CPUs

CPU 226

	6ES7 216-2AD23-0XB0	6ES7 216-2BD23-0XB0
Supply voltages		
Rated value		
– 24 V DC	Yes	
– Permitted range, lower limit (DC)	20.4 V	
– permissible range, upper limit (DC)	28.8 V	
– 120 V AC		Yes
– 230 V AC		Yes
– permissible range, lower limit (AC)		85 V
– permissible range, upper limit (AC)		264 V
– permissible frequency range, lower limit		47 Hz
– permissible frequency range, upper limit		63 Hz
Voltages and currents		
Load voltage L+		
– Rated value (DC)	24 V	24 V
– permissible range, lower limit (DC)	20.4 V	5 V
– permissible range, upper limit (DC)	28.8 V	30 V
Load voltage L1		
– Rated value (AC)		100 V; 100 to 230 V AC
– permissible range, lower limit (AC)		5 V
– permissible range, upper limit (AC)		250 V
– permissible frequency range, lower limit		47 Hz
– permissible frequency range, upper limit		63 Hz
Current consumption		
• Inrush current, max.	10 A; at 28.8 V	20 A; at 264 V
• from supply voltage L+, max.	1,050 mA; 150 to 1050 mA, output current for expansion modules (5 V DC) 1000 mA	
• from supply voltage L1, max.		320 mA; 40 to 160 mA (240 V), 80 to 320 mA (120 V); output current for expansion modules (5 V DC) 1000 mA
– Backup time, max.	100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module	100 h; (min. 70 h at 40 °C); 200 days (typ.) with optional battery module
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.
• Data memory and program memory		
– Data memory, max.	10 KByte	10 KByte
– Program memory, max.	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
CPU/processing times		
• for bit instruction, max.	0.22 µs	0.22 µs
Timers/counters and their retentive characteristics		

S7 counter		
– Number	256	256
• of which retentive with battery		
– adjustable	Yes; via super capacitor or battery	Yes; via super capacitor or battery
– lower limit	1	1
– upper limit	256	256
• Counting range		
– lower limit	0	0
– upper limit	32,767	32,767
S7 times		
– Number	256	256
• of which retentive with battery		
– adjustable	Yes; via super capacitor or battery	Yes; via super capacitor or battery
– upper limit	64	64
• Timing range		
– lower limit	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
Data areas and their retentive characteristics		
Flags		
– Number	32 Byte	32 Byte
– Retentivity	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
– of which retentive without battery	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
• Expansion units, max.	7; 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; 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)
– Digital inputs/outputs, max.	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)
Connection system		
• Pluggable I/O terminals	Yes	Yes
1st interface		
• Type of interface	integrated RS 485 interface	integrated RS 485 interface
• Physical	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
– 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
– 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
MPI		
– Transmission rates, max.	187.5 kBit/s	187.5 kBit/s
– Transmission rates, min.	19.2 kBit/s	19.2 kBit/s
2nd interface		
• Type of interface	integrated RS 485 interface	integrated RS 485 interface
• Physical	RS 485	RS 485
Functionality		
– MPI	Yes; as MPI Slave for data exchange	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	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
– Functionality 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
– 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
MPI		
– Transmission rate, max.	187.5 kBit/s	187.5 kBit/s
– Transmission rate, min.	19.2 kBit/s	19.2 kBit/s
CPU/ programming		
Programming language		
– KOP	Yes	Yes
– FUP	Yes	Yes
– AWL	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
● User program protection/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)
● Program organization	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
Digital inputs		
● Number of digital inputs	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
– Length of cable unshielded, max	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
Input voltage		
– Rated value, DC	24 V	24 V
– for signal "0"	0 to 5 V	0 to 5 V
– for signal "1"	min. 15 V	min. 15 V
Input current		
– for 1 signal, typical	2.5 mA	2.5 mA
Input delay (at rated value of the input voltage)		
● For standard inputs		
– Parameterizable	Yes; all	Yes; all
– at 0 to 1, min.	0.2 ms	0.2 ms
– at 0 to 1, max.	12.8 ms	12.8 ms
● for alarm inputs		
– parameterizable	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
Digital outputs		
● Number of digital outputs	16; Transistor	16; Relay
● 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	No; provided externally
● Limitation of voltage induced on circuit interruption to	1 W	
Switching capacity of the outputs		
– at resistive load, max.	0.75 A	2 A

– at lamp load, max.	5 W	200 W; 30 W DC, 200 W AC
Output voltage		
– for 1 signal	20 V DC	L+/L1
Output current		
– for 1 signal rated value	750 mA	2 A
– for 0 signal residual current, max.	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
– "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
Parallel switching of 2 outputs		
– to increase power	Yes	No
Switching frequency		
– of pulse outputs, at resistive load, max.	20 kHz; A0.0 to A0.1	1 kHz
Summation current of the outputs (per group)		
● horizontal mounting positions		
– up to 55°C., max.	6 A	10 A
– up to 40 °C, max.	6 A	10 A
Relay outputs		
● Number of operating cycles		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
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
– Short-circuit protection	Yes; electronic at 400 mA	Yes; electronic at 400mA
– Output current, max.	400 mA	400 mA
Sensor		
Connectable encoders		
– 2-wire BEROS	Yes	Yes
– permissible closed-circuit current (2-wire BEROS), max.	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 sub-program with any content) when the setpoint value is reached; change of count direction etc.	6; fast counters (each 30 kHz), 32 bits (incl. sign), usable as up/down counter or for connecting 4 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counter)); parameterizable enable and reset input; interrupt options (incl. Call up a sub-program with any content) when the setpoint value is reached; change of count direction etc.
● Count frequency (counters) max.	30 kHz	30 kHz
● Number of alarm inputs	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
● Cut-off frequency (pulse)	20 kHz	20 kHz
Potentials/ electrical isolation		
Digital output functions		
– between the channels	Yes; Optocoupler	Yes; Relay
– between the channels, in groups of	8 and 8	4, 5 and 7
Digital input functions		
– between the channels	Yes	Yes; Optocoupler
– between the channels, in groups of	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
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"
Operating temperature		
– vertical mounting, min.	0 °C	0 °C
– vertical mounting, max.	45 °C	45 °C

– horizontal mounting, min.	0 °C	0 °C
– horizontal mounting, max.	55 °C	55 °C
Air pressure		
– permissible range, min	860 hPa	860 hPa
– permissible range, max	1,080 hPa	1,080 hPa
Relative humidity		
– Operation, min.	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
Degree of protection and class of protection		
– IP 20	Yes	Yes
Dimensions and weight		
● Width	196 mm	196 mm
● Height	80 mm	80 mm
● Depth	62 mm	62 mm
● Weight, approx.	550 g	660 g