
| • Power consumption max. | 110 to 700 mA | 30 to 100 mA (240 V) 60 to 200 mA (120 V) |
| Output voltage for sensors | | |
| • Rated value | L+ (24 V DC) | 24 V DC |
| • Permissible range | 15.4 to 28.8 V | 20.4 to 28.8 V |
| Output current for sensors (24 V DC) | | |
| • Rated value | 280 mA | 280 mA |
| • Short-circuit protection | Electronic at 600 mA | Electronic at 600 mA |
| Output current for expansion modules (5 V DC) | 660 mA | 660 mA |
| Integrated inputs | | |
| • Type | Current sinking or sourcing | Current sinking or sourcing |
| Input voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • For "1" signal, min. | 15 V | 15 V |
| • For "0" signal | 0 to 5 V | 0 to 5 V |
| Isolation | | |
| • In groups of | 6 and 8 | 6 and 8 |
| Input current | | |
| • For "1" signal | 4 mA | 4 mA |
| Input delay (at rated value of the input voltage) | | |
| • For standard inputs | Every 0.2 to 12.8 ms (settable) | Every 0.2 to 12.8 ms (settable) |
| • For interrupt inputs | (10.0 to 10.3) - | (10.0 to 10.3) - |
| • For fast counters, max. | (10.0 to 11.5) 30 kHz | (10.0 to 11.5) 30 kHz |
| Connection of 2-wire BERO | | |
| • Permissible quiescent current, max. | 1 mA | 1 mA |
| Cable lengths | | |
| • Unshielded (not for high-speed signals) | 300 m | 300 m |
| • Shielded | | |
| - Standard input | 500 m | 500 m |
| - High-speed counters | 50 m | 50 m |
| On-board outputs | 10 (transistor) Can be switched in parallel for high output currents | 10 (relay) |
| Rated load voltage L+/L1 | | |
| • Permissible range | 20.4 to 28.8 V DC | 5 to 30 V DC / 5 to 250 V AC |
| Output voltage | | |
| • For "1" signal, min. | 20 V DC | L+/L1 |
| Isolation | | |
| • In groups of | 5 and 5 | 3 and 4 |

| | | |
|---|--------------------------|-----------------------------|
| Output current, max. | | |
| • For "1" signal | | |
| - Rated value at 40 °C | 0.75 A | 2 A |
| - Rated value at 55 °C | 0.75 A | 2 A |
| - Min. current | - | - |
| • For "0" signal | 10 µA | 0 mA |
| Sum of all output currents (horizontal mounting) | | |
| • At 40 °C, max. | 3.75 A | 8.0 A |
| • At 55 °C, max. | 3.75 A | 8.0 A |
| ON delay | | |
| • Of the standard outputs, max. | (Q0.2 to Q1.1) 15 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (Q0.0 to Q0.1) 2 µs | - |
| OFF delay | | |
| • Of the standard outputs, max. | (Q0.2 to Q1.1) 100 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (A0.0 to A0.1) 10 µs | - |
| Operating frequency of pulse outputs | | |
| • For resistive load | 20 kHz | - |
| Switching capacity of the outputs | | |
| • For resistive load | 0.75 A | 2 A |
| • For lamp load | 5 W | 30 W for DC 200 W for AC |
| Service life of the contacts (number of switching cycles to VDE 0660, Part 200) | | |
| • Mechanical | - | 10 mill. |
| • For rated load voltage | - | 100.000 |
| Voltage induced on current interruption, max. | | |
| | 1 V | - |
| Short-circuit protection | | |
| | Provide externally | Provide externally |
| Cable lengths | | |
| • Unshielded | 150 m | 150 m |
| • Shielded | 500 m | 500 m |
| Isolation | | |
| • Between 24 V DC and 5 V DC | 500 V DC | 500 V DC |
| • Between 24 V DC and 230 V AC | - | 1500 V AC |
| Dimensions (W x H x D) in mm | | |
| | 120.5 x 80 x 62 | 120.5 x 80 x 62 |
| Weight, approx. | | |
| | 360 g | 410 g |

Because of the limited output current, the use of expansion modules can be subject to restrictions

1 output to 40 °C

CPUs - CPU 226



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
- Up to 7 expansion modules.

Area of application

The high-performance package for complex technical tasks. With additional PPI port for added flexibility and communication options. 40 inputs/outputs on board, upgradable to 7 expansion boards.

Design

The CPU 226 features:

- Integrated 24 V encoder/load power supply; for the direct connection of sensors and encoders. With 400 mA it can also be used as a load power supply.
- 2 device versions; with various supply and control voltages
- Integrated digital inputs/outputs; 24 inputs and 16 outputs
- 2 communication interfaces; optional
 - As PPI with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200-internal CPU/CPU communication (9.6/19.2/187.5 kbit/s) or as MPI slave for data exchange with MPI masters (S7-300/-400, OPs, TDs, Push Button Panels)
 - User-programmable interface (FreePort) with interrupt capability for serial data exchange with non-Siemens

devices, e.g. at ASCII protocol baud rates of 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; PC/PPI cable can be used as RS 232/RS 485 adapter

- Expansion bus
connection of expansion modules (only EMs of the 22x series can be used)
- Interrupt inputs;
allow the PLC to react with extremely high speed to the rising or falling edges of process signals
- High-speed counters;
6 high-speed counters (30 kHz), with parameterizable enable and reset input, simultaneously as up and down counters with 2 independent inputs; can be used for the connection of incremental encoders with 2 pulse sequences (20 kHz) with 90° offset
- Trouble-free expandability through digital and analog expansion modules (EM's, optional)
- Simulator (optional);
for the simulation of integrated inputs and the testing of user programs
- Analog potentiometer;
2 analog potentiometers, can be used as a user-friendly setpoint adjuster during everyday operation, such as for setting timers
- Pulse outputs;
2 high-frequency pulse outputs (max. 20 kHz);
For use in positioning tasks and the control of frequency-regulated motors and stepper motors via power circuits
- Real-time clock;
for example for adding time stamps to messages, for registering machine running times or for the time-control of processes
- EEPROM memory module (optional);
allows rapid program change (even without a programming device) and additional program archiving
- Battery for long-term backup;
for increasing the storage time to typically 200 days. Without the battery module, user data (such as memory bit statuses, data blocks, timers, counters) are saved by an internal high-power capacitor for around 5 days. The program is always stored in non-volatile memory (maintenance-free). The battery module is inserted into the memory module slot.

| Device versions | | | | |
|-----------------|----------------|---------------|----------------------------|-------------------|
| Version | Supply voltage | Input voltage | Output voltage | Output current |
| • DC outputs | 24 V DC | 24 V DC | 24 V DC | 0.75 A transistor |
| • Relay outputs | 85 to 264 V AC | 24 V DC | 24 V DC, 24 to 230 V AC | 2 A, relay |

Functions

- Extensive set of instructions;
a large number of
 - **Basic operations such as binary logic operations, result allocation, save, count, create times, load, transfer, compare, shift, rotate, create complement, call subprogram (with local variables),**
 - **Integrated communication commands (such as S7-200 communication (Network read (NETR), Network write (NETW) or Freeport (Transmit XMT, Receive RCV)) and**
 - **Enhanced functions such as pulse-duration modulation, pulse sequence function, arithmetic functions, floating point arithmetic, PID close-loop control, jump functions, loop functions and code conversions simplify the programming task**
- Counting;
user-friendly counting functions in conjunction with the integrated counters and special commands for high-speed counters open up new application areas for the user.
- Interrupt handling;
 - Edge-triggered interrupts (triggered by either rising or falling edges of process signals at interrupt inputs) permit extremely fast reactions to process interrupts
 - Time-controlled interrupts can be set in at 1 ms increments from 1 ms to 255 ms.
 - Counter interrupts can be triggered when a specified value is reached or if the counter direction changes.
 - Communication interrupts allow the rapid and easy exchange of information with peripheral devices such as printers or bar code readers

- Direct interrogation and driving of inputs/outputs; inputs and outputs can also be interrogated and set independently of the cycle. The controller can so react quickly to process events (e.g. direct resetting of outputs when interrupt occurs)
- Password protection; the 3-level password protection concept safeguards effectively your know-how. The protection concept has the following options for access to the user program:
 - Full access: the program can be modified as desired.
 - Read only: the program is protected against unauthorized modification. Test, system parameter settings and copying of the program is allowed.
 - Complete protection: the program is protected against modification and unauthorized readout and copying. Parameter settings are supported.
- Test and diagnostic functions; user-friendly functions support testing and diagnostics: the complete program is run over a predetermined number of cycles and analyzed. Internal parameters such as memory bits, timers or counters are logged at the same time over a maximum of 124 cycles.
- "Forcing" of inputs and outputs in test and diagnostics modes; inputs and outputs can be set independently of cycle and thus permanently, for example to test the user program.
- Runtime edit: In RUN mode, programs can be edited and modified programs can be loaded into the CPU at the click of a mouse, without the current program having to be interrupted
- Additional mathematical modules such as SIN, COS, TAN, LN, EXP

Programming

The STEP 7-Micro/WIN32 V3 programming package permits complete programming of all S7-200 CPUs.

Note :

The CPU 226 cannot be programmed using STEP 7-Micro/DOS. For programming via the serial interface of the programming device/PC, a PC/PPI cable is required. When using the STEP 7-Micro/Win32 V3 programming software, programming is also possible via the SIMATIC CPs CP 5511 or CP 5611 (see SIMATIC NET) or the MPI interface of the programming device. This increases the maximum permissible transmission rate to 187.5 kbit/s.

Technical Specifications

| CPU 226 | |
|-----------------------------|---|
| Program memory | 8 KB |
| Data memory | 5 KB |
| Memory cartridge (optional) | 1 memory module; contents identical to integral EEPROM |
| Program backup | Entire program maintenance-free in the integral EEPROM, programmable via CPU |
| Data backup | Entire DB 1 loaded from PG/PC in integral EEPROM; maintenance-free |
| | Current value of DB 1 in the RAM, retentive bit memories, timers, counters etc. maintenance-free with high-intensity capacitor; optional battery for long-term backup |
| Backup time | 190 h (min. 120 h at 40 °C); 200 days (typ.) with optional battery module |
| Programming language | LAD, CSF and STL |
| Program organization | 1 OB, 1 DB, 1 SDB subroutines with/without parameter transfer |
| Program execution | Free cycle (OB 1) <ul style="list-style-type: none"> • Interrupt-driven • Time-driven (1 to 255 ms) |
| Number of subroutines, max. | 64 |

| | |
|-------------------------------------|--|
| User program protection | 3-stage password protection |
| Operation set | Bit binary functions, comparison operations, timing operations, counter operations, clock operations, fixed-point arithmetic, floating-point arithmetic, numerical functions, transfer operations, table operations, binary functions, shift and rotate instructions, program control operations, interrupt and communication operations, stack operations |
| Execution time for bit operations | 0.37 µs |
| Cycle time monitoring | at 300 ms, can be retriggered |
| Bit memories | 256 |
| • Of which retentive | 0 to 112 in EEPROM, selectable; 0 to 256, via high-intensity capacitor or battery, selectable |
| Counters | 256 |
| • Of which retentive | 256, via high-intensity capacitor or battery, adjustable |
| • Counting range | 0 to 32767 |
| Timers | 256 |
| • Of which retentive | 64, via high-intensity capacitor or battery, adjustable |
| • Range | 4 timers, 1 ms to 30 s 16 timers, 10 ms to 5 min 236 timers, 100 ms to 54 min |
| Integral high-speed functions | |
| • Interrupt inputs | 4 (4 rising edges and/or 4 falling edges) |
| • Counters | 6 high-speed counters (each 30 kHz), 32 bits (incl. sign), can be used as up/down counters or for the connection of 2 incremental encoders with two pulse trains at 90° intervals (max. 20 kHz (A/B counter)); programmable enable and reset inputs; interrupt features (including calling of subroutine of random contents) upon reaching the setpoint; reversal of counter direction, etc. |
| • Pulse outputs | 2 high-speed outputs, 20 kHz, with interrupt option; pulse width and frequency modulation possible |
| Interfaces | Two RS 485 communications interfaces, optionally: |
| | As PPI interface with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rate 9.6/19.2/187.5 kbit/s |
| | • Or as MPI slave for data exchange with MPI masters (S7-300/S7-400 CPUs, OPs, TDs, Push Button Panels); S7-200 internal CPU/CPU communication is possible to a limited extent in the MPI network; transmission rates 19.2/187.5 kbit/s |
| | • Or as freely programmable interface with interrupt possibility for serial data exchange with third-party devices with ASCII protocol baud rates: 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38.4 kbit/s, the PC/PPI cable can be used as a RS232/RS485 adapter |
| | Expansion bus |
| | - Connection of expansion modules (EM) ¹ . Only EMs of the S7-22x series can be used |
| Connectable programmer/PC | SIMATIC programming units/PCs, standard PCs |
| Integrated inputs/outputs | |
| • Plug-in I/O terminals | Yes |
| • Digital inputs | 24 |
| • Digital outputs | 16 |
| • Analog potentiometers | 2 analog potentiometers; resolution 8 bits |
| Max. number of inputs/outputs | |
| • Digital inputs/outputs | 128 inputs and 120 outputs |
| • Analog inputs/outputs | 28 inputs and 7 outputs or 0 inputs and 14 outputs |
| • AS-Interface inputs/outputs, max. | max. 31 AS-Interface slaves (CP 243-2) |

| | | |
|---|--|--|
| Expansion, max. | 7 expansion modules ¹⁾ . Only expansion modules of the S7-22x series can be used | |
| Degree of protection | IP 20 in accordance with IEC 529 | |
| Ambient temperature | | |
| • With horizontal installation | 0 to 55 °C | |
| • When mounted vertically | 0 to 45 °C | |
| Relative humidity | 5 to 95 % (RH severity level 2 in accordance with IEC 1131-2) | |
| Atmospheric pressure | 860 to 1080 hPa | |
| Additional environmental conditions | See "S7-200 automation system, system manual" | |
| | | |
| Power supply: | 24 V DC | 100 to 230 V AC |
| Inputs: | 24 V DC | 24 V DC |
| Outputs: | 24 V DC | Relay |
| Supply voltage L+/L1 | | |
| • Rated value | 24 V DC | 100 to 230 V AC |
| • Permissible range | 20.4 to 28.8 V | 85 to 264 V AC (47 to 63 Hz) |
| Input current, typ. | - | - |
| • Max. incl. load | 10 A at 28.8 V | 20 A at 264 V |
| • Power consumption max. | 150 to 1050 mA | 40 to 160 mA (240 V) 80 to 320 mA (120 V) |
| Output voltage for sensors | | |
| • Rated value | L+ (24 V DC) | 24 V DC |
| • Permissible range | 15.4 to 28.8 V | 20.4 to 28.8 V |
| Output current for sensors (24 V DC) | | |
| • Rated value | 400 mA | 400 mA |
| • Short-circuit protection | Electronic at approx. 1.5 A | Electronic at approx. 1.5 A |
| Output current for expansion modules | 1000 mA | 1000 mA |
| Integrated inputs | 24 | 24 |
| • Type | Current sinking or sourcing | Current sinking or sourcing |
| Input voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • For "1" signal, min. | 15 V | 15 V |
| • For "0" signal | 0 to 5 V | 0 to 5 V |
| Isolation | Optocoupler | Optocoupler |
| • In groups of | 13 and 11 | 13 and 11 |
| Input current | | |
| • Nominal value at "1" signal | 4 mA | 4 mA |
| Input delay (at rated value of the input voltage) | | |
| • For standard inputs | Every 0.2 to 12.8 ms (settable) | Every 0.2 to 12.8 ms (settable) |
| • For interrupt inputs | (I0.0 b. I0.3) - | (I0.0 b. I0.3) - |
| • For fast counters, max. | (I0.0 to I1.5) 30 kHz | (I0.0 to I1.5) 30 kHz |
| Connection of 2-wire BERO | | |

| | | |
|---|--|---------------------------------|
| • Permissible quiescent current, max | 1 mA | 1 mA |
| Cable lengths | | |
| • Unshielded (not for high-speed signals) | 300 m | 300 m |
| • Shielded | | |
| - Standard input | 500 m | 500 m |
| - High-speed counters | 50 m | 50 m |
| On-board outputs | 16 (transistors) Can be switched in parallel for high output currents | 16 (relays) |
| Rated load voltage L+/L1 | 24 V DC | 24 V DC/ 24 to 230 V AC |
| • Permissible range | 20.4 to 28.8 V DC | 5 to 30 V DC / 5 to 250 V AC |
| Output voltage | | |
| • For "1" signal, min. | 20 V DC | L+/L1 |
| Isolation | | |
| | Optocoupler | Relay |
| • In groups of | 8 and 8 | 4, 5 and 7 |
| Output current, max. | | |
| • For "1" signal | | |
| - Rated value at 40 °C | 0.75 A | 2 A |
| - Rated value at 55 °C | 0.75 A | 2 A |
| - Min. current | - | - |
| • For "0" signal" | 10 µA | 0 mA |
| Sum of all output currents (horizontal mounting) | | |
| • At 40 °C, max. | 6.0 A | 10.0 A |
| • At 55 °C, max. | 6.0 A | 10.0 A |
| ON delay | | |
| • Of the standard outputs, max. | (Q0.2 to Q1.1) 15 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (Q0.0 to Q0.1) 2 µs | - |
| OFF delay | | |
| • Of the standard outputs, max. | (Q0.2 to Q1.1) 100 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (A0.0 to A0.1) 10 µs | - |
| Operating frequency of pulse outputs | | |
| • For resistive load | 20 kHz | (Q0.0 to Q0.1) - |
| Switching capacity of the outputs | | |
| • For resistive load | 0.75 A | 2 A |
| • For lamp load | 5 W | 30 W for DC 200 W for AC |
| Service life of the contacts (number of switching cycles to VDE 0660, Part 200) | | |
| • Mechanical | - | 10 mill. |
| • For rated load voltage | - | 100.000 |
| Voltage induced on current interruption, max. | 1 V | - |
| Short-circuit protection | Provide externally | Provide externally |
| Cable lengths | | |
| • Unshielded | 150 m | 150 m |

| | | |
|---------------------------------|---------------|---------------|
| • Shielded | 500 m | 500 m |
| Isolation | | |
| • Between 24 V DC and 5 V DC | 500 V DC | 500 V DC |
| • Between 24 V DC and 230 V AC | -- | 1500 V AC |
| Dimensions (W x H x D) in mm | 196 x 80 x 62 | 196 x 80 x 62 |
| Weight, approx. | 550 g | 660 g |

Because of the limited output current, the use of expansion modules can be subject to restrictions

CPUs - CPU 226 XM



Overview

- The high-performance package for large-scale technical tasks
- With an additional PPI connection for increased flexibility and communication options
- 40 on-board inputs/outputs
- Expansion capability for max. 7 expansion units
- Enhanced program and data memory

Area of application

The high-performance package for large-scale technical tasks The additional PPI connection offers increased flexibility and communication options 40 on-board inputs/outputs, with expansion capability for max. 7 expansion units. With enhanced program memory (16 KByte) and data memory (10 KByte).

Design

The CPU 226 has:

- An integrated 24 V encoder/load power supply; for the direct connection of sensors and encoders. 400 mA output current can also be used as load power supply
- 2 device variants; with various supply and control voltages
- Integrated digital inputs/outputs; 24 inputs and 16 outputs
- 2 communication interfaces; optionally
 - as PPI interface with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication (9.6/19.2/187.5 kbit/s) or as MPI slave for data exchange with MPI masters (S7-300/-400, OPs, TDs, Push Button Panels)
 - freely programmable interface (FreePort) with interrupt function for serial data exchange with external devices, e.g. with ASCII protocol baud rates 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; PC/PPI cable can be used as RS 232/RS 485 converter
- Expansion bus; Connection of expansion modules (only 22x series EMs can be used)
- Interrupt inputs; for high-speed reactions to rising or falling edges on process signals
- High-speed counters; 6 high-speed counters (30 kHz), with configurable enable and reset input, can be used simultaneously as up counters or down counters with 2 isolated inputs and for the connection of incremental encoders with 2 pulse trains at 90° intervals (20 kHz)
- Problem-free expansion capability using digital and analog expansion modules (EMs, optional)
- Simulator (optional); for simulating the integrated inputs and testing the user program
- Analog potentiometer; 2 analog potentiometers, easy-to-use in everyday operation as setpoint generators, e.g. for setting timers
- Pulse outputs; 2 high-frequency pulse outputs (max. 20 kHz); used for positioning tasks and for controlling variable-frequency motors and stepper motors via power sections
- Real-time clock; e.g. for messages with time stamps, for recording machine run times or for time-based control of processes
- EEPROM memory module (optional); for high-speed program changes (even without PG) and additional storing in program library
- Battery module for long-term backup; to increase the memory duration to (typ.) 200 days. Without a battery module, user data (e.g. bit memory states, data blocks, timers, counters) are saved approximately every 5 days by an internal high-intensity capacitor. The program is always saved permanently (maintenance-free). The battery module is then plugged into the slot for the memory module.

[Device variants](#)

| Variante | Supply voltage | Input voltage | Output voltage | Output current |
|-----------------|----------------|---------------|-------------------------|--------------------|
| • DC outputs | 24 V DC | 24 V DC | 24 V DC | 0.75 A, transistor |
| • Relay outputs | 85 to 264 V AC | 24 V DC | 24 V DC, 24 to 230 V AC | 2 A, relay |
| | | | | |

Functions

- Comprehensive instruction set; extensive
 - **Basic operations** such as binary functions, result assignment, saving, counting, timer generation, loading, transferring, comparing, shifting, rotating, complement generation, calling subroutines (with local variables),
 - **Integrated communication instructions** (e.g. S7-200 communication (Network read NETR, Network write NETW) or Freeport (Transmit XMT, Receive RCV)) and
 - **Easy-to-use functions** such as pulse duration modulation, pulse train functions, arithmetic functions, floating-point arithmetic, PID control, step functions, loop functions and code conversions facilitate programming
- Counting;

Easy-to-use counter functions in conjunction with the integrated timers and special instructions for high-speed counters enable the user to access additional areas of application
- Interrupt handling;
 - Edge-triggered interrupts (triggered by rising or falling edges of process signals on alarm inputs) enable process events to be reacted to extremely quickly
 - Time-controlled interrupts can be set in a 1 ms grid from 1 ms to 255 ms
 - Counter interrupts can be triggered when a setpoint is reached or on a change of counter direction
 - Communication interrupts enable information to be exchanged quickly and easily with I/O stations, e.g. printers or bar code readers
- Direct scanning and control of inputs/outputs;

Inputs and outputs can also be scanned and set directly, independently of the cycle. This means that the PLC can react quickly to process events (e.g. direct reset of outputs on an interrupt event)
- Password protection;

The 3-stage password protection concept can protect your know-how effectively. The protection concept can access the user program in the following ways:

 - Full access: the program can be changed at will
 - Read-only: the program is protected against illegal changes. The program can be tested and copied, system parameters can be set.
 - Complete protection: the program is protected against changes and illegal readouts/copying. Parameter settings can be made
- Testing and diagnostics functions;

Easy-to-use functions support testing and diagnostics: The entire program is executed and analysed using a definable number of cycles. Internal parameters such as bit memories, timers or counters, are logged in a max. of 124 cycles
- "Forcing" inputs and outputs in test and diagnostics mode;

Inputs and outputs can be set independently of the cycle and therefore permanently, to test the user program, for example
- Runtime edit:

In RUN mode, programs can be edited and modified programs can be loaded to the CPU by clicking with the mouse without interrupting the current program.
- Additional mathematic functions, e.g. SIN, COS, TAN, LN, EXP

Programming

The STEP 7 Micro/WIN32 V3 programming package is used for the complete programming of all S7 200 CPUs.

Note

The CPU 226 cannot be programmed with STEP 7 Micor/DOS. If programming is to take place via the serial interface of the PG/PC, the PC/PPI cable is required. If the STEP 7 Micro/Win32 V3 programming software is used, programming can take place via the SIMATIC CPs CP 5511 or CP 5611 (see SIMATIC NET) as well as via the MPI interface of the programming device. This enables the baud rate to be increased to 187.5 kbit/s.

Technical Specifications

| | |
|-----------------------------------|---|
| CPU 226 | |
| Program memory | 16 KB |
| Data memory | 10 KB |
| Memory cartridge (optional) | 1 memory module; contents identical to integral EEPROM |
| Program backup | Entire program maintenance-free in the integral EEPROM, programmable via CPU |
| Data backup | Entire DB 1 loaded from PG/PC in integral EEPROM; maintenance-free |
| | Current value of DB 1 in the RAM, retentive bit memories, timers, counters etc. maintenance-free with high-intensity capacitor; optional battery for long-term backup |
| Backup time | 190 h (min. 120 h at 40 °C); 200 days (typ.) with optional battery module |
| Programming language | LAD, CSF and STL |
| Program organization | 1 OB, 1 DB, 1 SDB subroutines with/without parameter transfer |
| Program execution | Free cycle (OB 1) <ul style="list-style-type: none"> • Interrupt-driven • Time-driven (1 to 255 ms) |
| Number of subroutines, max. | 64 |
| User program protection | 3-stage password protection |
| Operation set | Bit binary functions, comparison operations, timing operations, counter operations, clock operations, fixed-point arithmetic, floating-point arithmetic, numerical functions, transfer operations, table operations, binary functions, shift and rotate instructions, program control operations, interrupt and communication operations, stack operations |
| Execution time for bit operations | 0.37 µs |
| Cycle time monitoring | At 300 ms, can be retriggered |
| Bit memories | 256 <ul style="list-style-type: none"> • Of these retentive |
| | 0 to 112 in EEPROM, selectable; 0 to 256, via high-intensity capacitor or battery, selectable |
| Counters | 256 <ul style="list-style-type: none"> • Of these retentive |
| | 256, via high-intensity capacitor or battery, adjustable |
| | • Counting range |
| | 0 to 32767 |
| Timers | 256 <ul style="list-style-type: none"> • Of these retentive |
| | 64, via high-intensity capacitor or battery, adjustable |
| | • Range |
| | 4 timers, 1 ms to 30 s 16 timers, 10 ms to 5 min 236 timers, 100 ms to 54 min |
| Integral high-speed functions | |
| | • Interrupt inputs |
| | 4 (4 rising edges and/or 4 falling edges) |
| | • Counters |
| | 6 high-speed counters (each 30 kHz), 32 bits (incl. sign), can be used as up/down counters or for the connection of 2 incremental encoders with two pulse trains at 90° intervals (max. 20 kHz (A/B counter)); programmable enable and reset inputs; interrupt features (including calling of subroutine of random contents) upon reaching the setpoint; reversal of direction of counting etc. |
| | • Pulse outputs |
| | 2 high-speed outputs, 20 kHz, with interrupt option; pulse width and frequency modulation possible |
| Interfaces | Two RS 485 communications interfaces, optionally: |
| | As PPI interface with PPI protocol for programming functions, HMI functions (TD 200, OP), S7-200 internal CPU/CPU communication; transmission rate 9.6/19.2/187.5 kbit/s <ul style="list-style-type: none"> • Or as MPI slave for data exchange with MPI masters (S7-300/S7-400 CPUs, OPs, TDs, Push Button Panels); S7-200 internal CPU/CPU communication is possible to a limited extent in the MPI network; transmission rates 19.2/187.5 kbit/s • Or as freely programmable interface with interrupt possibility for serial data exchange with third-party devices with ASCII protocol baud rates: |

| | | |
|---|--|--|
| | 0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4 kbit/s; at 1.2 to 38,4 kbit/s, the PC/PPI cable can be used as an RS232/RS485 adapter | |
| | Expansion bus - Connection of expansion modules (EM)1). Only EMs of the S7-22x series can be used | |
| Connectable programmer/ PC | SIMATIC programming devices/PCs, standard PCs | |
| Integral inputs/outputs | | |
| • Plug-in I/O terminals | Yes | |
| • Digital inputs | 24 | |
| • Digital outputs | 16 | |
| • Analog potentiometers | 2 analog potentiometers; resolution 8 bits | |
| Max. number of inputs /outputs | | |
| • Digital inputs/outputs | 128 inputs and 120 outputs | |
| • Analog inputs/outputs | 28 inputs and 7 outputs or 0 inputs and 14 outputs | |
| • AS-Interface inputs/outputs, max. | max. 31 AS-Interface slaves (CP 243-2) | |
| Expansion, max. | 7 expansion modules ¹⁾ . Only expansion modules of the S7-22x series can be used | |
| Degree of protection | IP 20 in accordance with IEC 529 | |
| Ambient temperature | | |
| • With horizontal installation | 0 to 55 °C | |
| • When mounted vertically | 0 to 45 °C | |
| Relative humidity | 5 to 95 % (RH severity level 2 in accordance with IEC 1131-2) | |
| Atmospheric pressure | 860 to 1080 hPa | |
| Additional environmental conditions | See "S7-200 automation system, system manual" | |
| | | |
| Power supply: | 24 V DC | 100 to 230 V AC |
| Inputs: | 24 V DC | 24 V DC |
| Outputs: | 24 V DC | Relay |
| Supply voltage L+/L1 | | |
| • Rated value | 24 V DC | 100 to 230 V AC |
| • Permissible range | 20.4 to 28.8 V | 85 to 264 V AC (47 to 63 Hz) |
| Input current, typ. | - | - |
| • Max. incl. load | 10 A at 28.8 V | 20 A at 264 V |
| • Power consumption max. | 150 to 1050 mA | 40 to 160 mA (240 V) 80 to 320 mA (120 V) |
| Output voltage for sensors | | |
| • Rated value | L+ (24 V DC) | 24 V DC |
| • Permissible range | 25.4 to 28.8 V | 20.4 to 28.8 V |
| Output current for sensors (24 V DC) | | |
| • Rated value | 400 mA | 400 mA |
| • Short-circuit protection | Electronic at approx. 1.5 A | Electronic at approx. 1.5 A |
| Output current for expansion modules | 1000 mA | 1000 mA |

| | | |
|---|---|--|
| Integral inputs | 24 | 24 |
| • Type | Current sinking or sourcing | Current sinking or sourcing |
| Input voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • For "1" signal, min. | 15 V | 15 V |
| • For "0" signal | 0 to 5 V | 0 to 5 V |
| Galvanic isolation | | |
| • In groups of | 13 and 11 | 13 and 11 |
| Input current | | |
| • Nominal value for "1" signal | 4 mA | 4 mA |
| Input delay (at rated value of the input voltage) | | |
| • For standard inputs | Every 0.2 to 12.8 ms (settable) | Every 0.2 to 12.8 ms (settable) |
| • For interrupt inputs | (10.0 to 10.3) - | (10.0 to 10.3) - |
| • For fast counters, max. | (10.0 to 11.5) 30 kHz | (10.0 to 11.5) 30 kHz |
| Connection of 2-wire BERO | | |
| • Permissible quiescent current, max. | 1 mA | 1 mA |
| Cable lengths | | |
| • Unshielded (not for high-speed signals) | 300 m | 300 m |
| • Shielded | | |
| - Standard input | 500 m | 500 m |
| - High-speed counters | 50 m | 50 m |
| On-board outputs | | |
| | 16 (transistor) Can be switched in parallel for high output currents | 16 (relays) |
| Rated load voltage L+/L1 | | |
| • Permissible range | 20.4 to 28.8 V DC | 24 V DC/ 24 to 230 V AC 5 to 30 V DC / 5 to 250 V AC |
| Output voltage | | |
| • For "1" signal, min. | 20 V DC | L+/L1 |
| Galvanic isolation | | |
| • In groups of | 8 and 8 | 4, 5 and 7 |
| Output current, max. | | |
| • For "1" signal | | |
| - Rated value at 40 °C | 0.75 A | 2 A |
| - Rated value at 55 °C | 0.75 A | 2 A |
| - Min. current | - | - |
| • For "0" signal" | 10 µA | 0 mA |
| Sum of all output currents (horizontal mounting) | | |
| • At 40 °C, max. | 6.0 A | 10.0 A |
| • At 55 °C, max. | 6.0 A | 10.0 A |
| ON delay | | |
| • Of the standard outputs, max. | (Q0.2 to Q1.1) 15 µs | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (Q0.0 to Q0.1) 2 µs | - |

| | | |
|---|-------------------------------|-----------------------------|
| OFF delay | | |
| • Of the standard outputs, max. | (Q0.2 to Q1.1) 100 μ s | (all outputs) 10 ms |
| • Of the pulse outputs, max. | (A0.0 to A0.1) 10 μ s | - |
| Operating frequency of pulse outputs | (Q0.0 to Q0.1) | (Q0.0 to Q0.1) |
| • For resistive load | 20 kHz | - |
| Switching capacity of the outputs | | |
| • For resistive load | 0.75 A | 2 A |
| • For a lamp load | 5 W | 30 W for DC 200 W for AC |
| Service life of the contacts (number of switching cycles to VDE 0660, Part 200) | | |
| • Mechanical | - | 10 mill. |
| • For rated load voltage | - | 100,000 |
| Voltage induced on current interruption, max. | 1 V | - |
| Short-circuit protection | Provide externally | Provide externally |
| Cable lengths | | |
| • Unshielded | 150 m | 150 m |
| • Shielded | 500 m | 500 m |
| Isolation | | |
| • Between 24 V DC and 5 V DC | 500 V DC | 500 V DC |
| • Between 24 V DC and 230 V AC | -- | 1500 V AC |
| Dimensions (W x H x D) in mm | 196 x 80 x 62 | 196 x 80 x 62 |
| Weight, approx. | 550 g | 660 g |

Because of the limited output current, the use of expansion modules can be subject to restrictions