Control technology a class of its own

micro automation

SIMATIC S7-200

SIEMENS

Communicative, modular, compact:
So small – and so powerful

The Micro PLC SIMATIC S7-200 is truly in a class of its own: it's both compact and highly powerful – especially in relation to its real-time response – it's fast, features great communications options and comes with really easy-to-operate software and hardware.

But there's more to it than that: the Micro PLC SIMATIC S7-200 has a consistently modular design – for customized solutions which aren't too large for the present but open-ended enough to be expanded anytime in the future.

All this makes the SIMATIC S7-200 a real economic alternative in open-loop control for the lower performance range. For any applications in automation engineering that constantly depend on innovation and optimum customer benefit.

SIMATIC S7-200 delivers consistently economical solutions. The entire system family features

- Powerful performance,
- Optimum modularity and
- Open communications.

In addition, the SIMATIC S7-200 makes your job even easier: the Micro PLC is really easy to program. It enables fast and easy realization of applications – and the new toolbox concept for the software accelerates and facilitates your work even more.

This Micro PLC is now in successful use in millions of applications around the world – in both stand-alone solutions and networks.
Find out for yourself what the SIMATIC S7-200 has to offer!

Open communication

Open communication

1. Integrated standard RS-485 interface with data transmission mode dependent between 0.3 and 187.5 kbit/s
2. PPI protocol functioning as system bus for trouble-free networking
3. Programmable mode with user-specific protocols for any peripheral devices
4. Fast connection to PROFIBUS via module as a slave
5. Powerful to AS-Interface as a master
6. Communications anywhere thanks to modem link (for remote maintenance, teleservice or telecontrol)
7. Connection to Industrial Ethernet via Ethernet module
8. Now also featuring Internet link via Internet module

Optimal modularity

Optimal modularity

1. Systems engineering:

- 5 distinct CPUs in the performance range with comprehensive basic functionality and integrated Freeport communications interface
- A wide range of expansion modules for various functions:
  - Digital/analog expansions, scalable to specific requirements
  - PROFIBUS communications as a slave
  - AS-Interface communications as a master
  - Exact temperature measurement
  - Positioning
  - Remote diagnostics
  - Ethernet/Internet communications
- HMI functions
- Software STEP 7-Micro/WIN with toolbox and Micro/WIN add-ons

2. Compelling systems engineering – now featuring precise dimensioning and optimum solutions for a wide range of different requirements for one automation task

Powerful performance

Powerful performance

1. Small and compact – ideal for any applications where space is tight
2. Integrated and comprehensive basic functionality in all CPU models
3. Large memory
4. Outstanding real-time response – being in total command of the entire process at any time means increased quality, efficiency and safety
5. Easy to handle thanks to the user-friendly software STEP 7-Micro/WIN – ideal for both beginners and experts

Fast, intelligent and well-planned:
A system of endless possibilities

The Micro PLC SIMATIC S7-200 comes in one of five distinct CPUs with different performance ranges.

That makes customizing solutions a breeze:

- High basic functionality
- Modular expandability
- Integrated, programmable PPI interface(s)
- Excellent real-time response
- Extremely fast and precise sequence and process control
- Gapless control of time-critical processes based on time interrupts
- Compact design
- Easy and handy connection method based on removable terminal strips on the CPU and expansion modules

CPU 221

6/4 inputs/outputs

CPU 222

8/6 inputs/outputs (I/O)
+ max. 2 modules = 78 I/Os

CPU 224

14/10 inputs/outputs (I/O)
+ max. 7 modules = 168 I/Os

CPU 226

24/16 inputs/outputs (I/O)
+ max. 7 modules = 248 I/Os

CPU 226 XM

24/16 inputs/outputs (I/O)
+ max. 7 modules = 248 I/Os

- Modular building-block system
- Expansion modules can be scaled according to requirements
- Digital expansion modules from 4/4 to 16/16 inputs/outputs
- Analog expansion modules from 4/0, 4/1 to 0/2 inputs/outputs

NEW:
Power modules for switching loads: 5-A-DC or 10-A relay

Digital and analog expansions

Input modules

Output modules

Input/output modules

Software

STEP 7-Micro/WIN

- Easy handling
- Windows standard
- Configuration instead of programming: the Wizards
- Enormous instruction set easy to use by drag-and-drop
- Status for STL, LAD and CSF

- Modules for exact temperature measurement to a tenth of a degree Celsius:
  - RTD module for measurement of resistance temperature
  - TC module for measuring via thermocouples of common models
- EM 253 positioning module for controlling stepper motors and servodrives

Specific expansions

RTD temperature measurement

TC temperature measurement

Positioning module EM 253

- Integrated PPI interface as S7-200 system bus or as freely programmable interface – for connecting printers, barcode scanners etc.
- From CPU 222 upwards PROFIBUS-capable via PROFIBUS DP slave module
- From CPU 222 upwards functionality as AS-Interface master via AS-Interface module
- EM 241 modem module with integrated complete functions for PLC communications such as remote maintenance, telecontrol, remote diagnostics, reporting, remote data transmission

Communication

AS-Interface master max. 2 modules

PROFIBUS DP slave max. 2 modules

Modem module EM 241

NEW

Ethernet module CP 243-1

NEW

IT module CP 243-1 IT

TP 070
- Low-cost touch panel
- Numeric fields
- Bars and buttons
- Clear contrast

TD 200
- User-friendly, 2-line text display
- 187.5 kbit/s
- Clear contrast
- Connection possibility for other operator panel and touch panels of the SIMATIC HMI family

Operating and monitoring

TD 200

TP 070

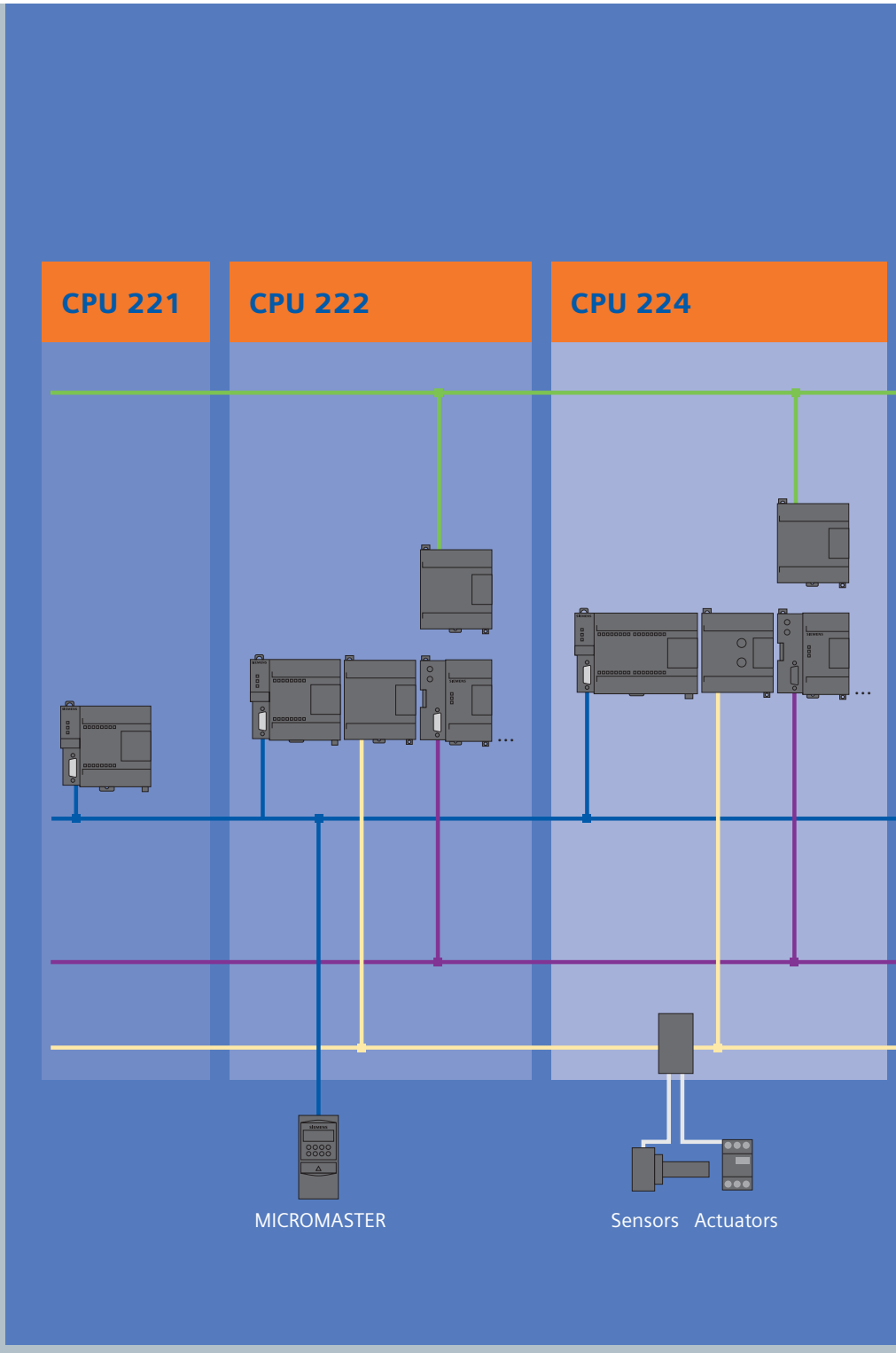
Connection possibilities of all SIMATIC panels

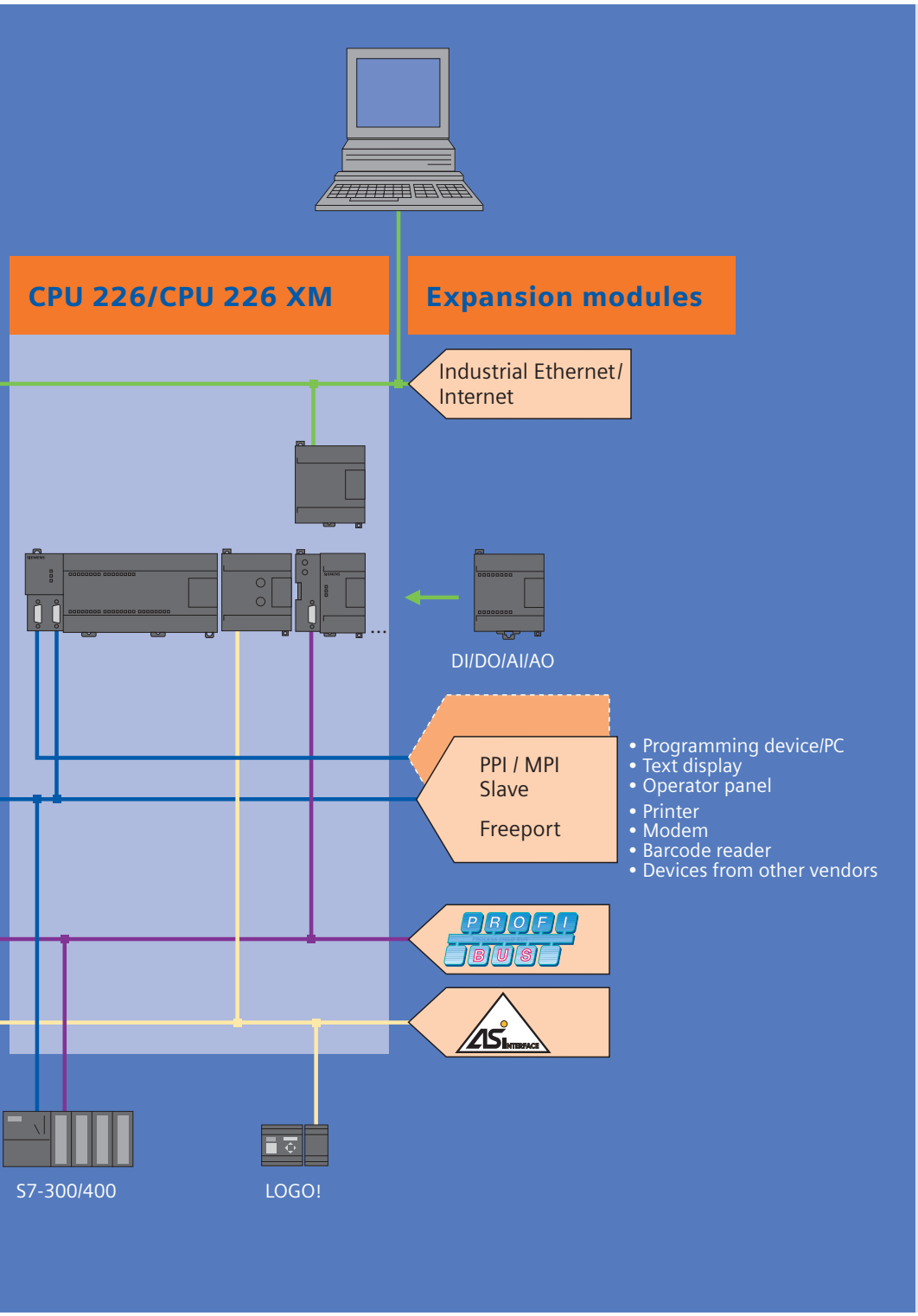
For service, maintenance, remote action and more:
Communication at every level

The communications possibilities of the Micro PLC SIMATIC S7-200 are unique. The integrated standard RS-485 interfaces can operate at data transmission rates from 0.3 to 187.5 kbit/s functioning as follows:

- As a system bus with a maximum of 126 stations. In this capacity, for example, it is possible to network programming devices, SIMATIC HMI products and SIMATIC CPUs without a problem. The integrated PPI protocol is used for pure S7-200 networks. In a network consisting of TIA components (SIMATIC S7-300/400 and SIMATIC HMI etc.), the S7-200 CPUs are integrated as MPI slaves.
- In programmable mode (up to max. 115.2 kBaud) with user-specific protocols (e.g. ASCII protocol).

  That means the SIMATIC S7-200 is open for any connected device; for example, it enables connection of a modem, barcode scanner, PC, non-Siemens PLC and much more. Up to 31 MICROMASTER- or MIDIMASTER-model frequency converters can be controlled via the USS protocol for drives without additional hardware.
- The Modbus RTU Library included in the package also enables connection to a Modbus RTU network.





Modem communications

The S7-200 CPUs can be accessed nearly anywhere in the world by modem via wired network or radio.

- Teleservice: the modem communication option is useful for avoiding expensive service calls. Two modems are all you need for remote use of the complete range of functions such as program transfer, status or control; the communications tools are integrated as a standard feature. External PCMCIA modems can be used as local modems.
- Telecontrol: you can call up messages and measured values via modem as well as define new setpoints or commands. In this case, one head-end can control a nearly unlimited number of tributary stations. The protocols for data transmission are freely selectable, e.g. for sending SMS messages directly to a cell phone or fault message to a fax machine. Preparations are being made to handle other protocols.

Speedy PROFIBUS connection

All 222-series CPUs or later can be run via the EM 277 communications module as a norm slave on the PROFIBUS DP with a transmission rate of up to 12 Mbit/s. This open feature of the S7-200 to higher-level PROFIBUS DP control levels ensures you can integrate individual machines into your production line. With the EM 277 expansion module, you can implement PROFIBUS capability of individual machines equipped with S7-200.

Powerful AS-Interface connection

The CP 243-2 turns series-222 CPUs or later into powerful masters on the AS-Interface. According to the new AS-Interface specification V 2.1, you can connect up to 62 stations, making even analog sensors easy to integrate. In accordance with the new AS-Interface specification, you can also connect up to 248 DIs + 186 DOs in the maximum configuration. The max. number of 62 stations can include up to 31 analog modules. The configuration of the slaves and reading/writing of data is supported by the handy AS-Interface Wizard.

Fast access via the Internet and Ethernet

Fast configuration, programming and monitoring via Ethernet from a central location can save time and money. For example, the Internet module CP 243-1 IT was designed to provide an easy universal PLC link via FTP to various computers for access via the Internet. Or take the Ethernet module CP 243-1 which can be used to quickly access S7-200 process data via Ethernet for archiving or further processing. STEP 7-Micro/WIN configuration support in this environment guarantees easy commissioning and convenient diagnostics. OPC makes open data exchange with PC applications possible.

So easy to use:
The software for plug & play

Extremely easy to operate ...

The programming software STEP 7-Micro/WIN features especially time-saving and powerful tools – and that means great cost savings in your day-to-day work. Operation of the programming software is the same as in standard Windows applications. Functions are selected by way of mouse-click, a button bar or simply by drag & drop.

There is an extensive SIMATIC command set available, which can also be programmed in accordance with IEC 1131 upon request. On-line help offers optimum context-related support. STEP 7-Micro/WIN lets you display and program various projects on the monitor at the same time – and copy entire sections of a program from one program to another at the click of your mouse.

Thanks to structured programming and the library concept with its own symbol and variable tables, you can design your program clearly and optimize the use of memory. This program structure also ensures that program sections such as

- PID controllers,
- Mathematical calculations,
- Table operations and
- Communications routines, like the one for Freeport operation, only need to be programmed once and can then be used over and over again.

Wizards within Micro/WIN enable easy configuration instead of programming. Following the menu-based system, you enter a few parameters and the software generates the executable program.

... even for commissioning, servicing and diagnostics

The integrated on-line functions such as program and table status as well as runtime edit or the programming and system monitoring option via modem from anywhere in the world make STEP 7-Micro/WIN a unique tool. For this, STEP 7-Micro/WIN features integrated modem support for modems with Windows drivers.

SIMATIC Microcomputing

- Controls data exchange between CPU-PC via standard Microsoft mechanisms such as OLE, OPC ...
- Data exchange between CPU and applications such as Visual Basic, Visual C++, Excel, Designer, Delphi, Photoshop etc.
- Collection of controls, displays and mechanisms allows easy generation of a user interface on your PC

The Toolbox TP Designer features:

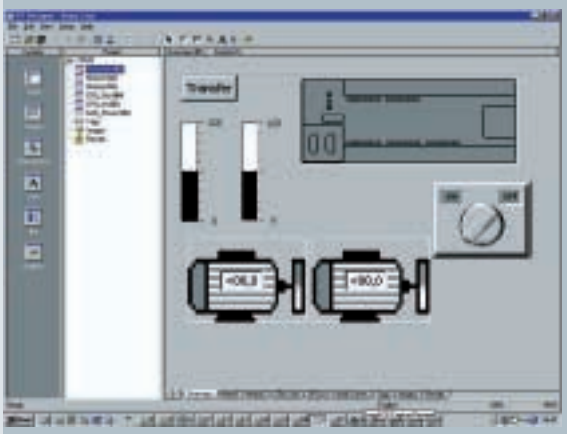
- A graphical configuration tool for the TP 070 touch panel
- Extremely easy configuration of complex visualization tasks

The Toolbox Command Library features:

- The USS protocol library containing all programming blocks required for controlling drives with the USS bus
- The Modbus library containing all the commands necessary for communicating in the Modbus

The Wizards at a glance

- TD 200
- PID controllers
- Fast counters
- NetRead – NetWrite
- AS-Interface Wizard
- Ethernet Wizard
- Internet Wizard
- Modem Wizard
- Positioning Wizard
- Control Panel
- Configuration instead of programming



Expandable, flexible and powerful:
Extras to meet any needs

TOP in real-time response

The advanced technology down to the last detail ensures our new CPUs deliver excellent real-time response rates:

- 4 and/or 6 independent hardware counters with 30 kHz each, e.g. for fast 4-edge internal evaluation for exact position monitoring with incremental position encoder or for extremely fast counting of process events
- 4 independent alarm inputs, input filter time 0.2 ms to program action – for maximum process safety
- Pulse capturing function for signals > 0.2 ms for fast events from the application
- 2 pulse outputs, each 20 kHz with pulse-time modulation as well as definition of pulse separation – e.g. for controlling stepper motors
- 2 time interrupts starting at 1 ms and adjustable in increments of 1 ms – for gapless control of rapidly changing processes
- Fast analog inputs – signal conversion with 25 µs, 12-bit resolution
- Real-time clock

Time interrupts

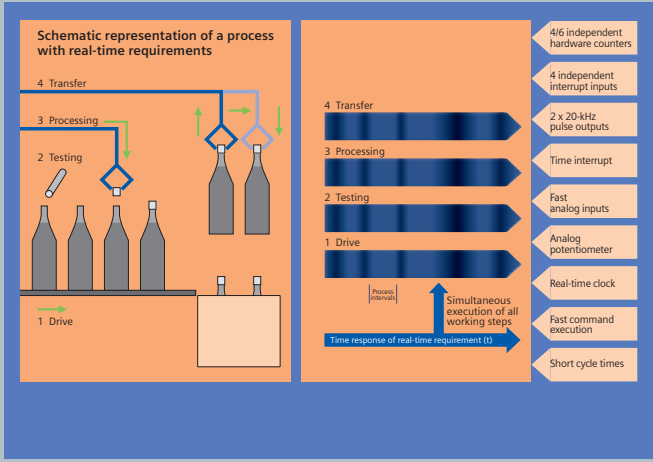
- Between 1 and 255 ms, with a resolution of 1 ms
- For example: it is possible to record and process signals during fast-action insertion of screws at an RPM rate of 3000 1/min after just a quarter turn. This enables very precise recording, for instance, of tightening torques (M) to ensure optimum fastening of the screw.

Fast counters

- Operating independently of each other, of other operations and of the program cycle
- Interrupt triggering when user-selectable counted values are reached – reaction time from the detection of an input signal to switching of an output is 300 µs
- 4-edge evaluation when incremental position encoders are used for exact positioning

Alarm inputs

- 4 independent inputs
- For registering signals in rapid succession
- Response time of 200 µs–500 µs for signal detection/300 µs for signal output
- Response to positive-going and/or negative-going signal edge
- Max. 16 interrupts in one queue depending on prioritization



Feature	CPU 221	CPU 222	CPU 224	CPU 226
Independent hardware counters	4	4	6	6
Independent alarm inputs	4	4	4	4
Pulse outputs	2	2	2	2
Time interrupts	1 to 250 ms	1 to 250 ms	1 to 250 ms	1 to 250 ms
Real-time clock	optional	optional	integrated	integrated
Binary processing speed	0.37 µs	0.37 µs	0.37 µs	0.37 µs

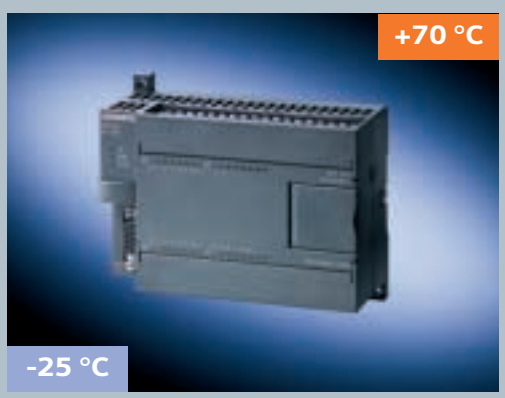
Great well-rounded technology

SITOP power – fits right in with the SIMATIC S7-200

SITOP power 24/3.5 A is the optimum backup power supply in the event the standard SIMATIC S7-200 CPU can no longer deliver power to connected consumers. The power supply is designed for, and functions entirely in tune with, the Micro PLC and can be integrated into the PLC network like an S7-200 module.

For tough customers: SIPLUS additions

Operating under extreme conditions? No problem! If you have to operate your system in an extended temperature range, require added condensation protection or demand other voltage ratings, then SIPLUS additions is the solution for you. It lets you adapt your CPUs to your special requirements.



Small and practical

EEPROM memory modules

A small optional EEPROM memory module can save you a lot of time and costs. It makes it very easy to copy, update or exchange your user program on the device. And if necessary you can use this module to send a program quickly and inexpensively to your customers. You just shut off the power, plug in the module, turn it all back on – and the program is instantly updated. The configuration of the TD 200 can also be updated using this module.

Battery module

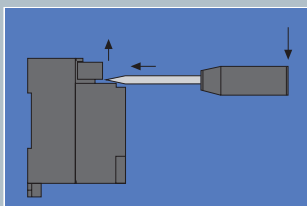
And to make sure no user data gets lost, you can use the optional battery module for long-term backups to extend backup time from the roughly 5 days of internal backup to, in general, a total of 200 days.

Real-time clock

Whether you need to count operating hours, warm up rooms or attach a time stamp to messages: the integrated real-time clock on the S7-200 runs to the minute and to the day via the software according to your settings – even in leap years.

Analog potentiometers

With the integrated analog potentiometers on the S7-200, you can optimize the process sequence almost "according to feel" without a PC or visualization. They let you fine-tune the contents of data registries, time values, preassigned counter values or other parameters without meddling with the program. This is a practical way, for example, to change a welding time or delay time quickly and directly.



Design of terminal block

Facts, Facts, Facts:
System data

Identical technical specifications of the CPUs 221, 222, 224, 226 and 226 XM:	
Feature	**CPU 221, 222, 224, 226, 226 XM**
32-bit floating-point arithmetic in accordance with IEEE norm	yes
Fully configurable, integrated PID controller	yes, up to 8 independent PID controllers
Bit processing speed	0.37 µs
Time-controlled interrupts	2 (cycle time between 1 and 255 ms at 1 ms resolution)
Hardware interrupts (edge detection at inputs)	max. 4 inputs
Flags, timers, counters	256 each
High-speed counters	4–6 (depending on CPU), max. 30 kHz
Pulse outputs (pulse-width or frequency-modulated)	2 outputs, 20 kHz each (for DC versions)
Program and data memory	retentive (retained by power-off)
Storage of dyn. data in the event of a power failure	retentive: via internal high-performance capacitor and/or add. battery module, retained by power-off: loading of data block with STEP 7-Micro/WIN or by user program to integrated EEPROM
– Storage time via high-performance capacitor	typ. 50 –190 h (depending on CPU)
– Storage time via optional battery module	typ. 200 days
Integrated communications interface	yes, RS-485 interface supporting the following operating modes: PPI master or slave/MPI slave/Freeport (freely configurable ASCII protocol)
Max. baud rate	187.5 kbaud (PPI/MPI) or 38.4 kbaud (Freeport)
Programming software	STEP 7-Micro/WIN supports all standards such as STL, CSF or LAD
Optional program memory module	yes, configurable in CPU, for program transmission
DC/DC/DC version	yes
Supply voltage	24 V DC
Digital inputs	24 V DC
Digital outputs	24 V DC, max. 0.75 A, parallel connection possible for higher switching capacity
AC/DC/relay version	yes
Supply voltage	85–264 V AC
Digital inputs	24 V DC
Digital outputs	5–30 V DC or 5–250 V AC, max. 2 A (relay)

Specific technical data on the CPUs

Features	CPU 221	CPU 222	CPU 224	CPU 226	CPU 226 XM
					
Integrated dig. inputs/outputs	6 DI/4 DO	8 DI/6 DO	14 DI/10 DO	24 DI/16 DO	24 DI/16 DO
Digital inputs/outputs/max. number of channels with expansion modules	–	40/38/78	94/82/168	128/120/248	128/120/248
Analog inputs/outputs/max. number of channels with expansion modules	–	8/4/10	28/14/35	28/14/35	28/14/35
Program memory	4 kByte	4 kByte	8 kByte	8 kByte	16 kByte
Data memory	2 kByte	2 kByte	5 kByte	5 kByte	10 kByte
Storage of dyn. data via high-performance capacitor	typ. 50 h	typ. 50 h	typ. 190 h	typ. 190 h	typ. 190 h
High-speed counters	4 x 30 kHz, of which 2 x 20 kHz A/B counter usabler	4 x 30 kHz, of which 2 x 20 kHz A/B counter usabler	6 x 30 kHz, of which 4 x 20 kHz A/B counter usabler	6 x 30 kHz, of which 4 x 20 kHz A/B counter usabler	6 x 30 kHz, of which 4 x 20 kHz A/B counter usabler
Communications interfaces RS 485	1	1	1	2	2
Supported protocols:				both interfaces	both interfaces
– PPI master/slave	yes	yes	yes	yes	yes
– MPI slave	yes	yes	yes	yes	yes
– Freeport (freely config. ASCII protocol)	yes	yes	yes	yes	yes
Optional communications possibilities	not expandable	yes, PROFIBUS DP Slave and/or AS-Interface Master/Ethernet/ Internet/Modem	yes, PROFIBUS DP Slave and/or AS-Interface Master/Ethernet/ Internet/Modem	yes, PROFIBUS DP Slave and/or AS-Interface Master/Ethernet/ Internet/Modem	yes, PROFIBUS DP Slave and/or AS-Interface Master/Ethernet/ Internet/Modem
Integrated 8-bit analog potentiometer (for commissioning, value change)	1	1	2	2	2
Real-time clock	optional	optional	yes	yes	yes
Integrated 24-V-DC sensor supply volt.	max. 180 mA	max. 180 mA	max. 280 mA	max. 400 mA	max. 400 mA
Removable terminal strip	–	–	yes	yes	yes
Dimensions (W x H x D in mm)	90 x 80 x 62	90 x 80 x 62	120,5 x 80 x 62	196 x 80 x 62	196 x 80 x 62

Facts, Facts, Facts:
System data

Technical data			
Digital I/O modules	**EM 221**	**EM 222**	**EM 222**
Number of inputs/outputs	8 DI (DC)	8 DO (DC)	8 DO (relay)
Number of **inputs**	8	–	–
Input type	24 V DC	–	–
Sinking/sourcing	x / x	–	–
Input voltage	24 V DC, max. 30 V	–	–
Isolation	yes	–	–
in groups of	4 inputs	–	–
Number of **outputs**	–	8	8
Output type	–	24 V DC	relay
Output current	–	0.75 A in group-parallel connection possible for higher switching capacity	2 A
Output voltage DC	–	20.4–28.8 V	5–30 V
(permissible range) AC	–	–	5–250 V
Isolation	–	yes	yes
in groups of	–	4 outputs	4 outputs
Removable terminal strip	yes	yes	yes
Dimensions (W x H x D in mm)	46 x 80 x 62	46 x 80 x 62	46 x 80 x 62

Digital I/O modules	**EM 221** New	**EM 222** New	**EM 222** New
Number of inputs/outputs	16 DI (DC)	4 DO (DC)	4 DO (relay)
Number of **inputs**	16	–	–
Type of input	24 V DC	–	–
Sinking/sourcing	x / x	–	–
Input voltage	24 V DC, max. 30 V	–	–
Isolation	yes	–	–
in groups of	4 inputs	–	–
Number of **outputs**	–	4	4
Output type	–	24 V DC	relay
Output current	–	5 A max. per output, switchable in parallel for greater power	10 A max. per output
Output voltage DC (permissible range) AC	–	20.4–28.8 V	12–250 V
Isolation	–	yes	yes
in groups of	–	1 output	1 output
Removable terminal strip	yes	yes	yes
Dimensions (W x H x D in mm)	71.2 x 80 x 62	46 x 80 x 62	46 x 80 x 62

Accessories	**PC/PPI cable (Single Master)[1]**	**RS 232 Smart Cable (Multimaster[2, 3])**	**USB Smart Cable (Multimaster[4])**
Isolation	yes	yes	yes
Power supply	from CPU	from CPU	from USB Port
Supported protocols	PPI and ASCII (Freeport); 10/11 bit	PPI and ASCII (Freeport); 10/11 bit	PPI; 10/11 bit
PPI communication	9.6 k; 19.2 k	9.6 k; 19.2 k; 187.5 k	9.6 k; 19.2 k; 187.5 k
Communication setting	DIP switch	DIP switch; RS 232 automatically	unnecessary
LED display	yes	yes	yes
Required software	STEP 7-Micro/WIN	STEP 7-Micro/WIN V3.2 from SP4	STEP 7-Micro/WIN V3.2 from SP4

[1] PC/PPI cable: the low-cost solution for 1 CPU; [2] RS 232 Smart Cable: for networks and external modems (also GSM);
[3] Settings, e.g. for modems permanently stored; [4] USB Smart Cable: Multimaster for USB

Technical data						
Digital I/O modules	**EM 223**	**EM 223**	**EM 223**	**EM 223**	**EM 223**	**EM 223**
Number of inputs/outputs	4 DI (DC) / 4 DO (DC)	4 DI (DC) / 4 DO (relay)	8 DI (DC) & 8 DO (DC)	8 DI (DC) & 8 DO (relay)	16 DI (DC) & 16 DO (DC)	16 DI (DC) & 16 DO (relay)
Number of **inputs**	4	4	8	8	16	16
Input type	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Sinking/ sourcing	x / x	x / x	x / x	x / x	x / x	x / x
Input voltage	24 V DC, max. 30 V	24 V DC, max. 30 V	24 V DC, max. 30 V	24 V DC, max. 30 V	24 V DC, max. 30 V	24 V DC, max. 30 V
Isolation	no	no	yes	yes	yes	yes
in groups of	–	–	4 inputs	4 inputs	8 inputs	8 inputs
Number of **outputs**	4	4	8	8	16	16
Output type	24 V DC	relay	24 V DC	relay	24 V DC	relay
Output current	0.75 A in parallel conncection possible for higher switching capacity	2 A	0.75 A in group-parallel conncection possible for higher switching capacity	2 A	0.75 A in group-parallel conncection possible for higher switching capacity	2 A
Output voltage DC	20.4–28.8 V	5–30 V	20.4–28.8 V	5–30 V	20.4–28.8 V	20.4–28.8 V
(permissible range) AC	–	5–250 V	–	5–250 V	–	–
Isolation	no	no	yes	yes	yes	yes
in groups of	–	–	4 outputs	4 outputs	4/4/8 outputs	4 outputs
Removable terminal strip	yes	yes	yes	yes	yes	yes
Dimensions (W x H x D in mm)	46 x 80 x 62	46 x 80 x 62	71.2 x 80 x 62	71.2 x 80 x 62	137.3 x 80 x 62	137.3 x 80 x 62

Analog I/O modules	**EM 231**	**EM 232**	**EM 235**
Number of inputs/outputs	4 AI	2 AO	4 AI & 1 AO
Number of **inputs**	4	–	4
Input type	0–10 V/0–20 mA	–	0–10 V/0–20 mA
Voltage ranges	0–10 V, 0–5 V +/–5 V, +/–2.5 V	–	0–10 V, 0–5 V +/–5 V, +/–2.5 V and others
Resolution	12 bit	–	12 bit
Isolation	no	–	no
Number of **outputs**	–	2	1
Output type	–	+/–10 V, 0–20 mA	+/–10 V, 0–20 mA
Resolution	– 11 bit current	12 bit volt., 11 bit current	12 bit volt.
Isolation	–	no	no
Removable terminal strip	no	no	no
Dimensions (W x H x D in mm)	71.2 x 80 x 62	46 x 80 x 62	71.2 x 80 x 62

Facts, Facts, Facts:
System data

Technical data		
Temperature measurement modules	**EM 231 TC thermocouples**	**EM 231 RTD resistance-type sensors**
Number of inputs/outputs	4 AI	2 AI
Number of **inputs**	4	2
Input type	Thermocouples Type S, T, R, E, N, K, J Voltage +/–80 mV	Pt 100, 200, 500, 1000 ohm, Pt 10.000, Ni 10, 120, 1000 ohm, R 150, 300, 600 ohm
Resolution	15 bit + sign	15 bit + sign
Isolation	500 V AC	500 V AC
Cold-junction compensation	yes	not nec.
Wiring	two-wire	two-, three- or four-wire
Max. wire length to sensor	100 m	100 m
Removable terminal strip	no	no
Dimensions (W x H x D in mm)	71.2 x 80 x 62	71.2 x 80 x 62

The program features temperature values in either Celsius or Fahrenheit displayed to the tenth of a degree.

Positioning module EM 253		
Number of **inputs**	5 points (RP, LMT–, LMT+, ZP, STP)	
Type of inputs	active high/active low (IEC Type 1 sink, except ZP)	
Number of integrated outputs	6 points (4 signals)	
Type of outputs		
P0+, P0–, P1+, P1–	RS-422 driver	
P0, P1+, DIS, CLR	Open drain	
Switching frequency		
P0+, P0–, P1+, P1–	200 kHz	
Power supply:		
L + supply voltage	11 to 30 V DC	
Logic output voltage	+5 V DC +/–10 %, max. 200 mA	
L + supply current VS, 5 V DC load		
Load current	12-V-DC input	24-V-DC input
0 mA (no load)	120 mA	70 mA
200 mA (rated load)	300 mA	130 mA
Dimensions (W x H x D)	71.2 x 80 x 62	
Weight	0.190 kg	
Dissipation	2.2 W	
V-DC requirements		
+5 V DC	190 mA	
+24 V DC	70 mA	

Technical data		
Communications module	**EM 277 PROFIBUS-DP modul**	**CP 243-2 AS-i master module**
Interface	1 communications interface RS 485	AS-Interface
Supported protocols:	– MPI slave – PROFIBUS-DP slave	AS-Interface
Transmission rate	9,600 baud up to 12 Mbaud adaptive	– max. 5 ms cycle time with 31 slaves – max. 10 ms cycle time with 62 slaves
Connectable stations:	– Text display TD 200, V2.0 or later – Operator panels, touch panels – PG/PC with MPI interface (CPU downloads/status via Micro/WIN possible) – CPU S7-300/400 – PROFIBUS DP master or slaves	max. 62 AS-Interface slaves
Status displays	CPU error, power, DP error, DX mode	Status displays for slaves, error displays
Station address	adjustable on module (0–99)	not necessary
Galvanic isolation	500 V AC	no
Max. cable length (without repeater)	1200 m (bei 93,75 kBaud)	100 m
Removable terminal strip	no	yes
Dimensions (W x H x D in mm)	71 x 80 x 62	71.2 x 80 x 62
Weight in g	175	210
Dissipation in W	2.5	1.8

EM 241 modem module	
Phone connection:	
Isolation (phone line against Logic and ...)	1500 V AC (galvanic)
Cable connector	RJ11 (6 points, 4-wire)
Modem standards	Bell 103, Bell 212, V.21, V.22, V.22 bis, V.23c, V.32, V.32 bis, V.34 (standard)
Safety features	Password, callback
Calling method	Pulse or tone dialing
Messaging protocols (SMS)	Numerical TAP (alphanumeric) UCP commands 1, 30, 51
Industrial standard protocols	Mode RTU, PPI, integrated functions for data exchange
Dimensions (W x H x D)	71.2 x 80 x 62
Weight	0.190 kg
Dissipation	2.1 W
V-DC requirements +5 V DC +24 V DC	 80 mA 70 mA

Ethernet communications modules	CP 243-1	CP 243-1 IT
Transmission rate	10/100 Mbit/s	10/100 Mbit/s
Interfaces (connection Industrial Ethernet)	RJ45	RJ45
Supply voltage	24 V DC	24 V DC
Power consumption via backplane/via 24 V DC external	55 mA/60 mA	55 mA/60 mA
Dissipation DC 24 V	1.75 W	1.75 W
Dimensions (W x H x D)	71.2 x 80 x 62	71.2 x 80 x 62
Weight	150 g	150 g
S7/PG communication		
Number of operable connections	8 S7 connections + 1 PG connection	8 S7 connections + 1 PG connection
Configuration	with STEP 7-Micro/WIN (V3.2 SP1 or later)	with STEP 7-Micro/WIN (V3.2 SP3 or later)
IT communications		
Number of connections to an E-mail server	–	1
E-mail client	–	32 E-mails with max. 1024 characters
Number of FTP/HTTP connections	–	1/4
Adjustable access protection	–	8 users
Memory capacity of the file system	–	8 MByte

Facts, Facts, Facts:
System data

Technical data	
Text Display TD 200	
Display	LCD-backlit, 2-line, 20 characters/line (ASCII, Cyrillic), 10 characters/line (Chinese), 5 mm character height
Controls	8 freely configurable keys
Interfaces	1 PPI (RS 485); to set up a network with max. 126 stations (S7-200, OP, TP, TBP, PG/PC); transmission rates 9.6/19.2/187.5 kbit/s
Power supply	24 V DC, 120 mA; power supply through S7-200 communications interface possible
Ambient temperature	0 to 60 °C
Degree of protection	IP 65 front
Dimensions (W x H x D) in mm	148 x 76 x 27

Text Display TD 200

The TD 200 enables:

- Displays of message texts
- Adjustment of the control program, e.g. change setpoint
- Setting of inputs and outputs, e.g. to switch the motor on and off

Touch Panel TP 070

The TP 070 is a professional touch panel specially designed for the SIMATIC S7-200. It handles HMI funtions for small machines or plants.

Technical data	
Touch Panel TP 070	
Display	STN, CCFL-backlit
• MTBF display and backlighting at 25 °C	50,000 h
• Resolution (pixels)	320 x 240
• Display area	5,7" blue mode
Keypad	Touch (resistive/analog)
• Switching cycles, min.	1 million
Operating system	Windows CE
User memory	Flash (retentive)
• Size	128 KB
Supply voltage	24 V DC
• Power consumption typ.	200 mA at 24 V
Integrated interface	RS 485 (19.2 kBit/s)
• Log. connections	1; only point-to-point connection
Clock	Real-time clock of CPU can be displayed
Ambient conditions	
• Operating temperature	
– vertical assembly	0 to +50 °C
– tilted up to 35°	0 to +40 °C
• Humidity	≤ 85 %, non-condensing humidity permissible
Dimensions of front panel in mm (W x H)	212 x 156
Degree of protection front/back	IP 65/IP 20
Certified for	CE/UL/CSA/FM
Functionality	(typ. approx. 20 process diagrams, 10 graphics, several buttons, fixed texts and 50 variables)
• Images	30 max.
• Variables	yes
• Fields per image	20
• Variables per image	10
• Graphic objects	yes
• Text objects	yes
• Bars charts per image	3

Product	Order No.
CPUs	
CPU 221 DC/DC/DC (not expandable)	**6ES7 211 0AA22 0XB0**
CPU 221 AC/DC/relay (not expandable)	**6ES7 211 0BA22 0XB0**
CPU 222 DC/DC/DC	**6ES7 212 1AB22 0XB0**
CPU 222 AC/DC/relay	**6ES7 212 1BB22 0XB0**
CPU 224 DC/DC/DC	**6ES7 214 1AD22 0XB0**
CPU 224 AC/DC/relay	**6ES7 214 1BD22 0XB0**
CPU 226 DC/DC/DC	**6ES7 216 2AD22 0XB0**
CPU 226 AC/DC/relay	**6ES7 216 2BD22 0XB0**
CPU 226XM DC/DC/DC	**6ES7 216 2AF22 0XB0**
CPU 226XM AC/DC/relay	**6ES7 216 2BF22 0XB0**
Expansion modules	
Digital and analog expansions	
Input module 8 x DI 24 V DC	**6ES7 221 1BF22 0XA0**
Input module 8 x DI 120 / 230 V	**6ES7 221 1EF22 0XA0**
Input module 16 x DI 24 V DC	**6ES7 221 1BH22 0XA0**
Output module 8 x DO 24 V DC	**6ES7 222 1BF22 0XA0**
Output module 8 x DO relay	**6ES7 222 1HF22 0XA0**
Output module 8 x DO 120 / 230 V	**6ES7 222 1EF22 0XA0**
Output module 4 x DO 24 V DC 5 A	**6ES7 222 1BD22 0XA0**
Output module 4 x DO relay 10 A	**6ES7 222 1HD22 0XA0**
Input/output module 4 x DI 24 V DC / 4 x DO 24 V DC	**6ES7 223 1BF22 0XA0**
Input/output module 4 x DI 24 V DC / 4 x DO relay	**6ES7 223 1HF22 0XA0**
Input/output module 8 x DI 24 V DC / 8 x DO 24 V DC	**6ES7 223 1BH22 0XA0**
Input/output module 8 x DI 24 V DC / 8 x DO relay	**6ES7 223 1PH22 0XA0**
Input/output module 16 x DI 24 V DC / 16 x DO 24 V DC	**6ES7 223 1BL22 0XA0**
Input/output module 16 x DI 24 V DC / 16 x DO relay	**6ES7 223 1PL22 0XA0**
Analog input module 4 AI 12 bit	**6ES7 231 0HC22 0XA0**
Analog input/output module 4 AI / 1 AO 12 bit	**6ES7 235 0KD22 0XA0**
Analog output module 2 AO 12 bit	**6ES7 232 0HB22 0XA0**
Specific expansions	
Analog input module RTD, 2 AI, PT100/200/500/1000, Ni100/120/1000, Cu10, Wdst. 150/300/600 ohm, 16 bit	**6ES7 231 7PB22 0XA0**
Analog input module TC, 4 AI, ± 80 mV and Thermocouples, Type J, K, S, T, R, E, N, 16 bit	**6ES7 231 7PD22 0XA0**
Positioning EM, Positioning expansion module[1)], 200 kHz, for driving stepper motors or servodrives, open-loop control, parameterization using Micro/WIN	**6ES7 253 1AA22 0XA0**
Communication	
PROFIBUS DP Module EM 277 [1)]	**6ES7 277 0AA22 0XA0**
AS-Interface Master Module CP 243-2	**6GK7 243 2AX01 0XA0**
Modem-EM [1)], Modem expansion module for analog telephone networks for remote maintenance, signalling, CPU-to-CPU, CPU-to-PC communication	**6ES7 241 1AA22 0XA0**
Industrial Ethernet CP 243-1, connection S7-200 to Industrial Ethernet	**6GK7 243 1EX00 0XE0**
Industrial Ethernet CP 243-1-IT, function as CP 243-1, in addition: FTP, E-mail, HTML	**6GK7 243 1GX00 0XE0**

1) only for CPUs version 6ES7 xxx xxx21 xxxx and higher

Product	Order No.
Manuals	
S7-200 system manual	**6ES7 298 8FA22 8AH0**
TD 200 text display, user manual	**6ES7 272 0AA20 8AA0**
TP 070 manual	**6AV6 591 1DC01 0AA0**
CP 243-2 communications processor manual	**6GK7 243 2AX00 8AA0**
HMI	
TD 200 text display, 2-line with cable (2.5 m) and mounting accessories, 187.5 kbaud	**6ES7 272 0AA30 0YA0**
TP 070 touch panel, 5.7" screen size, analog-resistive touch, backlighting	**6AV6 545 0AA15 2AX0**
Accessories	
Battery module	**6ES7 291 8BA20 0XA0**
Memory module EEPROM	**6ES7 291 8GE20 0XA0**
Clock module, incl. battery (221,222)	**6ES7 297 1AA20 0XA0**
Extension cable for expansion modules, 0.8 m	**6ES7 290 6AA20 0XA0**
PC/PPI cable, RS232/485 cable for PC/Laptop/Modem/ xxx to S7-200, max. 38.4 kbit/s, single master	**6ES7 901 3BF30 0XA0**
PC/PPI cable, RS232/485 cable for PC/Laptop/Modem/ xxx to S7-200, max. 187.5 kbit/s, multimaster	**6ES7 901 3CB30 0XA0**
PC/PPI cable, USB/485 cable for PC/Laptop to S7-200, max. 187.5 kbit/s, multimaster	**6ES7 901 3DB30 0XA0**
MPI cable	**6ES7 901 0BF00 0AA0**
CP5511: PCMCIA, Type II, RS485 (PPI/MPI/PROFIBUS) for PC/Laptop with max. 12 Mbit/s	**6GK1 551 1AA00**
CP5611: PCI card, RS485 (PPI/MPI/PROFIBUS) for PC/Laptop with max. 12 Mbit/s	**6GK1 561 1AA00**
Power supply, SITOP power 24 V / 3.5 A	**6EP1 332 1SH31**
Software	
Programming software STEP 7-Micro/WIN, V 3.2, 32 bit, for Win 95/98/Me, NT 4.x, 2000, 5 languages, incl. documentation on CD; single license	**6ES7 810 2BC02 0YX0**
Programming software STEP 7-Micro/WIN, V 3.2, 32 bit, for Win 95/98/Me, NT 4.x, 2000, 5 languages, incl. documentation on CD; upgrade from Micro/DOS and Micro/WIN Vx.x to V 3.2	**6ES7 810 2BC02 0YX3**
STEP 7-Micro/WIN Add-on: command library V 1.1, control of drives (USS protocol) and data transmission via Modbus protocol, for STEP 7-Micro/WIN V 3.2	**6ES7 830 2BC00 0YX0**
S7-200 Toolbox: TP-Designer for TP 070, configuring of S7-200 Touch Panels, V 1.0	**6ES7 850 2BC00 0YX0**
S7-200 Microcomputing limited, ActiveX components for data access to 1 S7-200, Win 95/98/Me, 2000, NT	**6ES7 810 2ML00 0YX0**
S7-200 Microcomputing unlimited, ActiveX components for data access to S7-200 Network, Win 95/98/Me, 2000, NT	**6ES7 810 2MU00 0YX0**
S7-200 OPC Server for random OPC Clients for data access to 1 S7-200, Win 95/98/Me, 2000, NT	**6ES7 810 2MS00 0YX0**

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More info on the SIMATIC S7-200 is available anywhere from a Siemens office in your area, selected electric wholesalers and in the direct mail-order catalog.

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More information about SIMATIC S7-200
Internet: **www.ad.siemens.de/s7-200**

- List of commands (quick reference card)
- Tips & tricks
- Demo software
- Free software updates
- Download of user manuals

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