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 programming tool makes your job even easier: the Micro PLC is very easy to program allowing fast and easy realization of applications – and the add-on libraries for the software accelerate and facilitate your work even more.

This Micro PLC has been 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 rates 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. With connection to the Internet by means of Internet module
9. New – S7-200 PC ACCESS – OPC Server for simple connection to the PC environment

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
- STEP 7-Micro/WIN software with Micro/WIN add-on library

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

Tried and tested worldwide thanks to:

- High basic functionality
- Modular expansion options
- Integral RS 485 interface for use as system bus
- Excellent real-time behavior
- Extremely fast and precise process and sequence control
- Seamless control of time-critical processes by means of time interrupts
- Compact design
- Simple and user-friendly connection method thanks to removable terminal strips on the CPU and expansion modules – permanent wiring

Our new devices offer you:

- Up to 50 % more program memory for CPU 224 and higher
- Up to 60 % more data memory for CPU 224 and higher
- New memory card for data logging, recipe management, saving of Micro/WIN project, storage of documentation in various formats
- PID auto-tune function
- 2 interfaces onboard for extended communication options, e.g. with other manufacturers' devices (CPU 224 XP, CPU 226)
- CPU 224 XP with integral analog inputs/outputs

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 224 XP

14/10 inputs/outputs (I/O)
2/1 analog I/O
+ max. 7 modules = 168 I/Os

CPU 226

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

Digital and analog expansions

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

Input modules

Output modules

Input/output modules

Software

STEP 7-Micro/WIN

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

Specific expansions

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

RTD temperature measurement

TC temperature measurement

Positioning module EM 253

Communication

- 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, etc

AS-Interface master max. 2 modules

Ethernet module CP 243-1

PROFIBUS DP slave max. 2 modules

IT module CP 243-1 IT

Modem module EM 241

Connection possibilities of all SIMATIC panels

Operating and monitoring

TD 200

- Backlit, 2-line LC-Display
- 8 user-programmable function keys
- Display of message texts
- Intervention in control program
- Setting of inputs/outputs

TD 200C

- Backlit, 2-line LC-Display
- Up to 20 configurable keys
- Appearance and size of keys can be configured individually
- User-interface layout selectable

OP 73micro

- Pixel graphics 3" display
- Signaling system with definable signal classes
- 5 online languages incl. Asian and Cyrillic scripts

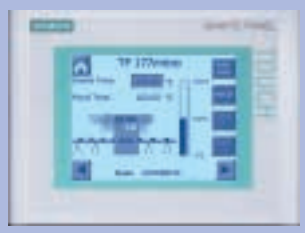
TP 170micro / TP 177micro

- Pixel graphics 5.7" display, suitable for vertical mounting (TP 177micro)
- Signaling system with definable signal classes
- 5 online languages incl. Asian and Cyrillic scripts

TD 200

TD 200C

OP 73micro



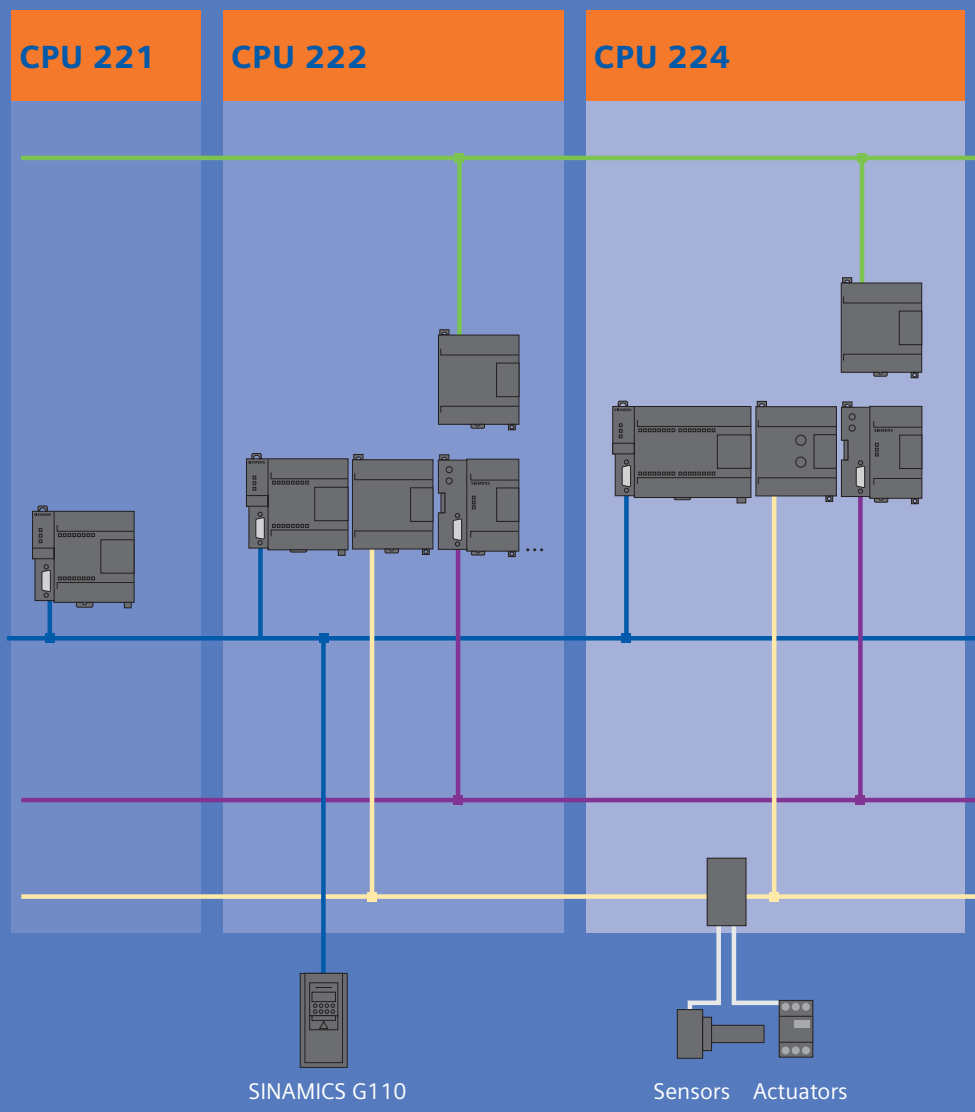
TP 177micro

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).

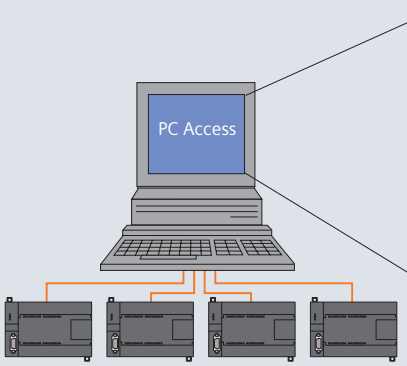
  This means the SIMATIC S7-200 is open for any connected device; for example, it enables connection of a modem, barcode scanner, PC, non-Siemens PLC and much more.
  By means of the USS protocol for drives, as many as 31 SINAMICS frequency converters can be controlled without additional hardware.
- The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

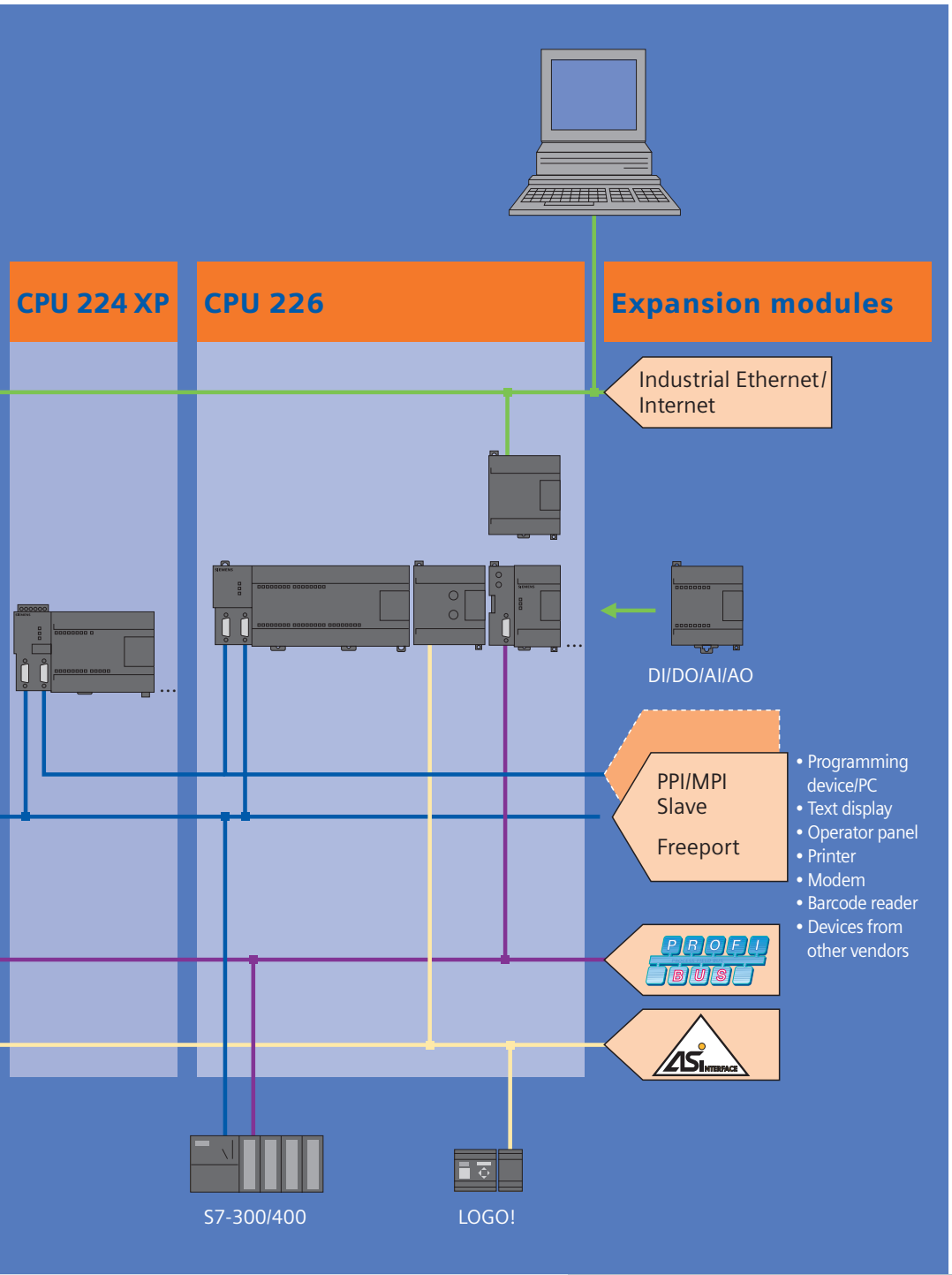


The perfect new connection with PC Access

PC Access is the perfect basis for data exchange between S7-200 and PC – regardless of the communication link selected (PPI, modem, Ethernet/IT CP). As an OPC Server, PC Access offers you the option of writing or reading S7-200 data with Microsoft Excel. As an OPC Client, it can be used for ProTool Pro, WinCC flexible RT, Win CC, Wonderware, etc. With an interface for the visualization via as many as 8 connections, the configuration, programming and monitoring can be implemented from a central location, saving both time and money.

The Internet module CP 243-1 IT also offers you fast access by permitting a simple universal connection of the PLC to different computers by means of FTP. The Ethernet module CP 243-1 allows you to access S7-200 process data quickly via Ethernet for archiving or further processing. The configuration support from STEP 7-Micro/WIN ensures simple commissioning and convenient diagnostic options.





Modem communications

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

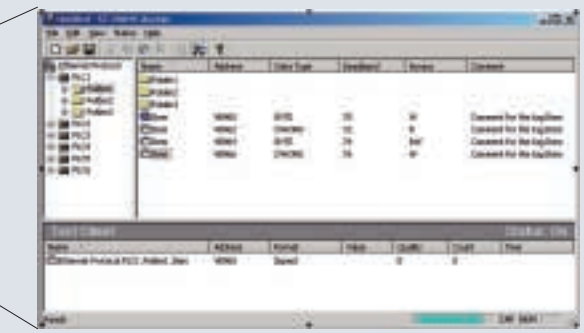
- Teleservice: the modem communication option is useful for avoiding expensive service calls. Two modems are all you need for remote use of the complete range of functions such as program transfer, status or control; the communications tools are integrated as a standard feature. External PCMCIA modems 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 text messages directly to a cell phone, error messages to a fax machine or Modbus RTU.

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.



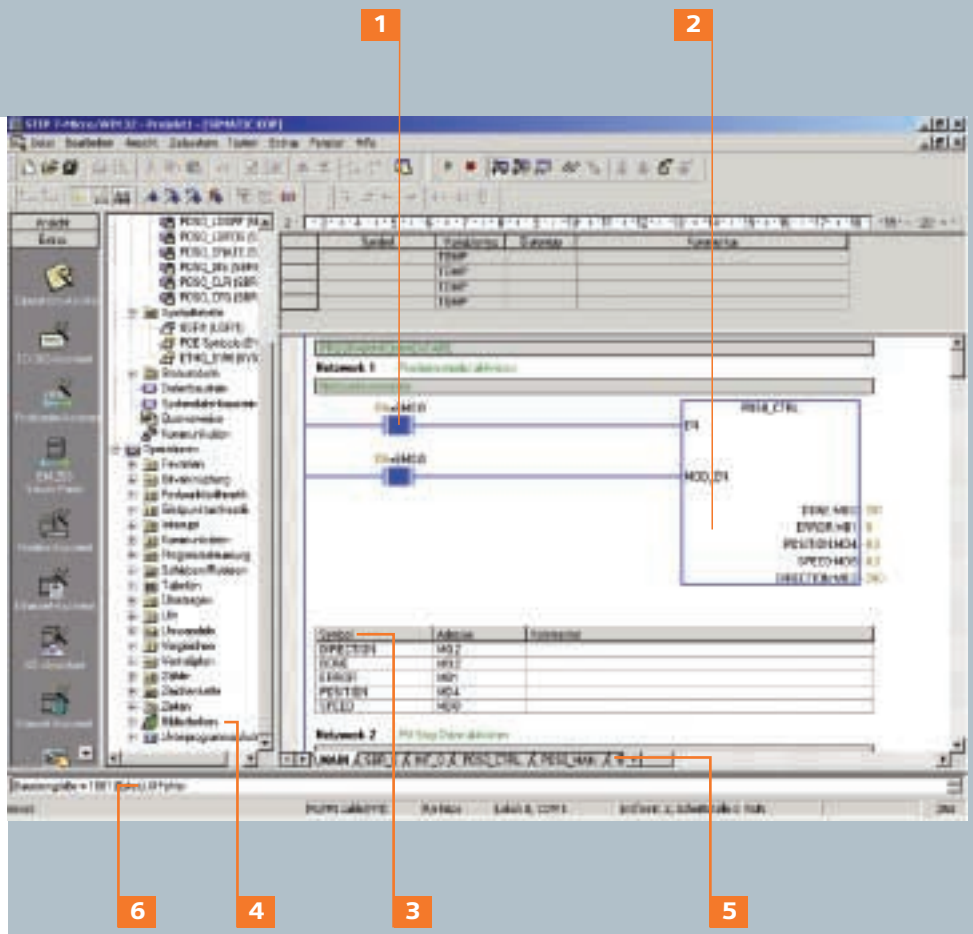
So easy to use:
The software for plug & play

The STEP 7-Micro/WIN programming software 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 standard Windows applications. Micro/WIN contains all the necessary tools for programming the entire S7-200 range of controllers. You have the powerful SIMATIC instruction set at your disposal and you can program in accordance with IEC 1131!

NEW **STEP 7-Micro/WIN 4.0**

The latest version STEP 7-Micro/WIN 4.0 ensures greater convenience – with Windows 2000 or Windows XP. A host of new functions such as Trend Charts and new, improved wizards now make programming even easier. And STEP 7-Micro/WIN 4.0 has even more to offer: e.g. segmented data memories, improved handling of the program and command structure or diagnostic functions such as a user-specific LED, error history or runtime edit and online download.

Programming in the standard editors LAD/FBD and STL – and it's easy to change between them.



1
Integrated online functions:
- Runtime edit
- Online status.

2
Context-sensitive online help is possible for all functions.

3
Clear and informative symbols and symbol table
- Standard symbol table
- User-defined table.

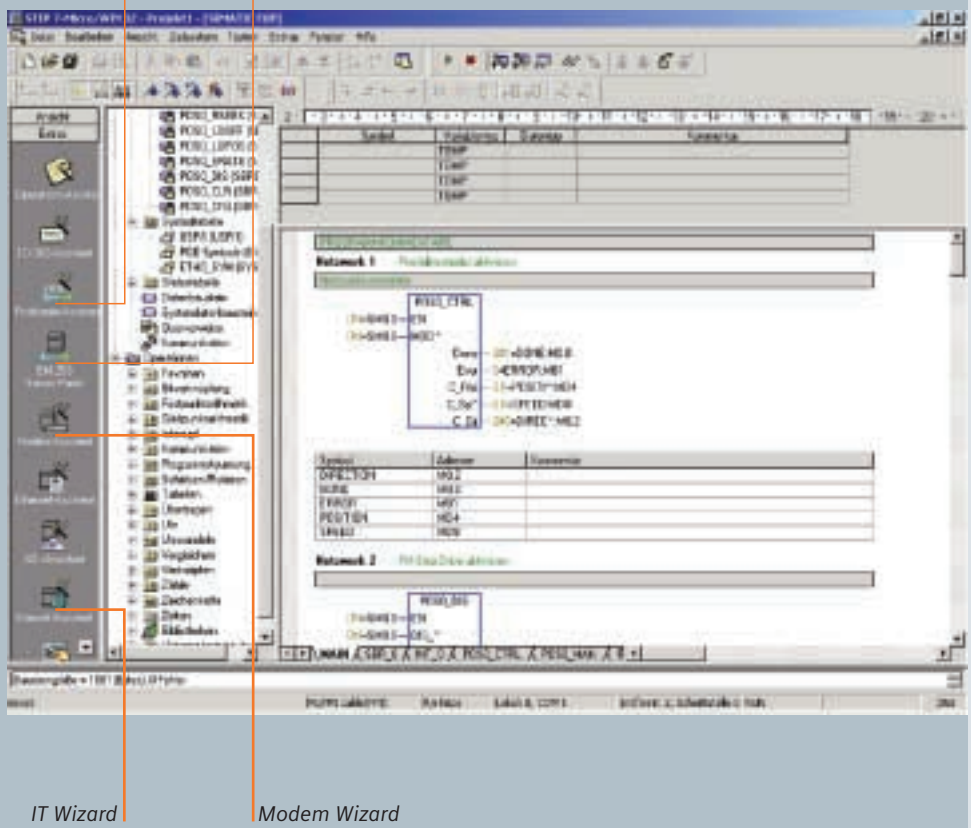
4
Structured programming with libraries
- USS protocol for actuating drives
- Modbus library
- Self-defined libraries.

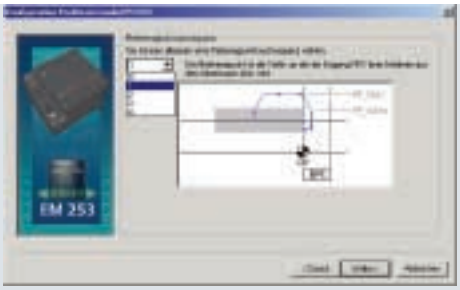
5
Structured programming with subroutines
- Parameterizable subroutines
- Password-protected subroutines
- Multiple calls of subroutines in user program
- Import/export of subroutines possible.

6
Debugging
- Fast online debugging
- Fault localization at the click of a mouse.

SIMATIC WinCC flexible

A special, low-cost engineering package has been bundled for configuration of the OP 73micro, TP 170micro and TP 177micro with WinCC flexible: WinCC flexible Micro. It goes without saying that the Compact/Standard/Advanced versions can also be used. Simple and quick configuration possible by means of a clear user interface, pre-generated graphics objects, intelligent tools for graphic configuration and support of multilingual configurations. A PC/PPI adapter cable is required for downloading the configuration.





Positioning Wizard


Positioning Control Panel

Modem Wizard


IT Wizard

The most important benefits of the wizards

- Parameterization instead of programming
- Graphical parameterization of complex tasks
- Automatic check of available memory area
- Generation of commented and executable program blocks.

STEP 7-Micro/WIN supports even the most complex automation solution with the following user-friendly wizards:

- TD 200 & TD 200C
- PID loops
- High-speed counters
- NetRead-NetWrite
- AS-Interface Wizard
- Ethernet/Internet Wizard
- Positioning Wizard
- Positioning Control Panel
- Modem
- Data Logging
- PID Auto-Tune Control Panel
- PTO (pulse outputs)
- Recipe management.

Positioning Wizard

- Parameterization of machine data
- Generation of different traverse profiles
- Selection of different types of reference point approaches

Control Panel

- Start-up tool for motion applications
- Adaptation and testing of the position parameters
- Modification of traverse profiles

IT Wizard

- Configuring of access authorization, E-mail, and FTP
- Parameterization of data exchange over Ethernet for, say, CPU to CPU

Modem Wizard

- Parameterization of data exchange between CPU and CPU
- Sending of SMS messages
- Teleservice with callback function and password protection

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 or 6 independent hardware counters, each with 30 kHz, 2 x 200 kHz with a new CPU 224 XP, e.g. for precise path monitoring with incremental encoders or for high-speed 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, or 2 x 100 kHz with new CPU 224 XP with pulse-width modulation and pulse-no-pulse setpoint – 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

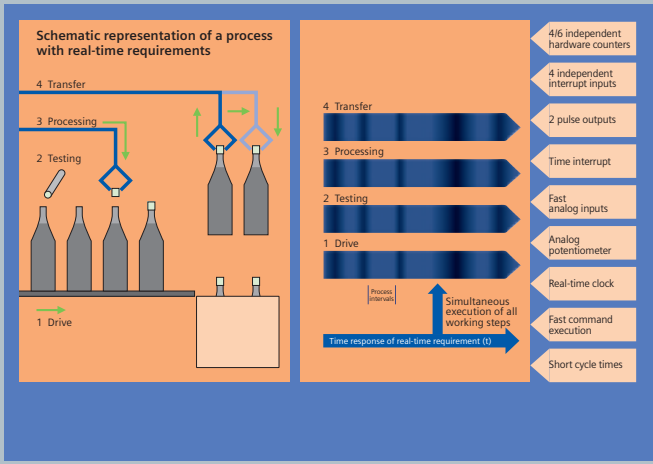
- Between 1 and 255 ms, with a resolution of 1 ms
- For example: it is possible to record and process signals during fast-action insertion of screws at an RPM rate of 3000 1/min after just a quarter turn. This enables very precise recording, for instance, of tightening torques (M) to ensure optimum fastening 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 224/224 XP	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	0.22 µs	0.22 µs	0.22 µs	0.22 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.

Memory Cartridge

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.

Whether project documentation, recipe handling or data logging – our new memory modules are available with 64 KB or 256 KB.

New options

Project documentation

- Bitmap files, PDF files, DOC files
- Complete MW projects can be transferred to the memory card with the S7-200 Explorer – giving you on-site access to the current user data at all times even without MW

Recipe handling

- Definition and download of the recipes, e.g. production data, machine parameters, etc
- Better use of memory by occupying the data memory in the CPU with only one recipe: online updating and adaptation

Data logging

- Dynamic storage, e.g. of performance or statistics data and fault or error messages
- Optionally with time stamp
- Log file transferable to PC via Explorer

Small and practical

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. Including automatic daylight saving-time switchover.

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.

Facts, Facts, Facts:
System data

Identical technical specifications of the CPUs 221, 222, 224, 224 XP, 226:	
Feature	**CPU 221, 222, 224, 224 XP, 226**
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	0.22 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, or 200 kHz with CPU 224 XP
Pulse outputs (pulse-width- or frequency-modulated)	2 outputs, 20 kHz each (for DC versions), 100 kHz with CPU 224 XP
Program and data memory	retentive (non-volatile)
Storage of dyn. data in the event of a power failure	retentive: non-volatile via internal high-performance capacitor and/or additional battery module: loading of data lock with STEP 7-Micro/WIN, TD 200C or by user program to integrated EEPROM
Buffering of the dynamic data with 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 115.2 kbaud (Freeport)
Programming software	STEP 7-Micro/WIN supports all standards such as STL, CSF or LAD
Optional program memory module	yes, programmable in CPU, for program transmission, data logging, recipe, documentation
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 224 XP	CPU 226
					
Integrated dig. inputs/outputs	6 DI/4 DO	8 DI/6 DO	14 DI/10 DO	14 DI/10 DO	24 DI/16 DO
Digital inputs/outputs/max. number of channels with expansion modules	–	40/38/78	94/82/168	94/82/168	128/120/248
Analog inputs/outputs/max. number of channels with expansion modules	–	8/4/10	28/14/35	2 AI/1 AO integrated 30/15/38	28/14/35
Program memory	4 KB	4 KB	8/12 KB	12/16 KB	16/24 KB
Data memory	2 KB	2 KB	8 KB	10 KB	10 KB
Storage of dyn. data via high-performance capacitor	typ. 50 h	typ. 50 h	typ. 100 h	typ. 100 h	typ. 100 h
High-speed counters	4 x 30 kHz, of which 2 x 20 kHz A/B counter usable	4 x 30 kHz, of which 2 x 20 kHz A/B counter usable	6 x 30 kHz, of which 4 x 20 kHz A/B counter usable	4 x 30 kHz, 2 x 200 kHz of which 3 x 20 kHz + 1 x 100 kHz A/B counter usable	6 x 30 kHz, of which 4 x 20 kHz A/B counter usable
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. 280 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	140 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**	**EM 222**	**EM 222**
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	**RS 232 Smart Cable (Multimaster[1, 2])**	**USB Smart Cable (Multimaster[3])**
Isolation	yes	yes
Power supply	from CPU	from USB Port
Supported protocols	PPI and ASCII (Freeport); 10/11 bit	PPI; 10/11 bit
PPI communication	9.6 k; 19.2 k; 187.5 k	9.6 k; 19.2 k; 187.5 k
Communication setting	DIP switch; RS 232 automatically	unnecessary
LED display	yes	yes
Required software	STEP 7-Micro/WIN V3.2 from SP4	STEP 7-Micro/WIN V3.2 from SP4

[1] RS 232 Smart Cable: for networks and external modems (including GSM); [2] Settings, e.g. for modems, are stored permanently;
[3] 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 connection possible for higher switching capacity	2 A	0.75 A in group-parallel connection possible for higher switching capacity	2 A	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	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

Temperature values in Centigrade or degrees Fahrenheit are available in the program as values with one decimal place.

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 module**	**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 download/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 (at 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 24 V DC	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				
Operator panels	**TD 200**	**TD 200C**	**OP 73micro[2)]**	**TP 170micro/TP 177micro[2)]**
Display	LC-Display	LC-Display	LC-Display 3" [1)]	LC-Display 5.7", STN, Blue Mode, 4 blue stages[1)]
Number of lines	2	2	–	–
Characters per line (max.)	20 (ASCII/Cyrillic), 10 (Chinese)	20 (ASCII/Cyrillic), 10 (Chinese)	–	–
Character height	5 mm	5 mm	–	–
Resolution	–	–	160 x 48 pixels	320 x 240 pixels (240 x 320 for vertical configuration of TP 177micro)
Operator controls	Membrane keyboard	Membrane keyboard	Membrane keyboard	Touch screen
Function keys (programmable)	8	20 freely configurable	4	–
System keys	5		8	–
Memory integrated (usable memory for user data)	User data on CPU	User data on CPU	128 KB Flash	256 KB Flash
Interfaces	1 PPI (RS 485); for setup of a network with max. 126 nodes	1 PPI (RS 485); for setup of a network with max. 126 nodes	1 x RS 485	1 x RS 485
Functionality				
Signals (freely definable signal classes)	80	80	250	500
Signal buffer (number of entries)	–	–	128 (no battery backup)	128 (no battery backup)
Mimic diagrams	64	64	250	250
Variables	864	864	500	250
Graphics objects	–	icons	bitmaps/icons/ background images	bitmaps/icons/ background images
Numeric/alphabetic input	• / –	• / –	• / •	• / •
Password	•	•	•	•
Online languages	5	5	5	5
Bar charts (pixel graphics)	•	•	•	•
Degree of protection (front/rear)	IP65, NEMA4 / IP20	IP65, NEMA4 / IP20	IP65 (when built in), NEMA4, NEMA4X, NEMA12 / IP20	IP65 (when built in), NEMA, NEMA4X, NEMA12 / IP20
Dimensions				
Front panel W x H in mm	148 x 76	148 x 76	154 x 84	212 x 156
Depth of device in mm	27	27	27	42
Certification	CE, cULus, FM, C-Tick, ATEX	CE, cULus, FM, C-Tick, ATEX	in prep. FM, cULus, CE, C-Tick	in prep. FM, cULus, CE, C-Tick
Supply voltage	24 V DC	24 V DC	24 V DC	24 V DC
Ambient conditions				
Operating temperature				
• vertical mounting	0 °C to 60 °C	0 °C to 60 °C	0 °C to 50 °C	0 °C to 50 °C
• max. angle of inclination	0 °C to 60 °C	0 °C to 60 °C	0 °C to 40 °C	0 °C to 40 °C
Transport/storage temperature	–20 °C to 70 °C	–20 °C to 70 °C	–20 °C to 70 °C	–20 °C to 60 °C
Weight	0.42 lb	0.44 lb	0.66 lb	1.54 lb
Configuration/programming	Micro/WIN 4.0	Micro/WIN 4.0	from WinCC flexible Micro	from WinCC flexible Micro

1) MTBF for backlighting (at 25 °C): OP 73micro about 100,000 h, TP 170micro/TP 177micro about 50,000 h

2) Available from: 4th quarter of 2004

• possible

– not possible

Product	Order No.
CPUs	
CPU 221 DC/DC/DC (not expandable)	6ES7 211-0AA23-0XB0
CPU 221 AC/DC/relay (not expandable)	6ES7 211-0BA23-0XB0
CPU 222 DC/DC/DC	6ES7 212-1AB23-0XB0
CPU 222 AC/DC/relay	6ES7 212-1BB23-0XB0
CPU 224 DC/DC/DC	6ES7 214-1AD23-0XB0
CPU 224 AC/DC/relay	6ES7 214-1BD23-0XB0
CPU 224XP DC/DC/DC	6ES7 214-2AD23-0XB0
CPU 224XP AC/DC/relay	6ES7 214-2BD23-0XB0
CPU 226 DC/DC/DC	6ES7 216-2AD23-0XB0
CPU 226 AC/DC/relay	6ES7 216-2BD23-0XB0
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, resist. 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 expansion module (EM)[1], 200 kHz, for controlling stepper motors or servo drives, open-loop control, parameterization via 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 control centers, signaling, CPU-to-CPU, CPU-to-PC communication	6ES7 241-1AA22-0XA0
Industrial Ethernet CP243-1, S7-200 interface to Industrial Ethernet	6GK7 243-1EX00-0XE0
Industrial Ethernet CP243-1-IT; function same as CP243-1 in addition: FTP, E-mail, HTML	6GK7 243-1GX00-0XE0
Manuals	
S7-200 system manual	6ES7 298-8FA24-8BH0
TP 170micro operating instructions	6AV6 691-1DB01-0AB0
OP 73micro/TP 177micro operating instructions	6AV6 691-1DF01-0AB0
User manual, WinCC flexible Micro	6AV6 691-1AA01-0AB0
CP 243-2 communications processor manual	6GK7 243-2AX00-8BA0

Product	Order No.
HMI	
TD 200 text display, 2-lines with cable (2.5 m) and fitting accessories, 187.5 kbaud	6ES7 272-0AA30-0YA0
TD 200C text display with individual user interface, 2-lines with cable (2.5 m) and fitting accessories, 187.5 kbaud	6ES7 272-1AA10-0YA0
TP 170micro, touch panel, pixel graphics 5.7"-STN display, configurable with WinCC flexible Micro	6AV6 640-0CA01-0AX0
OP 73micro, operator panel, pixel graphics 3" display, configurable with WinCC flexible Micro	6AV6 640-0BA11-0AX0
TP 177micro, touch panel, pixel graphics 5.7" display, configurable with WinCC flexible Micro	6AV6 640-0CA11-0AX0
Accessories	
Battery module	6ES7 291-8BA20-0XA0
EEPROM memory module (up to CPU ... 22 0XB0)	6ES7 291-8GE20-0XA0
Data logger cartridge, 64 KB (from CPU ... 23 0XB0)	6ES7 291-8GF23-0XA0
Data logger cartridge, 256 KB (from CPU ... 23 0XB0)	6ES7 291-8GH23-0XA0
Clock module, incl. battery (221, 222 to ... 22 0XB0)	6ES7 297-1AA20-0XA0
Clock module, incl. battery (221, 222 from ... 23 0XB0)	6ES7 297-1AA23-0XA0
Extension cable for expansion module, 0.8 m	6ES7 290-6AA20-0XA0
PC/PPI cable, RS 232/485 cable for PC/laptop/modem/xxx to S7-200, max. 187.5 kbit/s, Multimaster, ASCII, Freeport	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, RS 485 (PPI/MPI/PROFIBUS) for PC/laptop with max. 12 Mbit/s	6GK1 551-1AA00
CP5611: PCI card, RS 485 (PPI/MPI/PROFIBUS) for PC/laptop with max. 12 Mbit/s	6GK1 561-1AA00
Power supply unit, SITOP power 24 V/3.5 A	6EP1 332-1SH31
Blank template sheets for the front panel of the TD 200C (DIN A4, 10 sheets, each with 3 templates, perforated)	6ES7 272-1AF00-7AA0
Software	
STEP 7-Micro/WIN programming software, V4 for Win 2000, XP, 5 languages, incl. documentation on CD; single-user license	6ES7 810-2CC03-0YX0
STEP 7-Micro/WIN programming software, V4 for Win 2000, XP, 5 languages, incl. documentation on CD; upgrade from Micro/DOS and Micro/WIN Vx.x to V4	6ES7 810-2CC03-0YX3
STEP 7-Micro/WIN add-on Instruction library V1.1, control of drives (USS protocol) and data transmission via Modbus protocol, for STEP 7-Micro/WIN, V4	6ES7 830-2BC00-0YX0
WinCC flexible 2004 Micro: Single license on CD-ROM, without authorization: Engineering software for the configuration of the micro panels OP 73micro, TP 170micro and TP 177micro	6AV6 610-0AA01-0AA0
S7-200 PC Access V1.0 (OPC server) (single license)	6ES7 840-2CC01-0YX0
S7-200 PC Access V1.0 (OPC server) (multi-copy license –15)	6ES7 840-2CC01-0YX1
Complete systems	
SIMATIC S7-200 entry-level box with CPU 222, software STEP 7-Micro/WIN, V4 on CD incl. manual, 1-hour manual, PC/PPI data transmission cable, simulator, motor module	6ES7 298-0AA20-0AA3
Starter pack TP 170micro (TP 170micro, WinCC flexible Micro, manual collection on CD-ROM)	6AV6 650-0CA01-0AA0
Starter pack OP 73micro (OP 73micro, WinCC flexible Micro, manual collection on CD-ROM, MPI cable 5 m)	6AV6 650-0BA01-0AA0
Starter pack TP 177micro (TP 177micro, WinCC flexible Micro, manual collection on CD-ROM, MPI cable 5 m)	6AV6 650-0DA01-0AA0

Further information about SIMATIC S7-200 on the Internet: *www.siemens.com/s7-200*

- Command list (Quick Reference Card)
- Tips & tricks
- Demo software
- Free software updates
- Download manuals

Further information about SIMATIC panels on the Internet: *www.siemens.com/panels*

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