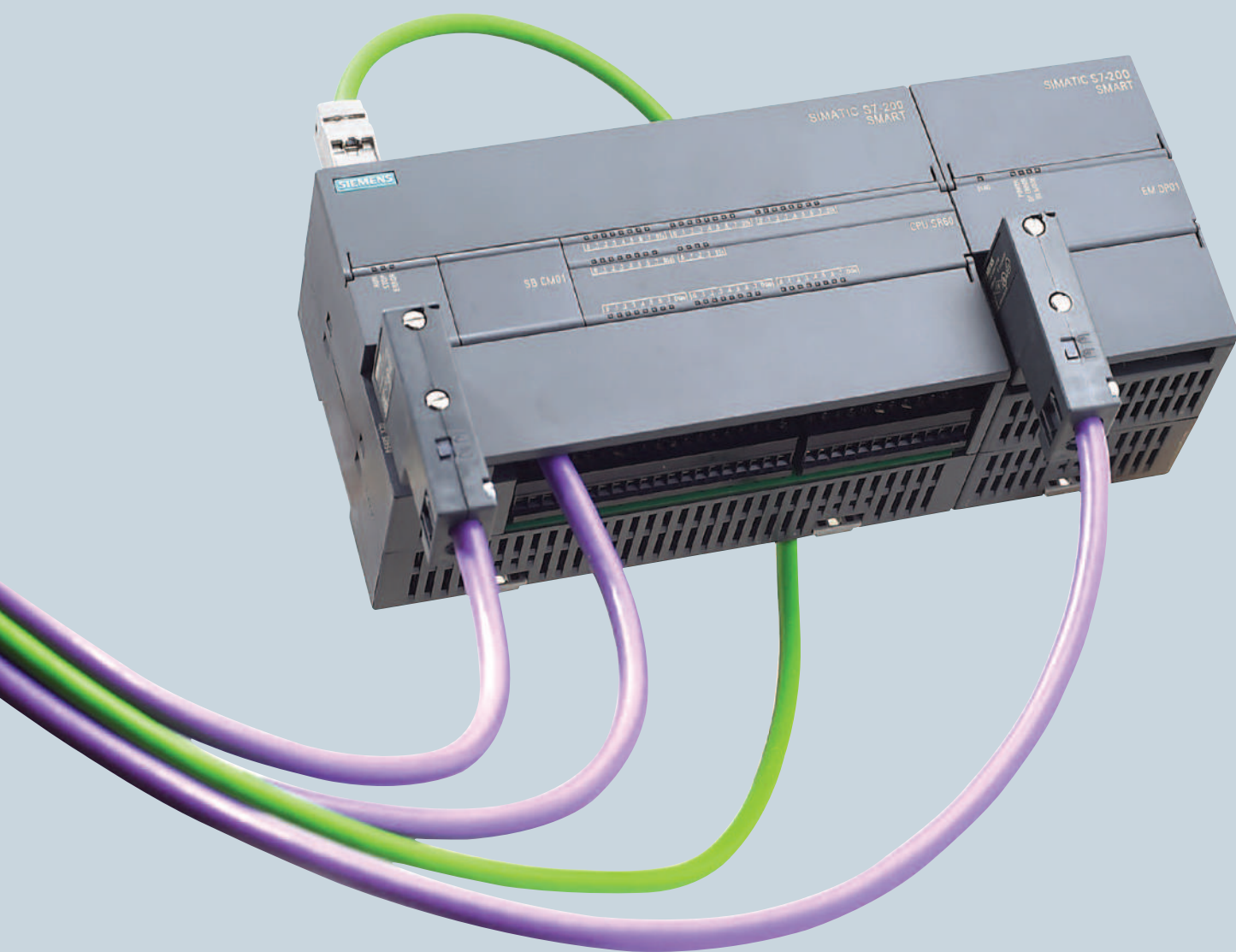


SIEMENS

Ingenuity for life



S7-200 SMART Programmable Controllers

product sample • 09.2020

[siemens.com](https://www.siemens.com)



Siemens has been committed to the development, promotion and application of the latest technologies in industrial automation for over 160 years.

In the meantime, it has brought reliable and efficient automation products to the vast number of industrial customers, and improved automation solutions.

The customer's production efficiency enhances the customer's market competitiveness.

The Siemens SIMATIC controller family is a complete product portfolio, from the most basic intelligent logic controllers

LOGO! And the S7 series of high-performance programmable controllers, and then to the PC-based automation control system. No matter how

With stringent requirements, it can be flexibly combined, customized, and met according to specific application needs and budget.

SIMATIC S7-200 SMART is a tailor-made company for Siemens customers after extensive market research.

Cost-effective small PLC products. Combined with Siemens SINAMICS drive products and SIMATIC HMI products,

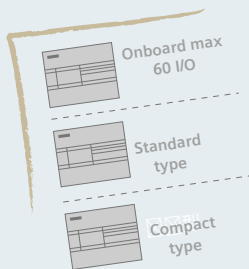
Small automation solutions centered on the S7-200 SMART will create more value for Chinese customers.



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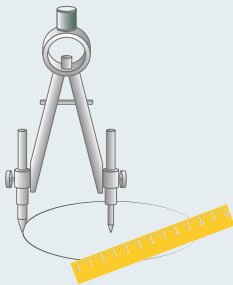
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SIMATIC S7-200 SMART Product Highlights



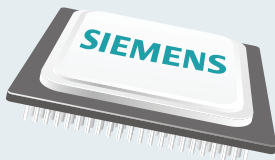
More models, more choices

It provides CPU modules that have a large number of I/O points onboard (up to 60 points.) The CPU module has a standard type and compact type for the users to choose, which can meet the different needs of customers.



Extension options, accurate customization

The new signal boards are designed with scalable communication ports, digital or analog channels, that are closely fitting to the user's application requirements, and lower the user's costs for expansion.



High speed chip, excellent performance

It is equipped with Siemens dedicated processor chip, the basic instruction execution time is up to 0.15 μ s, it has the leading performance compared to the micro PLC of the same level, it can easily deal with complex and fast processes.



Ethernet interconnectivity, economic and convenient

The standard Ethernet interface of the CPU supports various industrial Ethernet communication protocols such as PROFINET, TCP, UDP, Modbus TCP. Through this interface, it can also communicate with other PLCs, touch screens, inverters, servo drives, host computers and so on. The program can be downloaded to the PLC using a common network cable, eliminating the need for dedicated Programming cable, economical and fast

Tri-axial pulse, freedom in motion

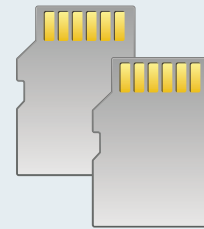
Provides powerful functions of speed and positioning control, the CPU module can maximally integrate three 100 kHz high speed pulse outputs, and support PWM/PTO.

The CPU-integrated PROFINET interface allows you to connect multiple servo drives with easy-to-use SINAMICS motion library commands for fast control of the machine's speed control and positioning.



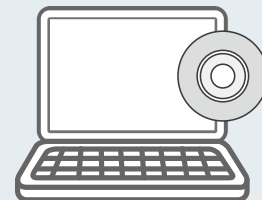
Common SD card, fast update

This PLC integrates Micro SD card slot, supports common Micro SD card, can be used to update the program or device firmware, and can provide great convenience to the engineer who conducts the field service.



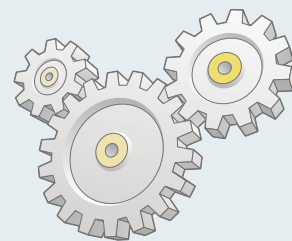
User-friendly software, programming efficiency

Based on the powerful functions inherited from the Siemens programming software, it has absorbed more humanized design which has enhanced the user friendliness of the software greatly. Improved the efficiency in developing the program.



Perfect integration, seamless integration

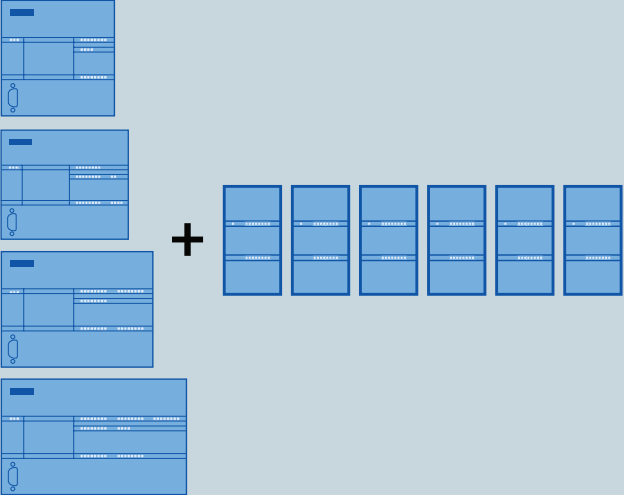
The perfect integration of SIMATIC S7-200 SMART, Basic HMI and SINAMICS V20/V90, forms the micro automation solutions that is cost-effective; meeting the OEM customer's full range of demand.



SR/ST CPU Module

The new S7-200 SMART CPU module can meet the needs of different industries, different customers and different equipment. The SR/ST standard CPU can expand 6 expansion modules and 1 signal board for applications with more I/O points and more complex logic control.

Standard CPU module
CPU SR20/SR30/SR40/SR60
CPU ST20/ST30/ST40/ST60



- Profinet interface 
- I/O expansion module
- RS485 serial port
- Signal board expansion
- Supporting Micro SD card
- Real-time clock ¹⁾
- High speed counters
- High speed pulse output ²⁾

¹⁾ Only supports the standard type CPU module
²⁾ Only supports the standard type transistor output;

Type	CR40	CR60	SR20	SR30	SR40	SR60	ST20	ST30	ST40	ST60
High speed counter	4 at 100 kHz for single phase		6 							
High speed pulse output	—						2 at 100 kHz	3 at 100 kHz		
Number of communication ports	2		2 ~ 4							
Number of Expansion modules	—		6							
Maximum I/O handling capacity ³⁾	40	60	216	226	236	256	216	226	236	256
Maximum analogue I/O ³⁾	—		49							

³⁾ The maximum I/O handling capacity is considering I/O expansion with Signal boards.



Communication and running state indicator, the PLC state can be seen easily.



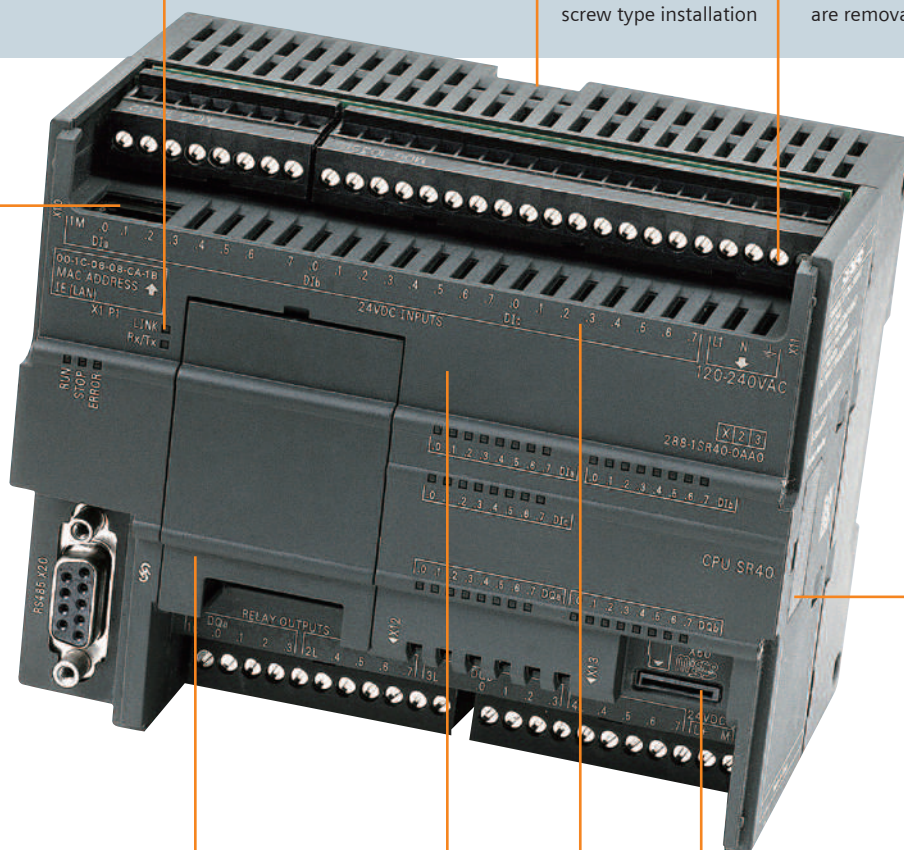
Convenient installation, support rail type and screw type installation



The input and output terminals of all modules are removable.



Integrated PROFINET interface, Program downloading and device networking are more convenient



Pin plug connection, module can be connected more closely



Signal board extension achieves accurate configuration, without occupying space in the electric control cabinet.



Generic Micro SD card supports program downloading and PLC firmware updating



Siemens dedicated high speed chip is incorporated, with basic instruction execution time up to 0.15 μ s



It is equipped with super capacitor, when the power is down, it still can guarantee the normal work of the clock

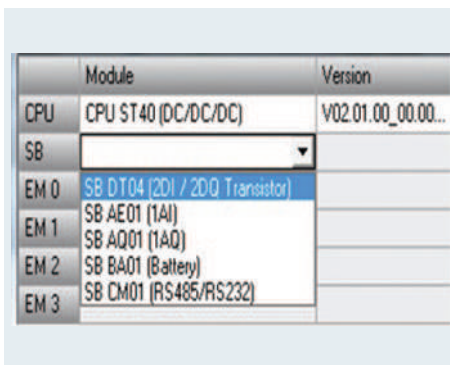
Signal board

The signal board is mounted directly on the front of the CPU body; without occupying the cabinet space, its installation and disassembly are convenient and quick. For a small amount of I/O points extension and more demand for communication ports, the signal board with new design can provide more economical and flexible solutions.



Basic information of the signal board

Model	Specification	Description
SB DT04	2DI/2DO transistor output	It provides additional digital I/O extensions, and support 2 digital inputs and 2 digital transistor outputs.
SB AQ01	1AO	It provides additional analogue I/O extension, and support 1 analogue output, with a precision 12 bits.
SB CM01	RS232/RS485	It provides additional RS232 or RS485 serial communication interface, the conversion can be realized via simple configuration in the software.
SB BA01	Battery module	It supports the generic CR1025 cell (battery), which can drive the clock for about 1 year.
SB AE01	1AI	It Provides additional analog I/O expansion to support 1. AI with 12 bits of precision



Signal board configuration

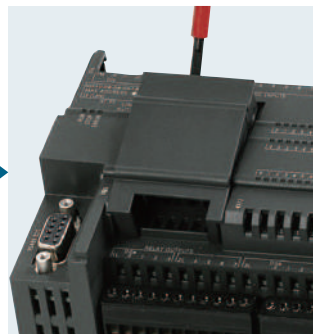
When the standard CPU module is selected in the system block, the aforementioned four signal boards will display the SB options:

- When SB DT04 is selected, the system can automatically distribute I7.0 and Q7.0 as the beginning of the I/O image area
- When SB AE01 is selected, the system automatically assigns AIW12 as the I/O image area.
- When SB AQ01 is selected, the system can automatically allocates AQW12 as the I/O image area
- When SB CM01 is selected, it can be done via selecting the RS232 or RS485 in the port type setting box.
- When SB BA01 is selected, the low power consumption alarm can be initialized or the power consumption state can be monitored via I7.0.

Installation steps



Remove the cover board of terminal



Remove the cover board with Screw driver



No fastening screw is required, gently insert it

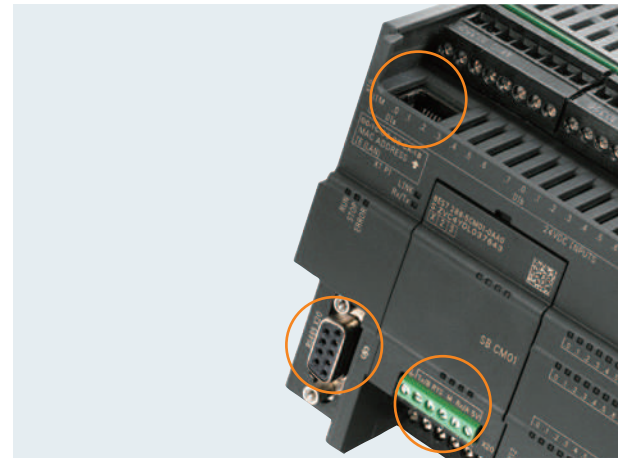


The installation is complete

Network communication

The S7-200 SMART SR/ST CPU module body integrates 1 PROFINET interface and 1 RS485 interface. By expanding the CM01 signal board or EM DP01 module, the number of communication ports can be increased to up to 4, which can meet small automation devices and touch screens. Inverters, servo drives and third-party devices

The need for communication.



Ethernet communication

SR/ST CPU integrated PROFINET interface, supports multiple protocols, and efficiently connects various devices:

- PROFINET communication: communication with the drive or servo drive, supporting up to 8 devices
- Can be used as a program download port (using a normal network cable)
- Supports Ethernet communication between multiple PLCs: Supports 8 active and 8 passive PUT/GET connections
- Open Ethernet communication: supports various communication protocols such as TCP, UDP, ISO_on_TCP, Modbus TCP, etc. Support 8 active and 8 passive connections

Profibus communication

The S7-200 SMART SR/ST CPU can be connected as a PROFIBUS-DP slave to the PROFIBUS communication network using the EM DP01 expansion module. The PROFIBUS-DP slave address can be set via the rotary switch on the module. The module Supports any PROFIBUS baud rate between 9600 baud and 12 M baud, allowing up to 244 input bytes and 244 output bytes.

The following protocols are supported:

- MPI slave
- PROFIBUS-DP slave

Serial communication

The S7-200 SMART CPU modules are integrated with one RS485 interface and can communicate with third-party devices such as inverters and touch screens. If an additional serial port is required, it can be realized by extending the CM01 signal board, and the signal board supports RS232/RS485 free conversion.

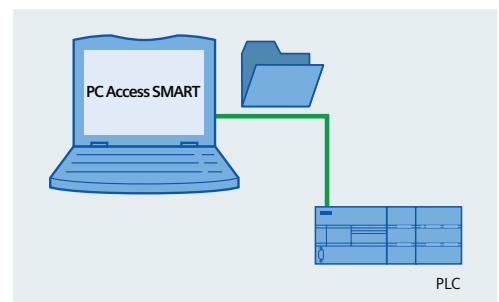
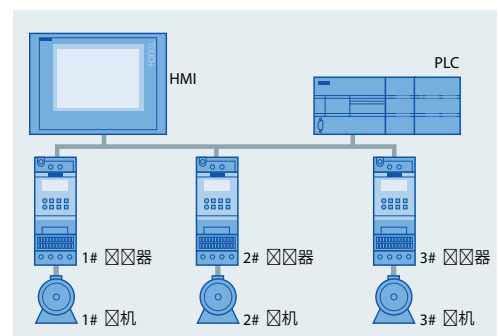
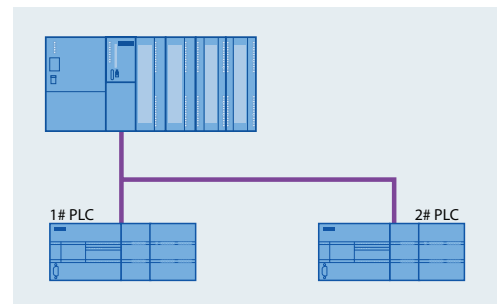
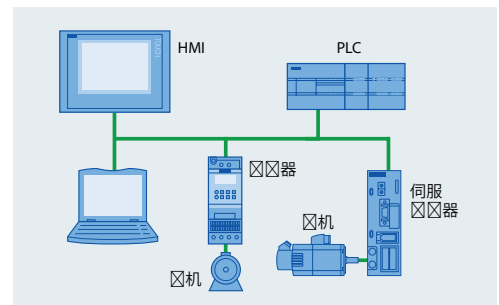
The serial port supports the following protocols:

- Modbus RTU
- USS
- Free port communication

Communication with the host computer

Using Siemens PC Access tool, it is possible to read the data from S7-200 SMART on to the host computer. This can be used for simple GUI requirements for data monitoring or data archiving.

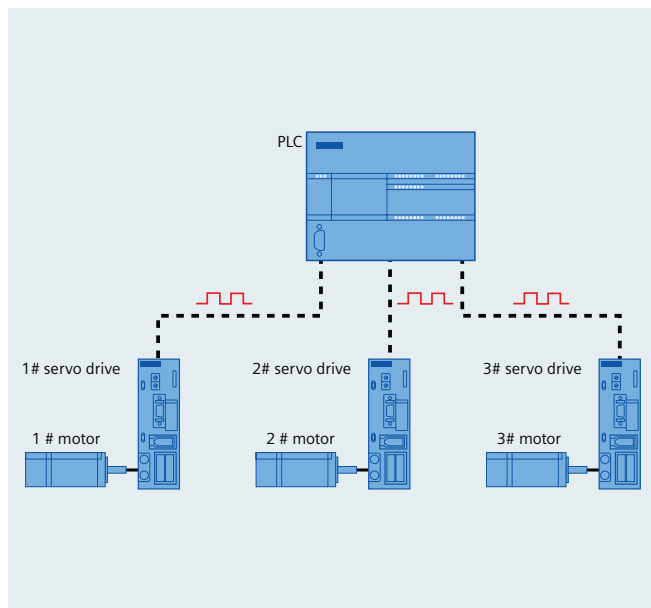
(PC Access is an OPC server protocol specifically developed for S7-200 series PLC, an OPC software dedicatedly developed for interaction between the micro PLC and host computer)



Motion control

S7-200 SMART CPU provides maximum three 100KHz high speed pulse outputs, it can be configured for PWM output or motion control output through the powerful and flexible setup wizard, providing a unified solution for speed and position control of both the stepper motor or servo motor, satisfying the precise positioning requirements of the small mechanical equipment.

The S7-200 SMART SR/ST CPU uses an integrated PROFINET interface to control the servo drive by means of communication, further reducing the inter-devicennWiring reduces the response time of the equipment to meet the positioning requirements of small mechanical equipment.



Basic functions of motion control

The S7-200 SMART CPU offers three open loop motion control methods:

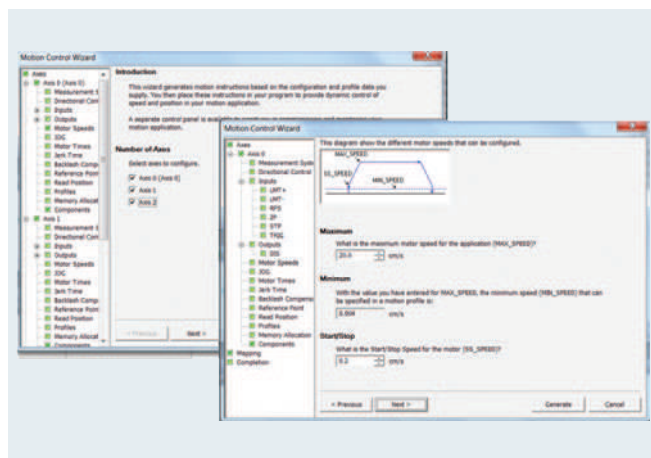
- Pulse train output (PTO): Built-in speed and position control of the CPU. This feature is only available Pulse train output is provided, and direction and limit control must be provided by the application using I/O integrated in the PLC or provided by the expansion module. See Pulse Output PLS Instruction
- Pulse Width Modulation (PWM): Built into the CPU's speed, position, or duty cycle control. If the PWM output is configured, the CPU will fix the cycle time of the output, controlling the duration of the pulse or the duty cycle through the program. The speed or position of the application can be controlled by changes in pulse duration. See pulse output PLS instruction
- Motion axis: Built into the CPU for speed and position control. This feature provides a single burst output with integrated directional control and disabled outputs, as well as programmable inputs and offers a variety of operating modes including automatic reference point search.

PWM and motion control wizard settings

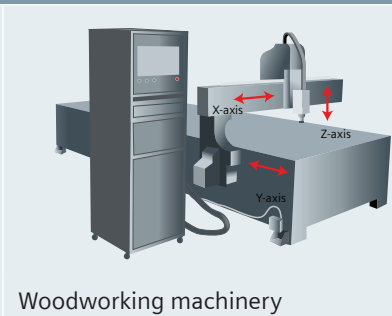
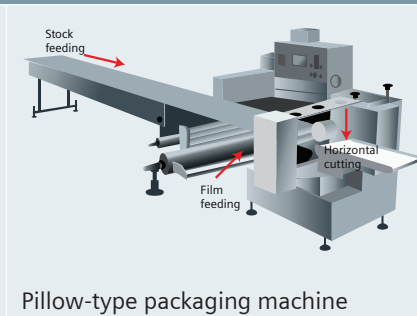
In order to simplify the control functions in your application, the position control wizard provided by the STEP 7- Micro/ WIN SMART can help you complete the PWM and the PTO configuration in a few minutes. The wizard can generate the position instructions, you can dynamically control the speed and position in your application with these instructions.

According to the user selected PWM pulse number, the PWM wizard can generate PWMx_RUN subroutine frame corresponding to editing.

Motion control wizards can maximally provide the settings for three pulse outputs, the pulse output speed is adjustable from 20 Hz to 100 kHz.



Typical applications

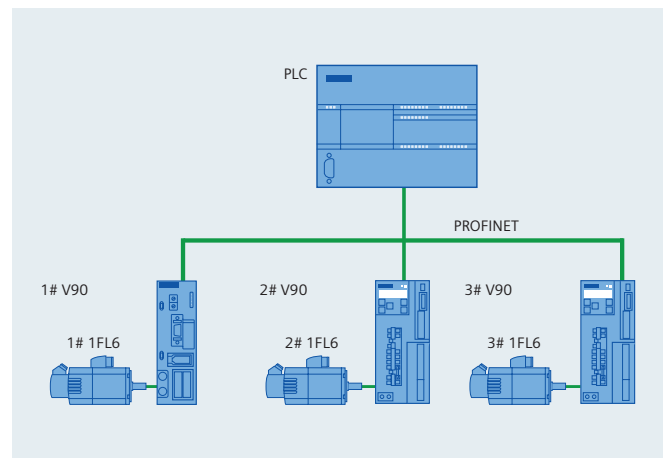


Control of SINAMICS servo drives with PROFINET

In order to simplify the control program and programming steps, STEP 7- Micro/WIN SMART integrates two sets of SINAMICS library instructions for easy PROFINET control servo positioning:

- SINAMICS_Control:
 - SINA_POS: Controls drive position via 8 different operating modes
 - SINA_SPEED : Control drive speed
- SINAMICS_Parameter:
 - SINA_PARA_S: read drive parameters or modify drive parameters

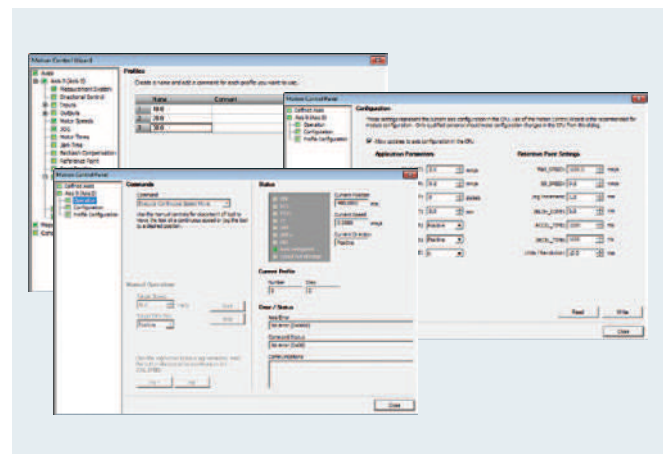
Note: Supported by STEP 7-Micro/WIN SMART V2.4 and above



PROFINET wizard and SINAMICS library make programming easier

Steps for connecting the S7-200 SMART CPU to the SINAMICS V90 PN servo drive:

- The SINAMICS V90 PN drive and servo motor are ready
- The drive and the S7-200 SMART CPU are connected to the PROFINET network
- The V-assistent software is connected to the SINAMICS V90 PN and has been configured for the V90PN Set relevant parameters (V-assistent software is V90PN debugging software)
- Add the GSDML file of the corresponding device to the STEP 7-Micro/WIN SMART software. Use the PROFINET wizard to set drive related parameters and configuration
- Call the SINAMICS library program and write the relevant program according to the control requirements



User-friendly software improves programming efficiency

STEP 7- Micro/WIN SMART is a programming configuration software for S7-200 SMART that runs smoothly on Windows 7 or Windows 10 operating systems and supports LAD (Ladder Diagram), STL (Statement List), FBD (Function Block Diagram) Programming language, freely convertible between some languages, the installation file is less than 200 MB. While using the excellent programming philosophy of STEP 7-Micro/WIN, more user-friendly design makes programming easier to use.

Project development is more efficient.

Full support for Windows 7 and Windows 10 operating systems

- Operating system: Windows 7 or Windows 10 (both 32-bit and 64-bit versions)
- At least 350 Mbytes of free hard disk space

New menu design

It has no more traditional drop-down menu. It has adopted the band-type menu design, all menu options can be seen completely. The image of the icon display makes the operation more convenient.

By double clicking on the menu, it can be hidden so as to provide more space for a visual programming window.

Fully movable window design

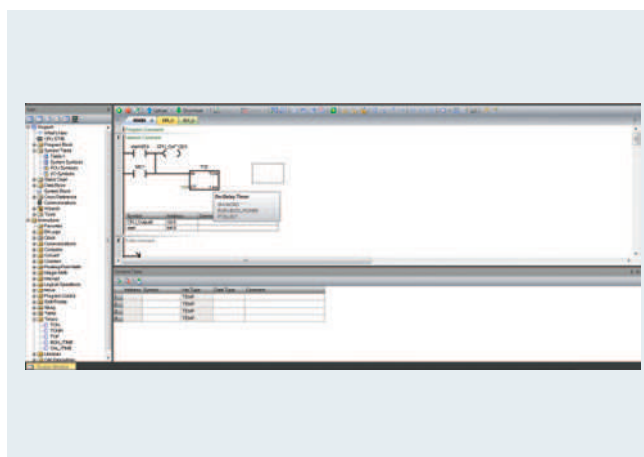
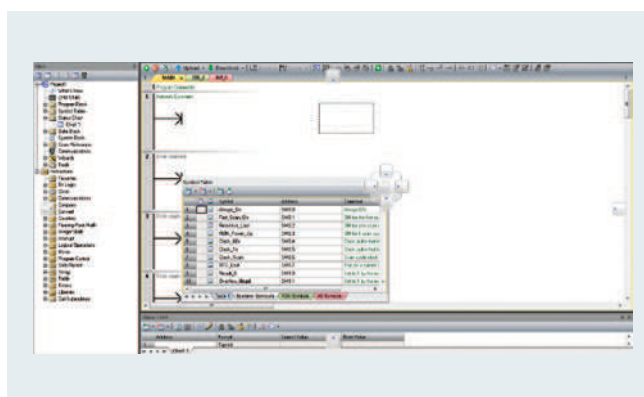
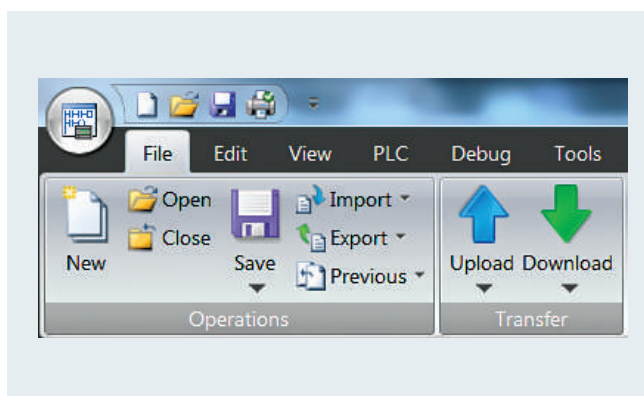
All windows in the software interface can move freely, and provide eight kinds of drag and drop methods.

The main window, the program editor, the output window, variable table, state diagram etc. windows can be combined according to the user's habits, maximally improve the programming efficiency.

The definitions of variables and program notes

The users can define the variable name according to the process flow, and can call through the variable name directly, allowing users to fully enjoy the convenience of high-level programming language. A special function registers the address call, automatically naming the variable, which can now be called directly the next time.

Micro/WIN SMART provides a perfect function for annotation, can add annotations to program block, programming network and variables, with its readability greatly improved. When the mouse is moved to the instruction block, data types supported by each pin are automatically displayed.



STEP 7-Micro/WIN SMART Software features:

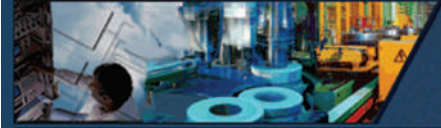
1. New menu design
2. Fully movable window design
3. Variable definitions and notes
4. Novel wizard setting
5. Status monitoring
6. Convenient command Library
7. Powerful password protection functions

For detailed information about the software, consult the S7-200 SMART System Manual.

SIEMENS

STEP 7-Micro/WIN SMART

Version V2.1



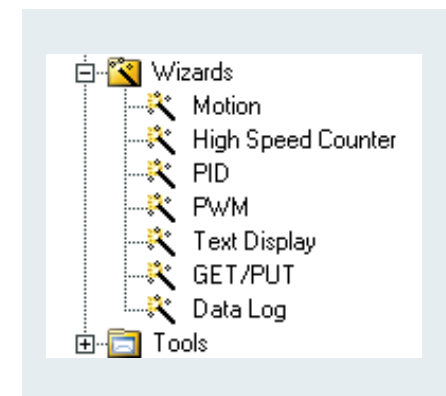
This program is protected by U.S. and international copyright laws as described in Help About

Setup wizard

Micro/WIN SMART integrates the quick and easy wizard setup function, just follow the wizard prompts to set the parameters of each step to complete the complex function settings. The new wizard feature allows the user to directly set the function of one of the steps, and the modified wizard does not need to reset each step.

The wizard settings support the following features:

- HSC (High Speed Counting)
- sport control
- PID
- PWM (Pulse Width Modulation)
- Text display
- GET/PUT
- Data log
- PROFINET 



Status monitoring

In the Micro/WIN SMART status graph, it can monitor the current values of each input / output channel of PLC, at the same time, it can conduct the mandatory input operation to test the program logic for each channel.

Status monitoring value can be displayed in numerical form, and can also be directly displayed in the waveform, the aforementioned two can also be switched each other.

In addition, the Micro/WIN SMART system can monitor the PID and motion control operation, equipment operation status through the dedicate operation panel.



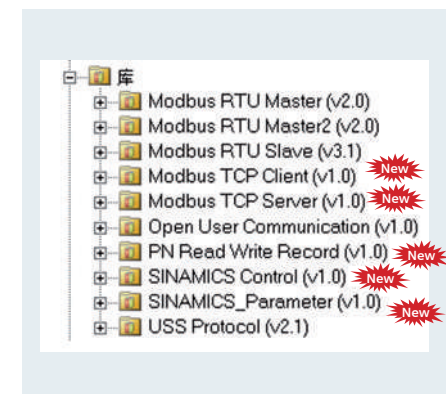
Convenient command Library

In PLC programming, the same tasks that are repetitively executed will be generally included in a subprogram, which can be directly used in the future. The use of subroutines can better organize the program structure, facilitate the debugging and reading.

Micro/WIN SMART provides the command library functions, converting the subroutine into a block of instructions, as a common block of instructions, which will be directly dragged and dropped into the programming interface to complete the call. The command library function provides password protection function, preventing the database files from being randomly reviewed or modified.

The Micro/WIN SMART software automatically integrates the Modbus RTU communication library, the Modbus TCP communication library, the open user communication library, the PN Read Write Record library, the SINAMICS library, and the USS communication library. 

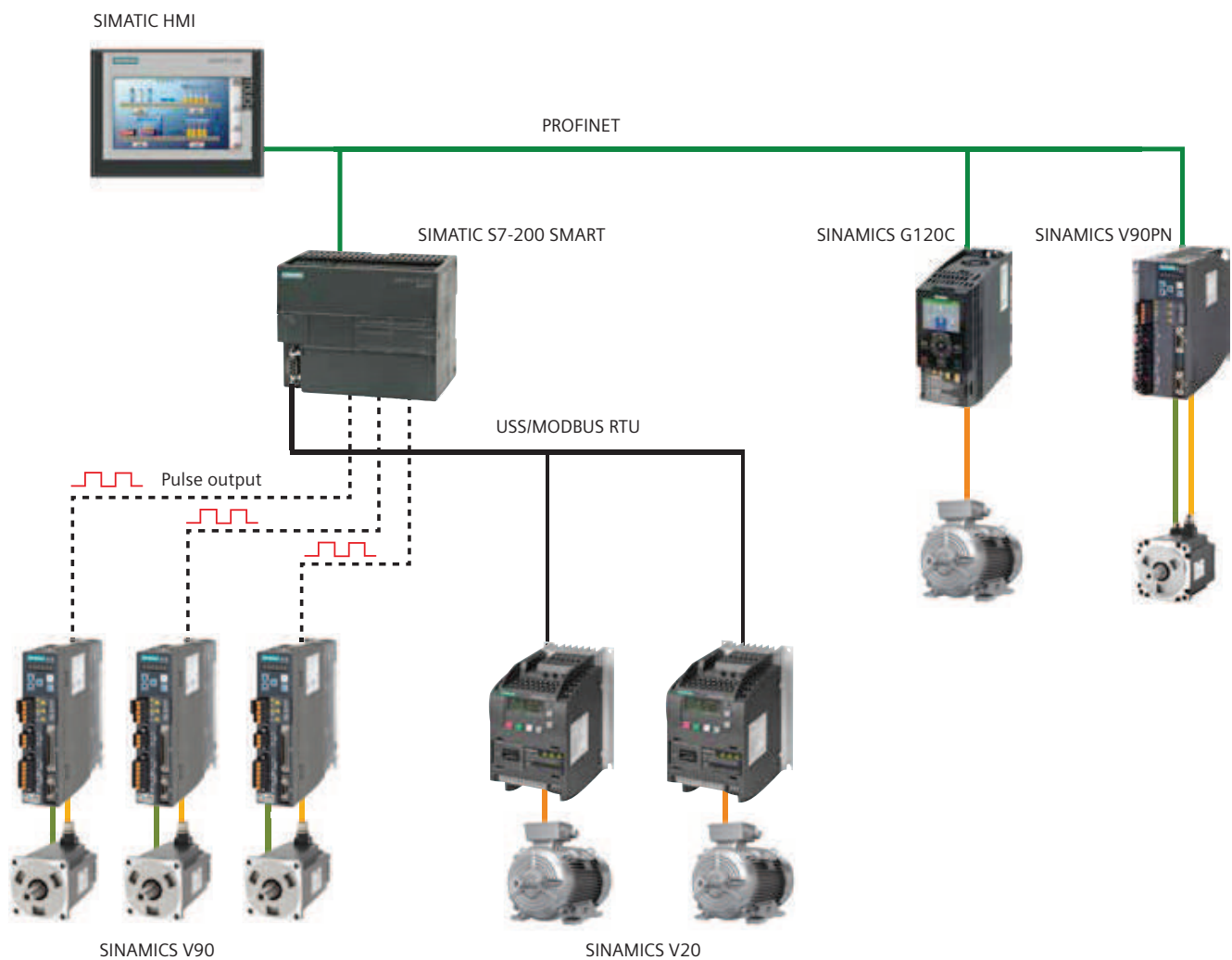
In addition, Siemens offers a large instruction library to complete a variety of functions, which can be easily added into the software.



SMART Automation Solution

The combination of Siemens SIMATIC automation products and SINAMICS drive products, the cost-effective SIMATIC S7-200 SMART PLC, SIMATIC SMART LINE touch screen, SINAMICS V20 inverter and SINAMICS V90 servo system bring perfect machine builders

A small automation solution that covers the full range of user needs for human-computer interaction, automation and drive. This solution helps users improve the performance of machinery and equipment, reduce development costs, significantly reduce the time-to-market of machinery and equipment, and effectively





For any information about SMART's small automation solutions, please visit <https://w3.siemens.co.in/automation/in/en/automation-systems/industrialautomation/s7-200-smart-plc/pages/default.aspx>

S7-200 SMART Recommendations:

- When programming and debugging, it is recommended to have one ordinary switch to connect related equipment (including PLC, touch screen, computer, inverter, servo drive, etc.) to the switch. After downloading the PLC or touch screen program, you can directly perform the touch test on the touch screen to check the working status of the PLC without connecting the PLC and the touch screen with cables.
- Quick and batch download of PLC programs using the Micro SD card. The produced source card can be sent to the end user via courier. When the customer puts forward various urgent needs on site, the source files in the card are directly sent to the on-site users via Email. After receiving, the source files can be copied to the Micro SD card for use.

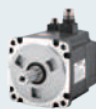


SIMATIC S7-200 SMART

- SR/ST CPU module with 20I/O, 30I/O, 40I/O, 60I/O configurations
- Integrated high-speed processor chip with bit instruction execution time of up to 0.15μs
- Expandable communication port, analog channel, digital channel and clock hold function via signal board
- SR/ST CPU module body integrates PROFINET interface and RS485 serial port, supports PROFINET interface download program
- Supports communication such as PROFINET, TCP, Modbus TCP, UDP, Modbus RTU, USS, PROFIBUS-DP
- The body integrates up to 3 100KHz high-speed pulse outputs And 6-channel 200KHz highspeed pulse input
- PN devices such as servo drives and inverters can be connected via the PROFINET network
- Support universal Micro SD card download program, update PLC firmware and restore factory settings
- PM207 provides high quality DC power to the entire system



SINAMICS V90



SIMOTICS S-1FL6

- 1/3 phase 220V power supply, covering power range from 0.05 kW to 2 kW
- 3-phase 380 V power supply covering power ranges from 0.4 kW to 7 kW
- One drive system for external pulse position control, internal setpoint position control, speed control and torque control System, accurate and efficient
- USS, Modbus RTU communication
- Full power standard brake resistor
- Real-time automatic optimization and harmonic suppression
- Supports high speed pulse input up to 1 MHz
- 20 bit high precision encoder
- Powerful and convenient debugging software, user-friendly design, rich debugging functions, and more efficient development



SINAMICS V20

- Single-phase 230 V power range from 0.12 to 3 kW, three-phase 400 V power range from 0.37 to 30 kW, integrated V/f, V2/f, FCC control mode
- ECO energy saving mode, energy saving effect is visible in real time through parameters
- Integrated USS, Modbus RTU communication
- Built-in common connection macros and application macros
- Parameter cloning and version upgrade without power supply
- Special features such as frost protection, hibernation, capture restart, auto restart
- 7.5 ~ 30 kW integrated brake module, other power supply brake options SINAMICS V20
- V20 with the same power supports a common DC busbar connection, energy sharing

Technical specifications

Technical specification for CPU SR20/ST20

Model	CPU SR20 AC/DC/RLY	CPU ST20 DC/DC/DC
Order No.: (MLFB)	6ES7 288-1SR20-0AA0	6ES7 288-1ST20-0AA0
Standard		
Dimension W x H x D (mm)	90 x 100 x 81	
Weight	367.3 g	320 g
Power consumption	14 W	20W
Available current (EM bus)	Max. 740 mA (5 V DC)	Max. 1110 mA (5 V DC)
Available current (24 V DC)	Max. 300 mA (sensor power source)	
Digital input current consumption (24 V DC)	4mA for each input point used	
CPU features		
User memory	12 KB program memory /8 KB data memory /max. 10 KB retentive memory	
On board digital I/O	12 input points / 8 output points	
Process image size	256 bits input (I) / 256 bits output (Q)	
Analog image	56 words input (AI) / 56 words output (AQ)	
Bit memory (M)	256 bits	
Temporary (local) memory	The main program has 64 bytes, each subroutine and interrupt program has 64 bytes	
I/O module extension	6 extension modules	
Signal board extension	Max. 1 signal board	
High speed counters	4 in total Single phase: 4 of 200 kHz Quadrature phase: 2 of 100 kHz	
Pulse output	–	2 of 100 kHz
Pulse capture input	12	
Cycle interrupt	2 in total, resolution is of 1ms,	
Interrupt Edge	4 rising edges and 4 falling edges (when using optional signal board, there are 6 edges each)	
Memory	Micro SDHC card (optional)	
Precision of real-time clock	120 seconds/month	
Real-time clock hold time	In general 7 days, or min. 6 days when 25 °C (Maintenance free super capacitor)	
Performance/ Processing Time		
Boolean	0.15 µs/instruction	
Moving word operations	1.2 µs/instruction	
Real mathematical operations	3.6 µs/instruction	
The user's program elements supported by the S7-200 SMART		
POUs	type/quantity • main program: 1 • sub-program: 128 (0 to 127) • interrupt program: 128 (0 to 127) Nesting depth • from main program: 8 sub-program level • from interrupt program: 4 sub-program level	
Accumulators	4	
Timer	type/quantity • non-holding (or not retained) (TON, TOF) : 192 • holding (or retained) (TONR) : 64	
Counters	256	
Communications 		
Number of ports	1 PROFINET port/ 1 serial (RS485) /1 additional serial (optional RS232/485 signal board) port	
HMI equipment	max. 4 connection on serial port & max. 8 connections on PROFINET port	
Programming equipment (PG)	PROFINET: 1 & Serial Port: 1	
CPU PUT/GET	PROFINET (LAN): 8 clients and 8 server connections	
PROFINET communication		
PROFINET controller/device	Yes/No	
Maximum number of PROFINET devices that can be connected to RT	8	
Maximum number of modules	64	
Open user communication	PROFINET (LAN): 8 active and 8 passive connections	
Data transmission rate	Profinet: 10/100 Mb/s RS485 system protocol: 9600, 19200 and 187500 b/s RS485 free port: 1200 to 115200 b/s	
Isolation (external signal and PLC logic side)	Profinet: Transformer isolation, 1500 V AC RS485: none	
Type of cable	Profinet: CAT5e shielded cable RS485: PROFIBUS network cable	
Power source		
Voltage range	85 ~ 264 V AC	20.4 ~ 28.8 V DC
Power supply frequency	47 ~ 63 Hz –	
Input current	When the maximum load is reached, only CPU is included 210 mA when voltage is 120 V AC (with a 300 mA sensor power output) 90 mA when voltage is 120 V AC (without a 300 mA sensor power output) 120 mA when voltage is 240 V AC (with a 300 mA sensor power output) 60 mA when voltage is 240 V AC (without a 300 mA sensor power output) When the max load is reached, it CPU and all the scalable extensions are included 290 mA when voltage is 120 V AC 170 mA when voltage is 240 V AC	When the maximum load is reached, only CPU is included 160 mA when voltage is 24 V DC (without a 300 mA sensor power output) 430 mA when voltage is 24 V DC (with a 300 mA sensor power output) When the max load is reached, CPU and all the scalable extensions are included 720 mA when voltage is 24 V DC

Model	CPU SR20 AC/DC/RLY	CPU ST20 DC/DC/DC
Inrush current (max)	9.3 A when voltage is 264 V AC	11.7 A when voltage is 28.8 DC
Isolation (input power with the logic side)	1500 V AC	—
Leakage current, AC line for functional earthing	Max 0.5 mA	—
Hold time (power off)	30 ms when voltage is 120 V AC 200 ms when voltage is 240 V AC	20 ms when voltage is 24 V DC
Internal fuse (cannot be replaced by the user)	3 A, 250 V, Slow-blow fuse	3 A, 250 V, Slow-blow fuse
Sensor power source		
Voltage range	20.4 ~ 28.8 V DC	
Rated output current (max)	300 mA (short circuit protection)	
Maximum ripple noise (<10 MHz)	<1 V peak-peak value	
Isolation (CPU logic side and sensor power source)	Not isolated	
Digital input		
Number of input points	12	
Type	The sinking / sourcing type (IEC type 1 sinking)	The sinking/sourcing type (IEC type 1 sinking excluding I0.0 to I0.3)
Rated voltage	It is 24V DC when the current is 4 mA, nominal value	
Allowable continuous voltage	Max 30 V DC	
Surge voltage	35 V DC, lasting 0.5 s	
Logic 1 signal (min)	It is 15 V DC when the current is 2.5 mA	The voltage is 4 V DC when it ranges from I0.0 to I0.3, I0.6 to I0.7: 8 mA Other input: 15 V DC when it is 2.5 mA
Logic 0 signal (min)	It is 5 V DC when the current is 1 mA	The voltage is 1 V DC when it ranges from I0.0 to I0.3, I0.6 to I0.7: 1 mA Other input: 5 V DC when it is 1 mA.
Isolation (field side and logic side)	500 V AC, lasting 1 min	
Isolation group	1	
Filter time	Each channel can be separately selected (point I0.0 to I1.3) : 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 μ s 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms	
HSC clock input frequency (max) (Logic 1 battery = 15 ~ 26 V DC)	Single phase: 4 200 KHz + 2 30 KHz Quadrature phase: 2 100 KHz + 2 20 KHz	
Number of inputs that connect at the same time	12	
Cable length (max), its unit is meter	Shielded: 500m (normal input), 50m (HSC input); non shielded: 300m (normal input)	I0.0 to I0.3, shielded (only limited to this category): 500 m (normal input), 50 m (HSC input) I0.6 to I0.7, shielded (only limited to this category): 500 m (normal input), All other inputs: shielded: 500 m (normal input); non shielded: 300 m (normal input)
Digital output		
Number of output	8	
Type	Relay, dry contact	Solid state-MOSFET (source-type)
Voltage range	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC
Logic 1 signal when the current is max.	—	Min. 20 V DC
Logic 0 signal when the load is KG	—	Max. 0.1 V DC
Rated current at each point (max)	2.0 A	0.5 A
Rated current at each public end (max)	10.0 A	6 A
Lamp load	30 W DC/200 W AC	5 W
On state resistance	New equipment is 0.2 Ω maximally	Max. 0.6 Ω
Leakage current at each point	—	Max. 10 μ A
Surge current	It is 7A when the contact is closed	8 A, max. lasting 100 ms
Overload protection	none	
Isolation (field side and logic side)	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	500 V AC, lasting 1 min
Isolation resistance	New equipment is 100 M Ω minimally	—
Disconnect the insulation between the contacts	750 V AC, lasting 1 min	—
Isolated group	1	2
Inductive voltage clamp	Not recommended	L+ - 48 V DC, 1 W loss
Relay max. on/off frequency	Not recommended	
Switching delay (Qa.0-Qa.3)	Max. 10 ms	From the disconnection to connection max. 1 μ s from the connection to disconnection is 3 μ s max.
Switching delay (Qa.0-Qa.7)	Max. 10 ms	From the disconnection to connection max. 50 μ s from the connection to disconnection is 200 μ s max.
Mechanical life (no load)	10,000,000 break/close cycles	—
Contact life under the rated load	100,000 break/close cycles	—
Output state under the STOP mode	Last value or replicable value (The default value is 0)	
Number of output that are connected at the same time	8	
Cable length	Shielded: 500 m; non shielded: 300 m	

Technical specification or CPU SR30/ST30

Model	CPU SR30 AC/DC/RLY	CPU ST30 DC/DC/DC
Order No.: (MLFB)	6ES7 288-1SR30-0AA0	6ES7 288-1ST30-0AA0
Standard		
Dimension W x H x D (mm)	110 x 100 x 81	
Weight	435 g	375 g
Power consumption	14 W	12W
Available current (EM bus)	Max. 740 mA (5 V DC)	
Available current (24 V DC)	Max. 300 mA (sensor power source)	
Digital input current consumption (24 V DC)	4mA for each input point used	
CPU features		
User memory	18 KB program memory /12 KB data memory /max. 10 KB retentive memory	
On board digital I/O	18 input points / 12 output points	
Process image size	256 bits input (I) / 256 bits output (Q)	
Analog image	56 words input (AI) / 56 words output (AQ)	
Bit memory (M)	256 bits	
Temporary (local) memory	The main program has 64 bytes, each subroutine and interrupt program has 64 bytes	
I/O module extension	6	
Signal board extension	Max. 1 signal board	
High speed counters	4 in total Single phase: 4 of 200 kHz Quadrature phase: 2 of 100 kHz	
Pulse output	–	3 of 100 kHz
Pulse capture input	12	
Cycle interrupt	2 in total, resolution is of 1ms,	
Interrupt Edge	4 rising edges and 4 falling edges (when using optional signal board, there are 6 edges each)	
Memory	Micro SDHC card (optional)	
Precision of real-time clock	120 seconds/month	
Real-time clock hold time	In general 7 days, or min. 6 days when 25 °C (Maintenance free super capacitor)	
Performance/ Processing Time		
Boolean	0.15 μs/instruction	
Moving word operations	1.2 μs/instruction	
Real mathematical operations	3.6 μs/instruction	
The user's program elements supported by the S7-200 SMART		
POUs	type/quantity • main program: 1 • sub-program: 128 (0 to 127) • interrupt program: 128 (0 to 127) Nesting depth • from main program: 8 sub-program level • from interrupt program: 4 sub-program level	
Accumulators	4	
Timer	type/quantity • non-holding (or not retained) (TON, TOF) : 192 • holding (or retained) (TONR) : 64	
Counters	256	
Communications 		
Number of ports	1 PROFINET port/ 1 serial (RS485) /1 additional serial (optional RS232/485 signal board) port	
HMI equipment	max. 4 connection on serial port & max. 8 connection on PROFINET port	
Programming equipment (PG)	PROFINET: 1 & Serial Port: 1	
CPU (PUT/GET)	PROFINET (LAN): 8 clients and 8 server connections	
PROFINET communication		
PROFINET controller/device	Yes/No	
Maximum number of PROFINET devices that can be connected to RT	8	
Maximum number of modules	64	
Open user communication	PROFINET (LAN): 8 active and 8 passive connections	
Data transmission rate	PROFINET: 10/100 Mb/s RS485 system protocol: 9600, 19200 and 187500 b/s RS485 free port: 1200 to 115200 b/s	
Isolation (external signal and PLC logic side)	PROFINET: Transformer isolation, 1500 V AC RS485: none	
Type of cable	PROFINET: CAT5e shielded cable RS485: PROFIBUS network cable	
Power source		
Voltage range	85 ~ 264 V AC	20.4 ~ 28.8 V DC
Power supply frequency	47 ~ 63 Hz	–
Input current	When the maximum load is reached, only CPU is included 92 mA (including power source of the sensor) when the voltage is 120 V AC 40 mA (excluding power source of the sensor) when the voltage is 120 V AC 52 mA (including power source of the sensor) when the voltage is 240 V AC 27 mA (excluding power source of the sensor) when the voltage is 240 V AC When the max load is reached, it CPU and all the scalable extensions are included 136 mA when voltage is 120 V AC 72 mA when voltage is 240 V AC	When the maximum load is reached, only CPU is included 64 mA when voltage is 24 V DC (without a 300 mA sensor power output) 365 mA when voltage is 24 V DC (with a 300 mA sensor power output) When the max load is reached, CPU and all the scalable extensions are included 624 mA when voltage is 24 V DC
Inrush current (max)	8.9 A when voltage is 264 V AC	6 A when voltage is 28.8 V DC

Model	CPU SR30 AC/DC/RLY	CPU ST30 DC/DC/DC
Isolation (input power with the logic side)	1500 V AC	–
Leakage current, AC line for functional earthing	Max 0. 5 mA	–
Hold time (power off)	30 ms when voltage is 120 V AC 200 ms when voltage is 240 V AC	20 ms when voltage is 24 V DC
Internal fuse (cannot be replaced by the user)	3 A, 250 V, Slow-blow fuse	
Sensor power source		
Voltage range	20.4 ~ 28.8 V DC	
Rated output current (max)	300 mA (short circuit protection)	
Maximum ripple noise (<10 MHz)	<1 V peak-peak value	
Isolation (CPU logic side and sensor power source)	Not isolated	
Digital input		
Number of input points	18	
Type	The sinking / sourcing type (IEC type 1 sinking)	The sinking/sourcing type (IEC type 1 sinking excluding I0.0 to I0.3)
Rated voltage	It is 24 V DC when the current is 4 mA, rated value	
Allowable continuous voltage	Max 30 V DC	
Surge voltage	35 V DC, lasting 0.5 s	
Logic 1 signal (min)	It is 15 V DC when the current is 2.5 mA	The voltage is 4 V DC when it ranges from I0.0 to I0.3, I0.6 to I0.7: 8 mA Other input: 15 V DC when it is 2.5 mA
Logic 0 signal (min)	It is 5 V DC when the current is 1 mA	The voltage is 1 V DC when it ranges from I0.0 to I0.3, I0.6 to I0.7: 1 mA Other input: 5 V DC when it is 1 mA.
Isolation (field side and logic side)	500 V AC, lasting 1 min	
Isolation group	1	
Filter time	Each channel can be separately selected (point I0.0 to I1.5): 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 µs 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms Each channel can be separately selected (I0.6) : 0, 6.4, 12.8 ms	
HSC clock input frequency (max) (Logic 1 battery = 15 ~ 26 V DC)	Single phase: 5 200 KHz + 1 30 KHz Quadrature phase: 3 100 KHz + 1 20 KHz	
Number of inputs that connect at the same time	18	
Cable length (max), its unit is meter	Shielding: 500m (normal input), 50m (HSC input) ; non shielding: 300m (normal input)	I0.0 to I0.3, shielding (only limited to this category): 500 m (normal input), 50 m (HSC input) I0.6 to I0.7, shielding (only limited to this category): 500 m (normal input), All other inputs: shielding: 500 m (normal input); non shielding: 300 m (normal input)
Digital output		
Number of output	12	
Type	Relay, dry contact	Solid state-MOSFET (source-type)
Voltage range	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC
Logic 1 signal when the current is max.	–	Min. 20 V DC
Logic 0 signal when the load is 10 K Ω	–	Max. 0.1 V DC
Rated current at each point (max)	2.0 A	0.5 A
Rated current at each public end (max)	10.0 A	6 A
Lamp load	30 W DC/200 W AC	5 W
On state resistance	New equipment is 0.2 Ω maximally	Max. 0.6 Ω
Leakage current at each point	–	Max. 10 µ A
Surge current	It is 7A when the contact is closed	8 A, max. lasting 100 ms
Overload protection	none	
Isolation (field side and logic side)	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	500 V AC, lasting 1 min
Isolation resistance	New equipment is 100 MΩ minimally	–
Disconnect the insulation between the contacts	750 V AC, lasting 1 min	–
Isolated group	1	
Inductive voltage clamp	Not recommended	L+ - 48 V DC, 1 W loss
Switching delay (Qa.0-Qa.3)	Max. 10 ms	From the disconnection to connection max.1 µs from the connection to disconnection is 3 µs max.
Switching delay (Qa.4-Qb.7)	Max. 10 ms	From the disconnection to connection max. 50 µs from the connection to disconnection is 200 µs max.
Mechanical life (no load)	10,000,000 break/close cycles	–
Contact life under the rated load	100,000 break/close cycles	–
Output state under the STOP mode	Last value or replicable value (The default value is 0)	
Number of output that are connected at the same time	12	
Cable length	Shielded: 500 m; non shielded: 150 m	

Technical specification for CPU SR40/ST40/CR40

Model	CPU SR40 AC/DC/RLY		CPU ST40 DC/DC/DC	CPU CR40 AC/DC/RLY
Order No.: (MLFB)	6ES7 288-1SR40-0AA0		6ES7 288-1ST40-0AA0	6ES7 288-1CR40-0AA0
Standard				
Dimension W x H x D (mm)	125 x 100 x 81			
Weight	441.3 g	410.3 g	440 g	
Power consumption	23 W	18 W	18 W	
Available current (EM bus)	Max. 740 mA (5 V DC)			–
Available current (24 V DC)	Max. 300 mA (sensor power source)			
Digital input current consumption (24 V DC)	4mA for each input point used			
CPU features				
User memory	24 KB program memory /16 KB data memory /max. 10 KB retentive memory		12 KB program memory /8 KB data memory /max. 10 KB retentive memory	
On board digital I/O	24 input points / 16 output points			
Process image size	256 bits input (I) / 256 bits output (Q)			
Analog image	56 words input (AI) / 56 words output (AQ)			
Bit memory (M)	256 bits			
Temporary (local) memory	The main program has 64 bytes, each subroutine and interrupt program has 64 bytes			
I/O module extension	6 extension modules			–
Signal board extension	Max. 1 signal board			–
High speed counters	4 in total Single phase: 4 of 200 kHz Quadrature phase: 2 of 100 kHz		4 in total Single phase: 4 of 100 kHz Quadrature phase: 2 of 50 kHz	
Pulse output	3, 100 kHz			–
Pulse capture input	14			
Cycle interrupt	2 in total, resolution is of 1ms,			
Interrupt Edge	4 rising edges and 4 falling edges (when using optional signal module, there are 6 edges each)		4 rising edges and 4 falling edges	
Memory	Micro SDHC card (optional)			
Precision of real-time clock	120 seconds/month			–
Real-time clock hold time	In general 7 days, or min. 6 days when 25 °C (Maintenance free super capacitor)			–
Performance/ Processing Time				
Boolean	0.15 µs/instruction			
Moving word operations	1.2 µs/instruction			
Real mathematical operations	3.6 µs/instruction			
The user's program elements supported by the S7-200 SMART				
POUs	type/quantity • main program: 1 • sub-program: 128 (0 to 127) • interrupt program: 128 (0 to 127) Nesting depth • from main program: 8 sub-program level • from interrupt program: 4 sub-program level			
Accumulators	4			
Timer	type/quantity • non-holding (or not retained) (TON, TOF): 192 • holding (or retained) (TONR): 64			
Counters	256			
Communications 				
Number of ports	1 PROFINET port/ 1 serial (RS485) /1 additional serial (optional RS232/485 signal board) port			
HMI equipment	max. 4 connection on serial port & max. 8 connection on PROFINET port			
Programming equipment (PG)	PROFINET: 1 & Serial Port: 1			
CPU (PUT/GET)	PROFINET (LAN): 8 clients and 8 server connections			
PROFINET communication				
PROFINET controller/device	Yes/No			
Maximum number of PROFINET devices that can be connected to RT	8			
Maximum number of modules	64			
Open user communication	PROFINET (LAN): 8 active and 8 passive connections			
Data transmission rate	PROFINET: 10/100 Mb/s RS485 system protocol: 9600, 19200 and 187500 b/s RS485 free port: 1200 to 115200 b/s			
Isolation (external signal and PLC logic side)	PROFINET: Transformer isolation, 1500 V AC RS485: none			
Type of cable	PROFINET: CAT5e shielded cable RS485: PROFIBUS network cable			
Power source				
Voltage range	85 ~ 264 V AC		20.4 ~ 28.8 V DC	85 ~ 264 V AC
Power supply frequency	47 ~ 63 Hz		–	47 ~ 63 Hz
Input current	Only includes the CPU	130 mA when voltage is 120 V AC (without a 300 mA sensor power output) 250 mA when voltage is 120 V AC (with a 300 mA sensor power output) 80 mA when voltage is 240 V AC (without a 300 mA sensor power output) 150 mA when voltage is 240 V AC (with a 300 mA sensor power output)	190 mA when voltage is 24 V DC (without a 300 mA sensor power output) 470 mA when voltage is 24 V DC (with a 300 mA sensor power output)	130 mA when voltage is 120 V AC (without a 300 mA sensor power output) 250 mA when voltage is 120 V AC (with a 300 mA sensor power output) 80 mA when voltage is 240 V AC (without a 300 mA sensor power output) 150 mA when voltage is 240 V AC (with a 300 mA sensor power output)
	Includes CPU and all extension accessories	300 mA when voltage is 120 V AC 190 mA when voltage is 240 V AC	680 mA when voltage is 24 V DC	–

Model	CPU SR40 AC/DC/RLY		CPU ST40 DC/DC/DC	CPU CR40 AC/DC/RLY
Inrush current (max)	16.3 A when voltage is 264 V AC		11.7 A when voltage is 28.8 V DC	7.3 A when voltage is 264 V AC
Isolation (input power with the logic side)	1500 V AC		—	1500 V AC
Leakage current, AC line for functional earthing	Max 0. 5 mA		—	Max 0. 5 mA
Hold time (power off)	30 ms when voltage is 120 V AC 200 ms when voltage is 240 V AC		20 ms when voltage is 24 V DC	50 ms when voltage is 120 V AC 400 ms when voltage is 240 V AC
Internal fuse (cannot be replaced by the user)	3 A, 250 V, Slow-blow fuse			
Sensor power source				
Voltage range	20.4 ~ 28.8 V DC			
Rated output current (max)	00 mA (short circuit protection)			
Maximum ripple noise (<10 MHz)	<1 V peak-peak value			
Isolation (CPU logic side and sensor power source)	Not isolated			
Digital input				
Number of input points	24			
Type	The sinking / sourcing type (IEC type 1 sinking)	The sinking/sourcing type (IEC type 1 sinking excluding I0.0 to I0.3)	The sinking / sourcing type (IEC type 1 sinking)	
Rated voltage	It is 24 V DC when the current is 4 mA, nominal value			
Allowable continuous voltage	Max 30 V DC			
Surge voltage	35 V DC, lasting 0.5 s			
Logic 1 signal (min)	It is 15 V DC when the current is 2.5 mA, 10.0 to 10.4 V DC at 8 mA	The voltage is 4 V DC when it ranges from I0.0 to I0.3 : 8 mA Other input: 15 V DC when it is 2.5 mA	Other input: 15 V DC when it is 2.5 mA	
Logic 0 signal (min)	It is 5 V DC when the current is 1 mA	The voltage is 1 V DC when it ranges from I0.0 to I0.3: 1 mA Other input: 5 V DC when it is 1 mA	Other input: 5 V DC when it is 1 mA	
Isolation (field side and logic side)	500 V AC, lasting 1 min			
Isolation group	1			
Filter time	Each channel can be separately selected (only first 14 input loads on board, including the digital input of the signal board) 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 μs 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms			
HSC clock input frequency (max) (Logic 1 battery = 15 ~ 26 V DC)	Single phase: 4 200 KHz + 2 30 KHz Quadrature phase: 2 100 KHz + 2 20 KHz			
Number of inputs that connect at the same time	24			
Cable length (max)	10.0 to 10.3: Shielding: 500m (normal input), 50m (HSC input); All other inputs: shielding 500m (normal input); non shielding: 300m (normal input)			
Digital output				
Number of output	16			
Type	Relay, dry contact	Solid state-MOSFET (source-type)	Relay, dry contact	
Voltage range	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC	5 ~ 30 V DC or 5 ~ 250 V AC	
Logic 1 signal when the current is max.	—	Min. 20 V DC	—	
Logic 0 signal when the load is KG	—	Max. 0.1 V DC	—	
Rated current at each point (max)	2.0 A	0.5 A	2.0 A	
Lamp load	30 W DC/200 W AC	5 W	30 W DC/200 W AC	
On state resistance	New equipment is 0.2 Ω maximally	Max. 0.6 Ω	New equipment is 0.2 Ω maximally	
Leakage current at each point	—	Max. 10 μ A	—	
Surge current	It is 7A when the contact is closed	8 A, max. lasting 100 ms	It is 7A when the contact is closed	
Overload protection	none			
Isolation (field side and logic side)	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	500 V AC, lasting 1 min	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	
Isolation resistance	New equipment is 100 MΩ minimally	—	New equipment is 100 MΩ minimally	
Disconnect the insulation between the contacts	750 V AC, lasting 1 min	—	750 V AC, lasting 1 min	
Isolated group	4	2	4	
Inductive voltage clamp	Not recommended	L+ - 48 V DC, 1 W loss	—	
Switching delay (Qa.0-Qa.3)	Max. 10 ms	From the disconnection to connection max.1 μs from the connection to disconnection is 3 μs max.	Max. 10 ms	
Switching delay (Qa.4-Qb.7)	Max. 10 ms	From the disconnection to connection max. 50 μs from the connection to disconnection is 200 μs max.	Max. 10 ms	
Mechanical life (no load)	10,000,000 break/close cycles	—	10,000,000 break/close cycles	
Contact life under the rated load	100,000 break/close cycles	—	100,000 break/close cycles	
Output state under the STOP mode	Last value or replicable value (The default value is 0)			
Number of output that are connected at the same time	16			
Cable length	Shielded: 500 m; non shielded: 150 m			

Technical specification for CPU SR60/ST60/CR60

Model	CPU SR60 AC/DC/RLY		CPU ST60 DC/DC/DC	CPU CR60 AC/DC/RLY
Order No.: (MLFB)	6ES7 288-1SR60-0AA0		6ES7 288-1ST60-0AA0	6ES7 288-1CR60-0AA0
Standard				
Dimension W x H x D (mm)	175 x 100 x 81			
Weight	611.5 g	528.2 g	620 g	
Power consumption	25 W	20 W		
Available current (EM bus)	Max. 740 mA (5 V DC)		–	
Available current (24 V DC)	Max. 300 mA (sensor power source)			
Digital input current consumption (24 V DC)	4 mA for each input point used			
CPU features				
User memory	30 KB program memory /20 KB data memory /max. 10 KB retentive memory		12 KB program memory / 8 KB data memory / max. 10 KB retentive memory	
On board digital I/O	36 input points / 24 output points			
Process image size	256 bits input (I) / 256 bits output (Q)			
Analogue image	56 words input (AI) / 56 words output (AQ)			
Bit memory (M)	256 bits			
Temporary (local) memory (L)	The main program has 64 bytes, each subroutine and interrupt program has 64 bytes			
I/O module extension	6 extension modules		–	
Signal board extension	Max. 1 signal board		–	
High speed counters	4 in total Single phase: 4 of 200 kHz Quadrature phase: 2 of 100 kHz		4 in total Single phase: 4 of 100 kHz Quadrature phase: 2 of 50 kHz	
Pulse output	3, 100 kHz		–	
Pulse capture input	14			
Cycle interrupt	2 in total, resolution is of 1ms,			
Interrupt Edge	4 rising edges and 4 falling edges (when using optional signal module, there are 6 edges each)		4 rising edges and 4 falling edges	
Memory	Micro SDHC card (optional)			
Precision of real-time clock	120 seconds/month		–	
Real-time clock hold time	In general 7 days, or min. 6 days when 25 °C (Maintenance free super capacitor)		–	
Performance/ Processing Time				
Boolean	0.15 µs/instruction			
Moving word operations	1.2 µs/instruction			
Real mathematical operations	3.6 µs/instruction			
The user's program elements supported by the S7-200 SMART				
POUs	type/quantity • main program: 1 • sub-program: 128 (0 to 127) • interrupt program: 128 (0 to 127) Nesting depth • from main program: 8 sub-program level • from interrupt program: 4 sub-program level			
Accumulators	4			
Timer	type/quantity • non-holding (or not retained) (TON, TOF) : 192 • holding (or retained) (TONR) : 64			
Counters	256			
Communications 				
Number of ports	1 PROFINET port/ 1 serial (RS485) /1 additional serial (optional RS232/485 signal board) port			
HMI equipment	max. 4 connection on serial port & max. 8 connection on PROFINET port			
Programming equipment (PG)	PROFINET: 1 & Serial Port: 1			
CPU (PUT/GET)	PROFINET (LAN): 8 clients and 8 server connections			
PROFINET communication				
PROFINET controller/device	Yes/No			
Maximum number of PROFINET devices that can be connected to RT	8			
Maximum number of modules	64			
Open user communication	PROFINET (LAN): 8 active and 8 passive connections			
Data transmission rate	PROFINET: 10/100 Mb/s RS485 system protocol: 9600, 19200 and 187500 b/s RS485 free port: 1200 to 115200 b/s			
Isolation (external signal and PLC logic side)	PROFINET: Transformer isolation, 1500 V AC RS485: none			
Type of cable	PROFINET: CAT5e shielded cable RS485: PROFIBUS network cable			
Power source				
Voltage range	85 ~ 264 V AC	20.4 ~ 28.8 V DC	85 ~ 264 V AC	
Power supply frequency	47 ~ 63 Hz	–	47 ~ 63 Hz	
Power input when max. load of the input current is reached	Only includes the CPU	160 mA when voltage is 120 V AC (without a 300 mA sensor power output) 280 mA when voltage is 120 V AC (with a 300 mA sensor power output) 90 mA when voltage is 240 V AC (without a 300 mA sensor power output) 160 mA when voltage is 240 V AC (with a 300 mA sensor power output)	220 mA when voltage is 24 V DC (without a 300 mA sensor power output) 500 mA when voltage is 24 V DC (with a 300 mA sensor power output)	160 mA when voltage is 120 V AC (without a 300 mA sensor power output) 280 mA when voltage is 120 V AC (with a 300 mA sensor power output) 90 mA when voltage is 240 V AC (without a 300 mA sensor power output) 160 mA when voltage is 240 V AC (with a 300 mA sensor power output)
	Includes CPU and all extension accessories	370 mA when voltage is 120 V AC 220 mA when voltage is 240 V AC	710 mA when voltage is 24 V DC	–

Model	CPU SR60 AC/DC/RLY	CPU ST60 DC/DC/DC	CPU CR60 AC/DC/RLY
Inrush current (max)	16.3 A when voltage is 264 V AC	11.5 A when voltage is 28.8 V DC	7.3 A when voltage is 264 V AC
Isolation (input power with the logic side)	1500 V AC	none	1500 V AC
Leakage current, AC line for functional earthing	none		
Hold time (power off)	30 ms when voltage is 120 V AC 200 ms when voltage is 240 V AC	20 ms when voltage is 24 V DC	50 ms when voltage is 120 V AC 400 ms when voltage is 240 V AC
Internal fuse (cannot be replaced by the user)	3 A, 250 V, Slow-blow fuse		
Sensor power source			
Voltage range	20.4 ~ 28.8 V DC		
Rated output current (max)	300 mA (short circuit protection)		
Maximum ripple noise (<10 MHz)	<1 V peak-peak value		
Isolation (CPU logic side and sensor power source)	Not isolated		
Digital input			
Number of input points	36		
Type	The sinking / sourcing type (IEC type 1 sinking)	The sinking/sourcing type (IEC type 1 sinking excluding I0.0 to I0.3)	The sinking/ sourcing type (IEC type 1 sinking)
Rated voltage	It is 24 V DC when the current is 4 mA, rated value		
Allowable continuous voltage	Max 30 V DC		
Surge voltage	35 V DC, lasting 0.5 s		
Logic 1 signal (min)	The voltage is 4 V DC when it ranges from I0.0 to I0.3 : 8 mA Other input: 15 V DC when it is 2.5 mA		Other input: 15 V DC when it is 2.5 mA
Logic 0 signal (min)	It is 5 V DC when the current is 1 mA	The voltage is 1 V DC when it ranges from I0.0 to I0.3: 1 mA Other input: 5 V DC when it is 1 mA	Other input: 5 V DC when it is 1 mA
Isolation (field side and logic side)	500 V AC, lasting 1 min		
Isolation group	1		
Filter time	Each channel can be separately selected (I0.0 to I1.5) : 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 μ s 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms Each channel can be separately selected (I0.6) : 0, 6.4, 12.8 ms		
HSC clock input frequency (max) (Logic 1 battery = 15 ~ 26 V DC)	Single phase: 4 200 KHz + 2 30 KHz & Quadrature phase: 2 100 KHz + 2 20 KHz		
Number of inputs that connect at the same time	36		
Cable length (max)	Shielded: 500m (normal input), 50m (HSC input) ; non shielded: 300m (normal input)	I0.0 to I0.3, shielded (only limited to this category) : 500 m (normal input), 50 m (HSC input) All other inputs: shielded: 500 m (normal input) ; non shielded: 300 m (normal input)	Shielded: 500m (normal input), 50m (HSC input) ; non shielded: 300m (normal input)
Digital output			
Number of output	24		
Type	Relay, dry contact	Solid state-MOSFET (source-type)	Relay, dry contact
Voltage range	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC	5 ~ 30 V DC or 5 ~ 250 V AC
Logic 1 signal when the current is max.	–	Min. 20 V DC	–
Logic 0 signal when the load is KG	–	Max. 0.1 V DC	–
Rated current at each point (max)	2.0 A	0.5 A	2.0 A
Lamp load	30 W DC/200 W AC	5 W	30 W DC/200 W AC
On state resistance	New equipment is 0.2 Ω maximally	Max. 0.6 Ω	New equipment is 0.2 Ω maximally
Leakage current at each point	–	Max. 10 μ A	–
Surge current	It is 7A when the contact is closed	8 A, max. lasting 100 ms	It is 7A when the contact is closed
Overload protection	none		
Isolation (field side and logic side)	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	500 V AC, lasting 1 min	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)
Isolation resistance	New equipment is 100 M Ω minimally	–	New equipment is 100 M Ω minimally
Disconnect the insulation between the contacts	750 V AC, lasting 1 min	–	750 V AC, lasting 1 min
Isolated group	6	3	6
Inductive voltage clamp	Not recommended	L+ - 48 V DC, 1 W loss	–
Switching delay (Qa.0-Qa.3)	Max. 10 ms	From the disconnection to connection max.1 μ s from the connection to disconnection is 3 μ s max.	Max. 10 ms
Switching delay (Qa.4-Qb.7)	Max. 10 ms	From the disconnection to connection max. 50 μ s from the connection to disconnection is 200 μ s max.	Max. 10 ms
Mechanical life (no load)	10,000,000 break/close cycles	–	10,000,000 break/close cycles
Contact life under the rated load	100,000 break/close cycles	–	100,000 break/close cycles
Output state under the STOP mode	Last value or replicable value (The default value is 0)		
Number of output that are connected at the same time	16		
Cable length	Shielded: 500 m; non shielded: 150 m		

Technical specification for digital input modules

Model	EM DE08	EM DE16
Order No. (MLFB)	6ES7 288-2DE08-0AA0	6ES7 288-2DE16-0AA0
Standard		
Dimension W x H x D (mm)	45 x 100 x 81	
Weight	141.4 g	176g
Power consumption	1.5 W	2.3 W
Current consumption (SM bus)	105 mA	
Current consumption (24 V DC)	4 mA for each input point used	
Digital input		
Number of input points	8	16
Type	The sinking / sourcing type (IEC type 1 sinking)	
Rated voltage	It is 24 V DC when the current is 4 mA, nominal value	

Model	EM DE08	EM DE16
Allowable continuous voltage	Max 30 V DC	
Surge voltage	35 V DC, lasting 0.5 s	
Logic 1 signal (min)	It is 15 V DC when the current is 2.5 mA	
Logic 0 signal (max)	It is 5 V DC when the current is 1 mA	
Isolation (field side and logic side)	500 V AC, lasting 1 min	
Isolation group	2	4
Filter time	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8 ms (optional 4 inputs form one group)	
Number of inputs that connect at the same time	8	16
Cable length (max)	500m (Shielded), 300m (non shielded)	

Technical specification for digital output modules

Model	EM DR08	EM DT08	EM QR16	EM QT16
Order number (MLFB)	6ES7 288-2DR08-0AA0	6ES7 288-2DT08-0AA0	6ES7 288-2QR16-0AA0	6ES7 288-2QT16-0AA0
Standard				
Size W x H x D(mm)	45 x 100 x 81			
Weight	166.3 g	147 g	221g	186g
Power consumption	4.5 W	1.5 W	4.5W	1.7W
Current consumption (SM bus)	120 mA		110 mA	120 mA
Digital output				
Number of outputs	8		16	
Types	Relay, dry contact	Solid-MOSFET (source type)	Relay, dry contact	Solid state
MOSFET (source type) voltage range	5 ~ 30 V DC Or 5 ~ 250 V AC	20.4 ~ 28.8 V DC	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC
Logic 1 signal at maximum current	–	20 V	–	20 V
Logic 0 signal with 10 KΩ load	–	0.1 V	–	0.1 V
Rated current per point (maximum)	2.0 A	0.75 A	2.0 A	0.75 A
Lamp load	30 W DC/200 W AC	5 W	30 W DC/200 W AC	5 W
On-state contact resistance	New equipment is 0.2 Ω maximally	0.6 Ω	New equipment is 0.2 Ω maximally	0.6 Ω
Leakage current at each point	–	10 μA	–	10 μA
Inrush current	When the contact is closed 7 A	8 A, continued 100 ms	When the contact is closed 7 A	8 A, continued 100 ms
Overload protection	no			
Isolation (field side and logic side)	1500 V AC, Lasts 1 min (coil and contacts) None (coil and logic side)	500 V AC, Lasting 1 min	1500 V AC, Lasts 1 min (coil and contacts) None (coil and logic side)	500 V AC, lasting 1 min
Isolation resistance	New equipment min100MΩ	–	xNew equipment min 100 MΩ	–
Disconnect the insulation between the contacts	750 V AC, Lasting 1 min	–	750 V AC,Lasting 1 min	–
Isolation group	2	2	4	4
Current of each public end (max)	8 A	3 A	8 A	3 A
Switching delay	Max10 ms	Disconnect to the maximum length of 50 μs and Switch ti max of 200 μs		switch to the max of 200 μs
Contact life at rated load	100,000 open/close cycle	–	100,000 open/close cycle	–
Output status in STOP mode	Previous value or replacement value (default is 0)			
Number of outputs simultaneously turned on	8		16	
cable length	Shielded: 500 m; non shielded: 300 m			

Technical specification for digital input/output modules

Model	EM DR16	EM DT16	EM DR32	EM DT32
Order No.: (MLFB)	6ES7 288-2DR16-0AA0	6ES7 288-2DT16-0AA0	6ES7 288-2DR32-0AA0	6ES7 288-2DT32-0AA0
Dimension W x H x D (mm)	45 x 100 x 81		70 x 100 x 81	
Weight	201.9 g	179.7 g	295.4 g	257.3 g
Power consumption	5.5 W	2.5 W	10 W	4.5 W
Current consumption (SM bus)	145 mA	145 mA	180 mA	185 mA
Current consumption (24 V DC)	4 mA for each input point used			
	Each relay coil used is 11 mA	–	Each relay coil used is 11 mA	–
Digital input				
Number of input points	8		16	
Type	The sinking / sourcing type (IEC type 1 sinking)			
Rated voltage	It is 24V DC when the current is 4 mA, nominal value			
Allowable continuous voltage	Max 30 V DC			
Surge voltage	35 V DC, lasting 0.5 s			
Logic 1 signal (min)	15 V DC			
Logic 0 signal (min)	5 V DC			
Isolation (field side and logic side)	500 V AC, lasting 1 min			
Isolation group	2			
Filter time	0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms (optional, 4 form one group)			
Number of inputs that connect at the same time	8		16	
Cable length	500 m (Shielded), 150 m (non shielded)			
Digital output				
Number of output	8		16	
Type	Relay, dry contact	Solid state-MOSFET	Relay, dry contact	Solid state-MOSFET
Voltage range	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC	5 ~ 30 V DC or 5 ~ 250 V AC	20.4 ~ 28.8 V DC
Logic 1 signal when the current is max.	–	Min. 20 V DC	–	Min. 20 V DC
Logic 0 signal when the load is KG	–	Max. 0.1 V DC	–	Max. 0.1 V DC
Rated current at each point (max)	2 A	0.75 A	2 A	0.75 A
Lamp load	30 W DC/200 W AC	5 W	30 W DC/200 W AC	5 W
Resistance of the contact in the ON state	New equipment is 0.2 Ω maximally	Max. 0.6 Ω	New equipment is 0.2 Ω maximally	Max. 0.6 Ω
Leakage current at each point	–	Max. 10 μ A	–	Max. 10 μ A
Surge current	It is 7A when the contact is closed	8 A, max. lasting 100 ms	It is 7A when the contact is closed	8 A, max. lasting 100 ms
Overload protection	none			
Isolation (field side and logic side)	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	500 V AC, lasting 1 min	1500 V AC, lasting 1 min (coil and contact) none, (coil and logic side)	500 V AC, lasting 1 min
Isolation resistance	New equipment is 100 MΩ minimally	–	New equipment is 100 MΩ minimally	–
Disconnect the insulation between the contacts	750 V AC, lasting 1 min	–	750 V AC, lasting 1 min	–
Isolated group	2	2	4	3
Each end of the current public	8 A	3 A	8 A	6 A
Inductive voltage clamp	–	-48 V	–	-48 V
Switching delay	From the disconnection to connection max.1 μs from the connection to disconnection is 3 μs max.	Max. 10 ms	From the disconnection to connection max.1 μs from the connection to disconnection is 3 μs max.	Max. 10 ms
Mechanical life (no load)	10,000,000 break/close cycles	–	10,000,000 break/close cycles	–
Contact life under the rated load	100,000 break/close cycles	–	100,000 break/close cycles	–
Output state under the STOP mode	Last value or replicable value (The default value is 0)			
Number of output that are connected at the same time	8		16	
Cable length	Shielded: 500 m; non shielded: 300 m			

Technical specification for digital input modules

Model	EM AE04	EM AE04
Order No.: (MLFB)	6ES7 288-3AE04-0AA0	6ES7 288-3AE08-0AA0
Standard		
Dimension W x H x D (mm)	45 x 100 x 81	
Weight	147 g	186 g
Power consumption	1.5 W (no load)	2.0 W (no load)
Current consumption (SM bus)	80 mA	
Current consumption (24 V DC)	40 mA (no load)	70 mA (no load)
Analogue input		
No. of Inputs	4	8
Type	Voltage or current (differential): 2 can be selected as a group Range	
Range	±10 V, ±5 V, ±2.5 V, or 0 ~ 20 mA	
Full scale range (data word)	-27, 648 ~ 27, 648	
Overshoot / undershoot range (data word)	Voltage: 27, 649 ~ 32, 511/-27, 649 ~ -32, 512 Current: 27, 649 ~ 32, 511/-4864 ~ 0	
Overflow / underflow (data word)	Voltage: 32, 512 ~ 32, 767/-32, 513 ~ -32, 768 Current: 32, 512 ~ 32, 767/-4, 865 ~ -32, 768	
Resolution	Voltage mode: 11 bits + signal bits Current mode: 11 bits	
Maximum voltage / current resistance	±35 V/±40 mA	
Smoothness	None, weak, medium or strong	
Noise suppression	400, 60, 50 or 10 Hz	
Input resistance	≥9 M Ω (voltage) / 250 Ω (current)	
Isolation (field side and logic side)	none	
Precision (25°C / 0 ~ 55°C)	Voltage mode: full range ±0.1 %/±0.2 % Current mode: full range ±0.2 %/±0.3 %	
Analogue to digital conversion time	625 μs (400 Hz inhibited)	
Common mode rejection	40 dB, DC to 60 Hz	
The working signal range	Signal plus common mode voltage must be less than +1.2 V and greater than -1.2 V;	
The cable length (maximum)	100 m, Shielded twisted pair	
Diagnosis		
Overflow / underflow	✓	
24 V DC low voltage	✓	

Technical specification for analogue output modules

Model	EM AQ02	EM AQ02
Order No.: (MLFB)	6ES7 288-3AQ02-0AA0	6ES7 288-3AQ04-0AA0
Standard		
Dimension W x H x D (mm)	45 x 100 x 81	
Weight	147.1 g	170.5g
Power consumption	1.5 W (no load)	2.1 W (no load)
Current consumption (SM bus)	60 mA	
Current consumption (24 V DC)	50 mA (no load)	75 mA (no load)
Analogue output		
No. of Inputs	2	4
Type	Voltage or current	
Range	±10 V or 0 ~ 20 mA	
Resolution	Voltage mode: 10 bits + signal bits Current mode: 10 bits	
Full scale range (data word)	Voltage: -27, 648 ~ 27, 648 Current: 0 to 27, 648	
Precision (25°C/0 ~ 55°C)	Full range ±0.5 %/ ±1.0 %	
Stabilisation time (95% of the new value)	Voltage: 300 µs (R), 750 µs (R), 750 µs (1 µ F) Current: 600 µs (1 mH), 2 ms (10 mH)	
Load resistance	Voltage: > 1000 Ω Current: < 500 Ω	
Output state under the STOP mode	Last value or replicable value (The default value is 0)	
Isolation (field side and logic side)	none	
Cable length (max)	100 m, shielded twisted pair	
Diagnosis		
Overflow / underflow	✓	
Short circuit to ground (only for voltage mode)	✓	
Circuit breaker (only for current mode)	✓	
24 V DC low voltage	✓	

Technical specification for analogue input/output modules

Model	EM AM06	EM AM03
Order No.: (MLFB)	6ES7 288-3AM06-0AA0	
Standard		
Dimension W x H x D (mm)	45 x 100 x 81	
Weight	173.4 g	
Power consumption	2.0 W (no load)	
Current consumption (SM bus)	80 mA	
Current consumption (24 V DC)	60 mA (no load)	
Analogue input		
No. of Inputs	4	
Type	Voltage or current (differential): 2 can be selected as a group	
Range	±10 V, ±5 V, ±2.5 V, or 0 ~ 20 mA	
Full scale range (data word)	-27, 648 ~ 27, 648	
Overshoot / undershoot range (data word)	Voltage: 27, 649 ~ 32, 511/-27, 649 ~ -32, 512 Current: 27, 649 ~ 32, 511/-4864 ~ 0	
Overflow / underflow (data word)	Voltage: 32, 512 ~ 32, 767/-32, 513 ~ -32, 768 Current: 32, 512 ~ 32, 767/-4, 865 ~ -32, 768	
Resolution	Voltage mode: 11 bits + signal bits Current mode: 11 bits	
Maximum voltage / current resistance	±35 V/±40 mA	
Smoothness	None, weak, medium or strong	
Noise suppression	400, 60, 50 or 10 Hz	
Input resistance	≥9 M Ω (voltage) / 250 Ω (current)	
Isolation (field side and logic side)	none	
Precision (25°C / 0 ~ 55°C)	Voltage mode: full range ±0.1 %/±0.2 % Current mode: full range ±0.2 %/±0.3 %	
Analogue to digital conversion time	625 μs (400 Hz inhibited)	

Model	EM AM06	EM AM03
Common mode rejection	40 dB, DC to 60 Hz	
Working signal range	Signal plus common mode voltage must be less than the +1.2 V is greater than -1.2 V	
The cable length (maximum)	100 m, Shielded twisted pair	
Analogue output		
No. of Inputs	2	1
Type	Voltage or current	
Range	±10 V or 0 ~ 20 mA	
Resolution	Voltage mode: 10 bits + signal bits Current mode: 10 bits	
Full scale range (data word)	Voltage: -27,648 ~ 27,648 Current : 0 ~ 27,648	
Precision (25°C/0 ~ 55°C)	Full range ±0.5 %/ ±1.0 %	
Stabilisation time (95% of the new value)	Voltage: 300 µs (R), 750 µs (R), 750 µs (1 µ F) Current: 600 µs (1 mH), 2 ms (10 mH)	
Load resistance	Voltage ≥ 1000 Ω Current ≤ 600 Ω	
Output state under the STOP mode	Last value or replicable value (The default value is 0)	
Isolation (field side and logic side)	None	
Cable length (max)	100 m, shielded twisted pair	
Diagnosis		
Overflow / underflow	✓	
Short circuit to ground (only for voltage mode)	✓	
Circuit breaker (only for current mode)	✓	
24 V DC low voltage	✓	

Technical specification for digital input / output signal board

Model	SB DT04
Order No.: (MLFB)	6ES7 288-5DT04-0AA0
Standard	
Dimension W x H x D (mm)	35 x 52.2 x 16
Weight	18.1 g
Power consumption	1.0 W
Current consumption (SM bus)	50 mA
Current consumption (24 V DC)	Each input used 4mA
Analogue input	
No. of Inputs	2
Type	Sinking type/sourcing type (IEC type 1 sinking)
Rated voltage	24 V DC, When the current is 4 mA, nominal value
Allowable continuous voltage	Max. 30 V DC
Surge voltage	35 V DC, lasting 0.5 s
Logic 1 signal (min)	15 V DC when the current is 2.5mA.
Logic 0 signal (max)	5 V DC when the current is 1 mA.
Isolation (field side and logic side)	500 V AC, lasting 1 min
Isolation group	1
Filter time	Each channel can be selected separately 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 µs
Number of inputs connected at the same time	2
Cable length	500 m (shielded), 300 m (non shielded)
Digital output	
Number of outputs	2
Type of output	Solid state -MOSFET
Voltage range	20.4 ~ 28.8 V DC
Logic 1 signal at max current	Min 20 V DC
Logic 0 signal at max current	Max 0.1 V DC
Rated current of each point (max)	0.5 A
Lamp load	5 W
Contact resistance in the ON status	Max 0.6 Ω
Current leakage at point	Max. 10 µA
Surge current	5 A, max lasting 100 ms
Overload protection	No
Isolation (field side and logic side)	500 V AC, lasting 1 min
Isolation group	1
Current of each public end	1 A
Inductive voltage clamp	L + - 48 V, 1 W loss
Switching delay	Disconnected to connected maximally 2 µs connected to disconnected maximally 10 µs
Output state under the STOP mode	Last value or replicable value (The default value is 0)
Number of inputs connected at the same time	2
Cable length (max)	500 m (shielded), 150 m (non shielded)

Technical specification for battery signal board

Model	SB BA01
Order No.: (MLFB)	6ES7 288-5BA01-0AA0
Standard	
Dimension W x H x D (mm)	35 x 52.2 x 16
Weight	20 g
Power consumption	0.6 W
Current consumption (SM bus)	18 mA
Current consumption (24 V DC)	None
Battery (need to be bought by the user)	
Hold duration	About 1 year
Type of battery	CR1025cell battery
Nominal voltage	3 V
Nominal capacity	30 mAh
Diagnosis	
Critical cell voltage	<2.5 V
Battery diagnosis	Low voltage lamp: Low battery voltage will cause the BA01 panel of the LED display in red state Diagnosis alarm / or low power digital output status available
Battery status	The battery status provided 0 =battery normal 1= Low battery
Battery status update	Battery status will be updated in the boot, then the CPU in RUN mode

Technical specification for analogue output signal board

Model	SB AQ01
Order No.: (MLFB)	6ES7 288-5AQ01-0AA0
Standard	
Dimension W x H x D (mm)	35 x 52.2 x 16
Weight	17.4 g
Power consumption	1.5 W
Current consumption (SM bus)	15 mA
Current consumption (24 V DC)	40 mA (no load)
Analogue output	
No. of Inputs	1
Type	Voltage or current
Range	±10 V or 0 ~ 20 mA
Resolution	Voltage mode: 11 bits + signal bits Current mode: 11 bits
Full scale range (data word)	-27, 648 ~ 27, 648 (-10V ~ 10 V) 0 ~ 27, 648 (0 ~ 20 mA)
Precision (25°C/0 ~ 55°C)	±0.5 %/ ±1.0 %
Stabilisation time (95% of the new value)	Voltage: 300 µs (R), 750 µs (R), 750 µs (1 µ F) Current: 600 µs (1 mH), 2 ms (10 mH)
Load resistance	Voltage ≥ 1000 Ω Current ≤ 600 Ω
Output state under the STOP mode	Last value or replicable value
Isolation (field side and logic side)	none
Cable length (max)	10 m, shielded twisted pair
Diagnosis	✓
Overflow / underflow	✓
Short circuit to ground (only for voltage mode)	✓
Circuit breaker (only for current mode)	✓

Technical specification for RS485/232 signal board

Model	1 SB CM01
Order No	6ES7 288-5CM01-0AA0
Standard	
Dimension W x H x D (mm)	35 x 52.2 x 16
Weight	18.2 g
Power consumption	0.5 W
Current consumption (5 V DC)	50 mA
Current consumption (24 V DC)	Not applicable
Transmitter and receiver (RS485)	
common-mode voltage range	-7 V ~ +12 V, 1 s, 3 VRMS continuous
Transmitter differential output voltage	min 2 V when RL = 100 Ω min 1.5 V when RL = 54 Ω
Termination and bias	On TXD 4.7 KΩ for +5 V On RXD 4.7 KΩ for GND
Receiver input impedance	Min 12 KΩ
The receiver threshold / sensitivity	Minimum +/-0.2 V, the typical lag 60 mV
Isolation	None
The RS485 signal and the shell grounding RS485 signal and CPU logic common end	
Length of cable, shielded cable	Isolation repeaters: 1000 m, baud rate up to 187.5 K No isolation repeaters: 50 m
Transmitter and receiver (RS232)	
Transmitter output voltage	Minimum +/-5V, when RL two 3 K
Output voltage sent	MAX. +/-1 5 V DC
Receiver input resistance	Min 3 KΩ
Receiver threshold / sensitivity	Lower limit 0.8 V, top limit 2.4 V typical lag 0.5 V
Receiver input voltage	Max +/- 30 V DC
Isolation	None
The RS232 signal and the shell grounding RS232 signal and CPU logic common end	
Length of cable, shielded cable	Max. 10 m

Technical specification for RTD module

Model	EM AR02	EM AR04
Order No.: (MLFB)	6ES7 288-3AR02-0AA0	6ES7 288-3AR04-0AA0
Standard		
Dimension W x H x D (mm)	45 x 100 x 81	
Weight	148.7 g	150 g
Power consumption	1.5 W	
Current consumption (SM bus)	80 mA	
Current consumption (24 V DC)	40 mA	
Analogue input		
No. of Inputs	2	
Type	RTD and resistance value of module reference ground	
Range	Please refer to RTD sensor selection table in the S7-200 SMART System Manual	
Nominal range (data word)		
overshoot / undershoot range (data word)		
Overflow / underflow (data word)		
Resolution		
Temperature	0.1°C / 0.1°F	
Resistance	15 position + sign	
Maximum voltage hold	±35 V	
Noise suppression	85 dB, 10 Hz/50 Hz/60 Hz/400 Hz	
Common mode rejection	> 120 dB	
Resistance	> 10 M Ω	
isolation		
Field side and logic side	500 V AC	
Field side and 24 V DC side	500 V AC	
24 V DC side and logic side	500 V AC	
Channel to channel isolation	0	
Precision	Please refer to RTD sensor selection table	
Repeatability	±0.05 % FS	
Maximum power consumption of the sensor	0.5 m W	
Measuring principle	Sigma-Delta	
Module update time	Please refer to the noise reduction selection table	
Cable length (maximum)	The maximum length to the sensor is 100 m	
Cable resistance	Max.20 Ω, for Cu10, max. is 2.7 Ω	
Diagnosis		
Overflow / underflow	✓	
Circuit breaker (only current mode)	✓	
24 V DC low voltage	✓	

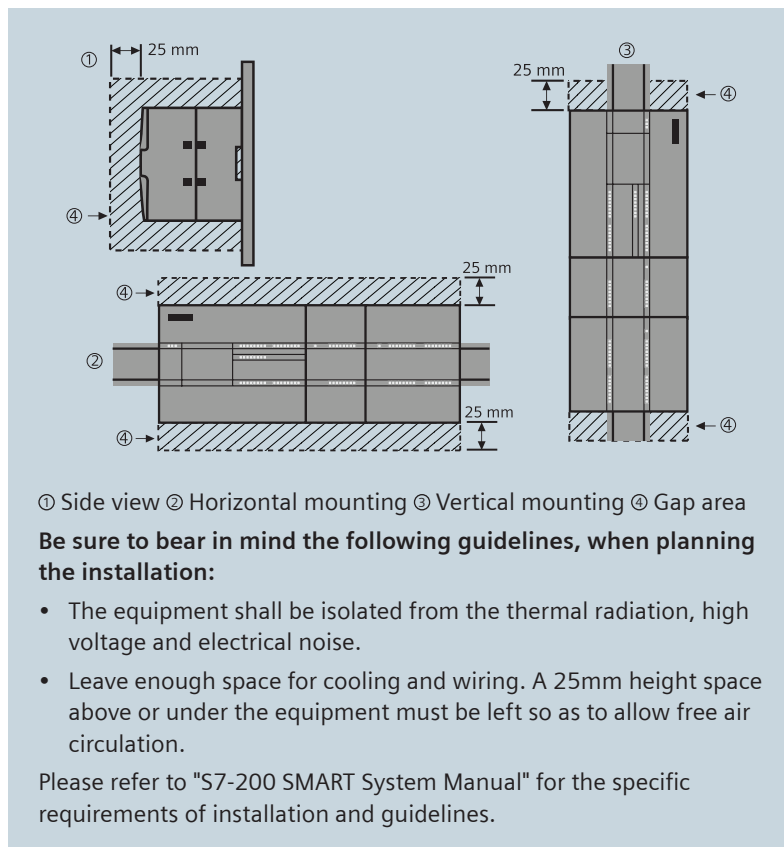
Technical specification of thermocouple module

Model	EM AT04
Order No.: (MLFB)	6ES7 288-3AT04-0AA0
Standard	
Dimension W x H x D (mm)	45 x 100 x 81
Weight	125 g
Power consumption	1.5 W
Current consumption (SM bus)	80 mA
Current consumption (24 V DC)	40 mA
Analogue input	
No. of Inputs	4
Range	Please refer to RTD sensor selection table in the S7-200 SMART System Manual
Nominal range (data word)	
overshoot / undershoot range (data word)	
Overflow / underflow (data word)	
Resolution	0.1°C / 0.1°F
Temperature	
Resistance	
Maximum voltage hold	±35 V
Noise suppression	For the selected filter settings (10 Hz, 50 Hz, 60 Hz or 400 Hz) is 85 dB
Common mode rejection	120 V AC of, > 120 dB
Resistance	≥ 10 M Ω
isolation	
Field side and logic side	500 V AC
Field side and 24 V DC side	500 V AC
24 V DC side and logic side	500 V AC
Channel to channel isolation	-
Precision	Please refer to RTD sensor selection table
Repeatability	±0.05 % FS
Maximum power consumption of the sensor	Integral type
Module update time	Please refer to the noise reduction selection table
The cold end temperature error	± 1.5 °C
Cable length (maximum)	The maximum length to the sensor is 100 m
Cable resistance	Max. 100 Ω
Diagnosis	
Overflow / underflow	✓
Circuit breaker (only current mode)	✓

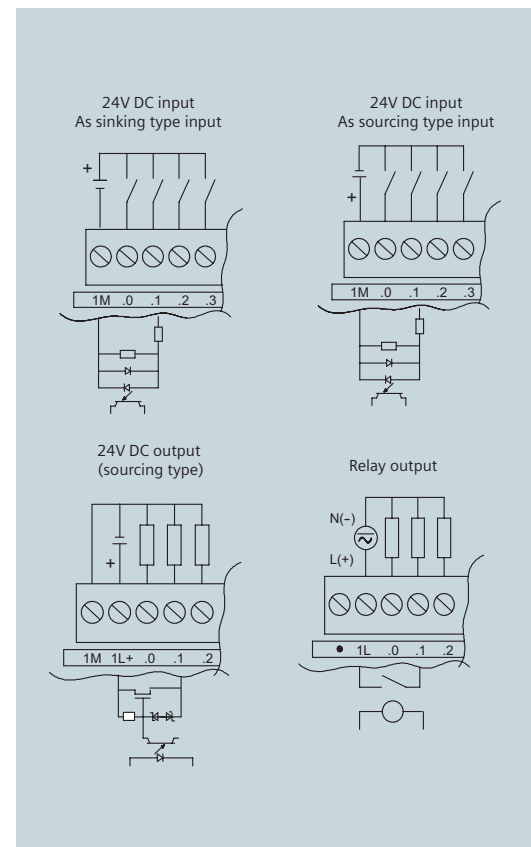
General technical specifications

Electromagnetic compatibility - immunity with EN61000-6-2	
EN 61000-4-2 electrostatic discharge	8 kV, the air discharge to all surfaces; ±4 kV, conductive contact discharge on the exposed surface
EN 61000-4-3	When 80 ~ 1000 MHz, 10 V/m, 1 kHz, 80 % AM
Radiation, radio frequency, electromagnetic field immunity test	When 1.4 ~ 2.0 GHz, 3 V/m, 1 kHz, 80 % AM When 2.0 ~ 2.7 GHz, 1 V/m, 1 kHz, 80 % AM
EN 61000-4-4 fast transient Bursts	2 kV, 5 kHz, - a coupled network of AC and DC power supply systems ; 2 kV, 5 kHz, I/O coupling clamp
EN 61000-4-5	AC system — 2 kV Common mode, 1 kV Differential mode
Surge immunity	DC system — 2 kV Common mode, 1 kV Differential mode For the DC system (I/O signal, DC power supply system), need the external protection
EN61000-4-6 Conducted interference	When 150 kHz ~ 80 MHz, 10 V RMS, 1 kHz, 80 % AM
EN61000-4-11 Voltage dip	Communication systems; 60 Hz, 0% for 1 cycles, 40% for 12 cycles and 70% for 30 cycles
Electromagnetic compatibility of a conduction and radiation in accordance with EN 61000-6-4	
Transmission of EN55001, class A, group 1	0.15 MHz ~ 0.5 MHz < 79 dB (μV) Quasi peak ; < 66 dB (μV) Average value 0.5 MHz ~ 5 MHz < 73 dB (μV) Quasi peak ; < 60 dB (μV) Average value 5 MHz ~ 30 MHz < 73 dB (μV) Quasi peak ; < 60 dB (μV) Average value
Radiation EN55001, Class A, Group 1	30 MHz ~ 230 MHz < 40 dB (μV/m) Quasi peak ; Measured distances is 10m 230 MHz ~ 1 GHz < 47 dB (μV/m) Quasi peak ; Measured distances is 10m
Environmental conditions -transport and storage	
EN60068-2-2, Bb test, EN60068-2-1 test Ab, hot and cold	-40°C~70°C
EN60068-2-30, Db test, damp heat	25°C ~ 55°C / humidity 95 %
EN60068-2-14 Na test, a temperature change	-40~ 70°C, residence time 3hrs, 2 cycles
EN60068-2-32, free fall	0.3 m, 5times, product package
Atmospheric pressure	1080 ~ 660 hPa (equivalent to altitude -1000 ~ 3500 m)
Environment conditions -running	
Ambient temperature range (25 mm height space under the equipment for the wind coming in)	0°C ~ 55°C, horizontal installation 0°C ~ 45°C, vertical installation Humidity 95 %, No condensation
Atmospheric pressure	1080 ~ 795 hPa (equivalent to altitude 1000 ~ 2000 m)
Pollutant concentration	SO2: < 0.5 ppm ; H2S : < 0.1 ppm ; RH < 60 %, No condensation
EN 60068-2-14, Nb test, temperature change	5°C ~ 55°C, 3°C/min
EN 60068-2-27 mechanical shock	15 G, 11 ms pulse, 3 axes upwards 6 impacts
EN 60068-2-6 Sinusoidal vibration	When DIN guide rail mounting : 5 ~ 9 Hz, 3.5 mm, when 9 ~ 150 Hz, 1 G Panel installation : when 5 ~ 9 Hz, 7.0 mm, when 9 ~ 150 Hz, 2 G Each axis swings 10 times, each divided into 1 octave
High voltage insulation test	
24 V/5 V nominal circuit	520 V DC (optical isolation boundary type test)
115/230 V Ground circuit	1500 V AC routine test/1950 V DC type test
11 5/230 V circuit for a 115/230 V circuit	1500 V AC routine test/1950 V DC type test
11 5/230 V circuit for a 24 V/5 V circuit	1500 V AC routine test /3250 V DC type test
Ethernet port on 24 V/5 V circuit and ground	1500 V AC (only the type testing)

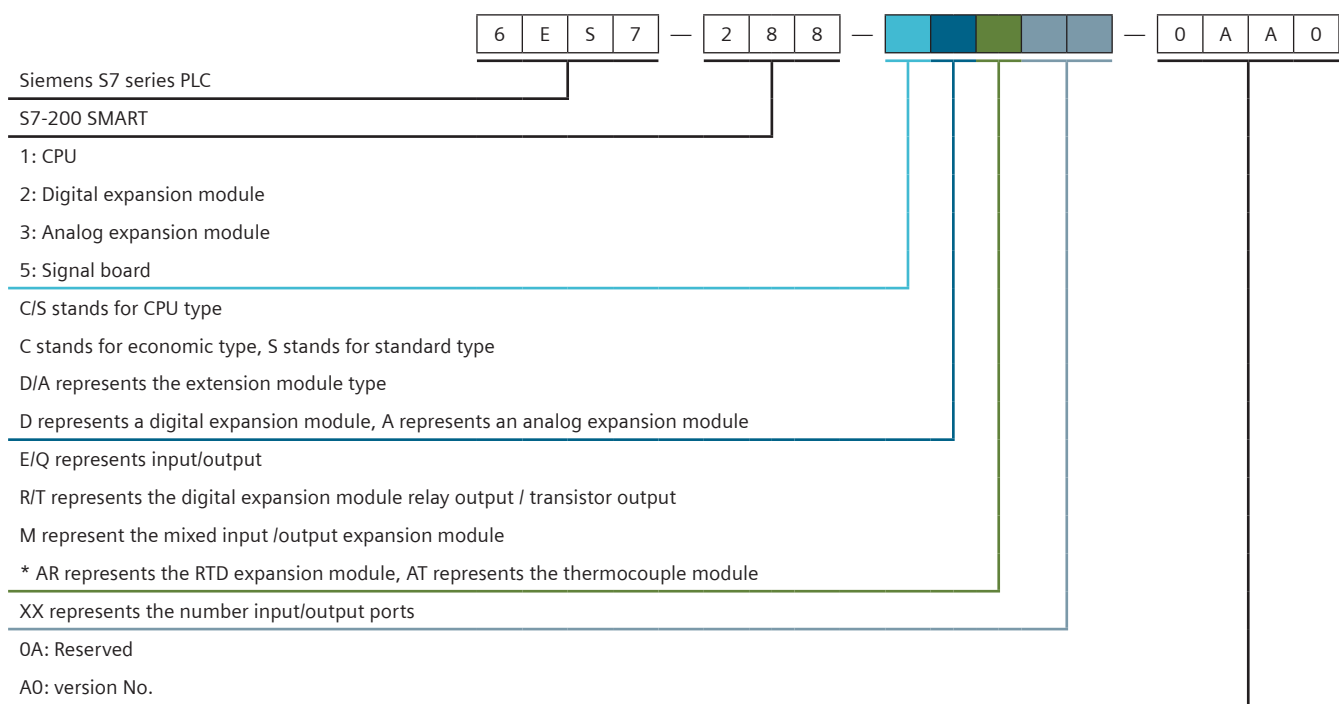
Mounting dimensions



Input and output wiring diagram

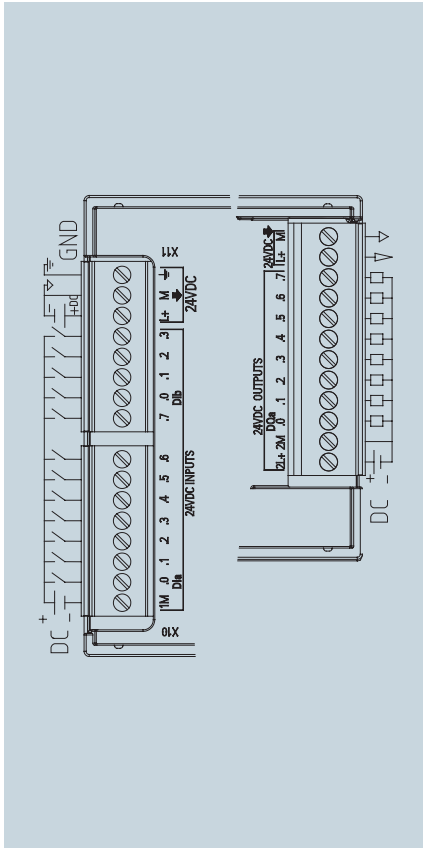


Order number description

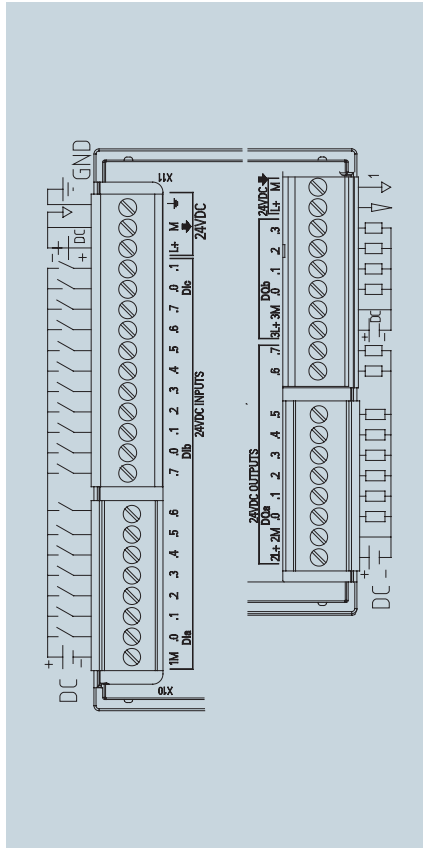


Schematic diagram of the module and the signal board wiring

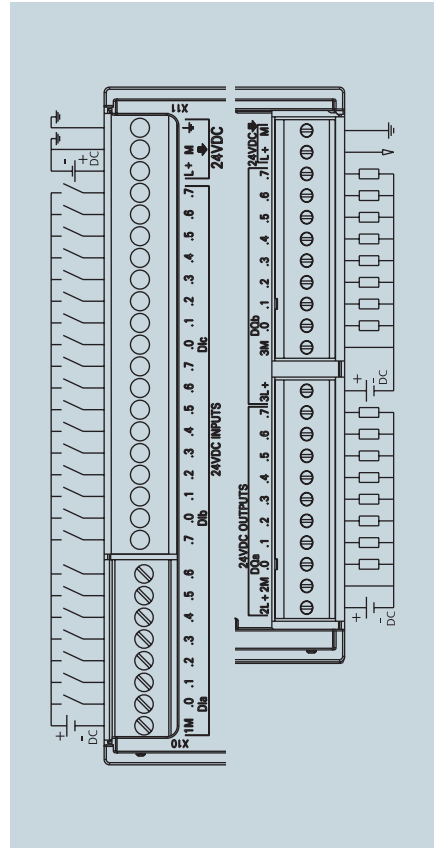
CPU ST20



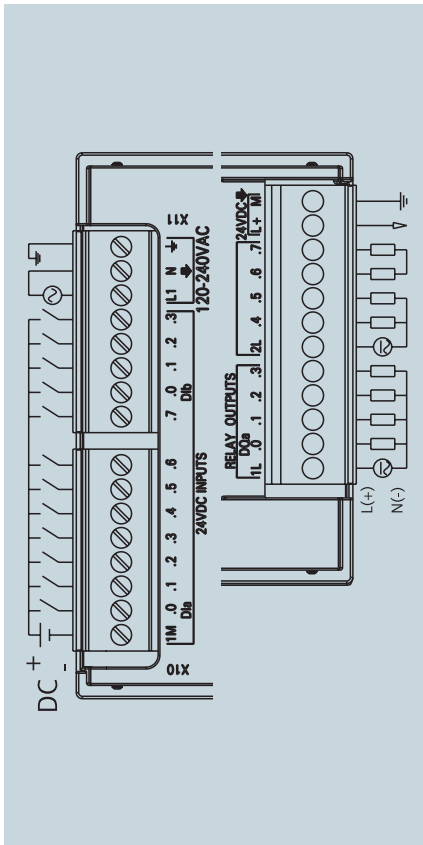
CPU ST30



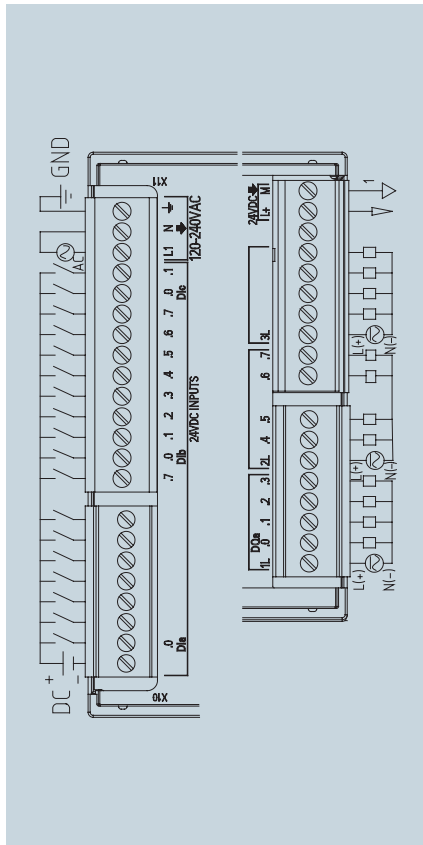
CPU ST40



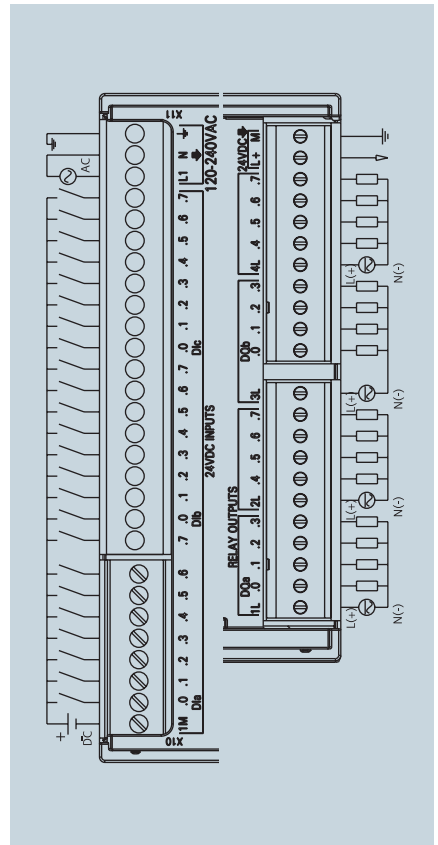
CPU SR20



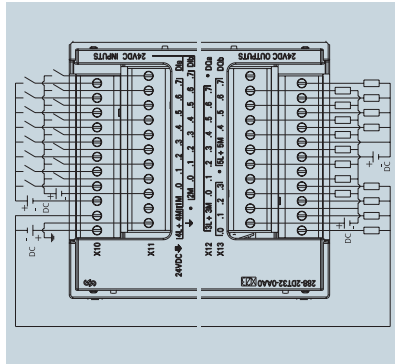
CPU SR30



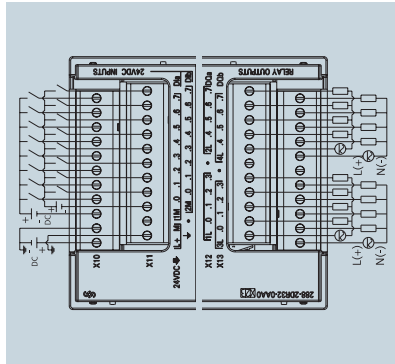
CPU SR40



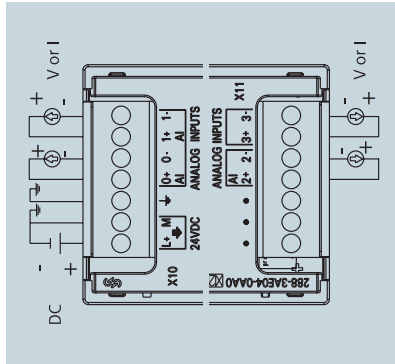
EM DT32



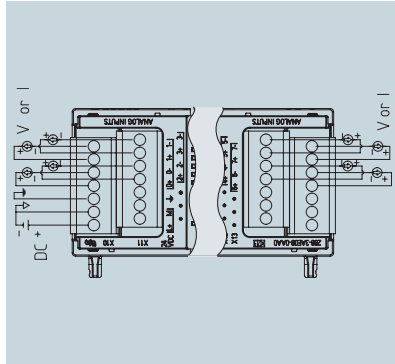
EM DR32



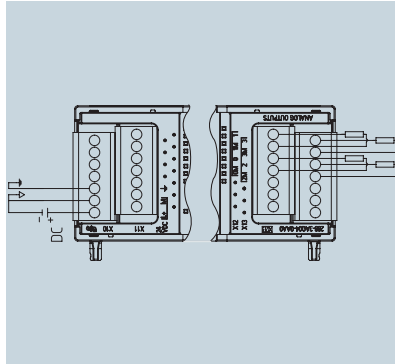
EM AE04



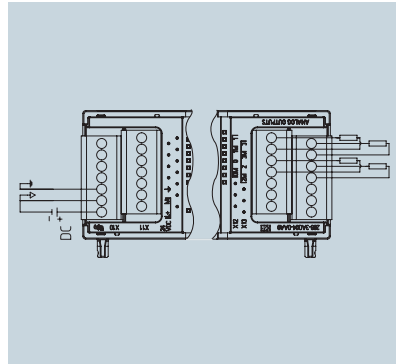
EM AE08



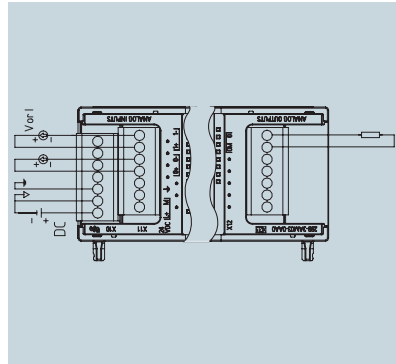
EM AQ02



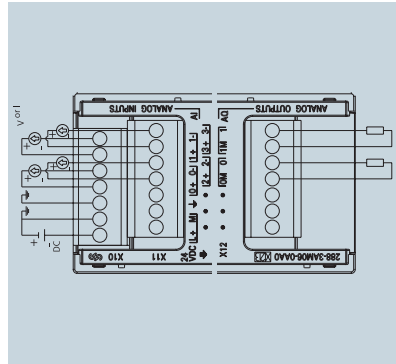
EM AQ04



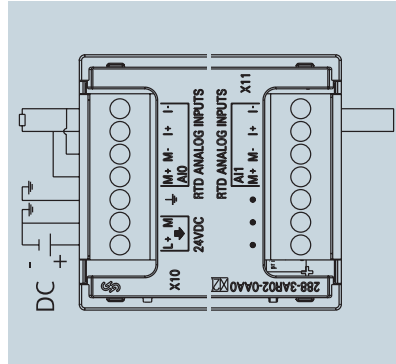
EM AM03



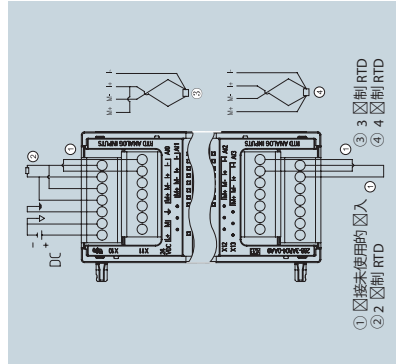
EM AM06



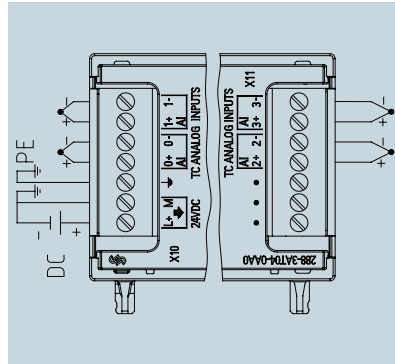
EM AR02



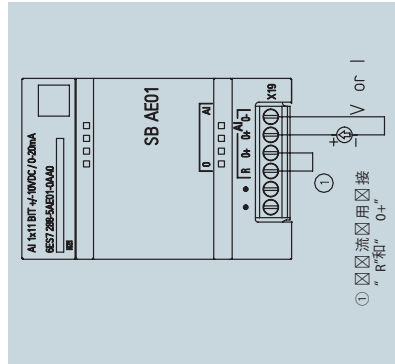
EM AR04



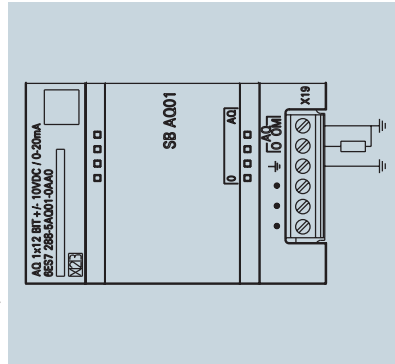
EM AT04



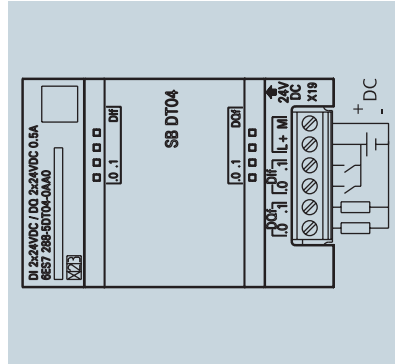
SB AE01



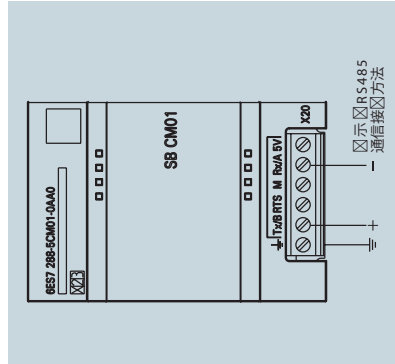
SB AQ01



SB DT04



SB CM01





Simple and extraordinary

The SIMATIC S7-200 SMART Compact CPU, which Siemens has developed in response to market demand, is economical and cost-effective. Works with SINAMIC V20 drives for your A small automated control system provides the ideal solution.

A new generation of economical S7-200 SMART CPU S7-200 SMART Compact CPU

- Economical CPU module with 20 I/O, 30 I/O, 40 I/O, 60 I/O configurations
- High-speed processor chip, bit instruction execution time up to 0.15µs
- Supports high-speed counting for single-phase 4-channel 100KHz or 2-channel A/B phase 50KHz input
- Integrated power-off data retention function, no special battery required, simple setup, easy
- Realize power outage data forever

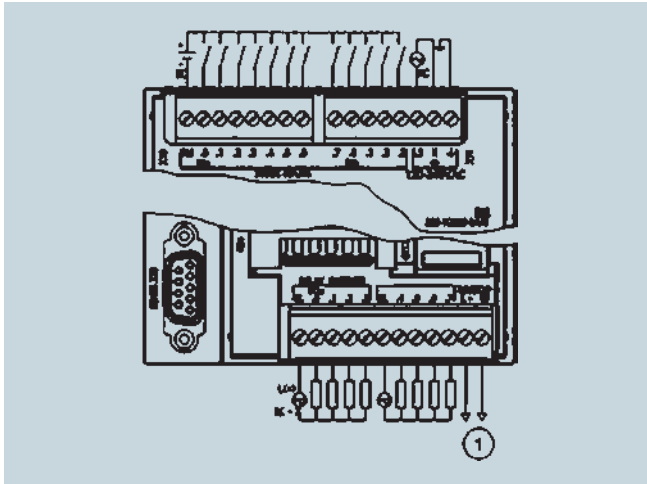
Economic CPU CR20s/CR30s/CR40s/CR60s specifications

MODEL	CPU CR20s AC/DC/RLY	CPU CR30s AC/DC/RLY	CPU CR40s AC/DC/RLY	CPU CR60s AC/DC/RLY
Order no (MLFB)	6ES7 288-1CR20-0AA1	6ES7 288-1CR30-0AA1	6ES7 288-1CR40-0AA1	6ES7 288-1CR60-0AA1
Standard				
Dimension W x H x D (mm)	90×100×81	110×100×81	125 x 100 x 81	175×100×81
Weight	367g	435g	440 g	620 g
Power consumption	14W	14W	18 W	20 W
Available current (24 V DC)	300 mA maximum (sensor power supply)			
DI current consumption (24 V DC)	4mA per point used			
CPU feature				
User Storage	12 KB program memory / 8 KB data memory / 2 KB retentive memory			
Onboard number I/O	12DI/8DO	18DI/12DO	24DI/16DO	36 DI/24DO
Process image size	256-bit input (I) / 256-bit output (Q)			
Analog image	—			
Bit memory (M)	256 Bit			
Temporary (partial) storage	64 bytes in the main program, 64 bytes in each subroutine and interrupt program			
I/O module extension	—			
Signal board expansion	—			
High speed counter	4 in total Single phase 4, 100 KHz Quadrature phase 2, 50 KHz			
Pulse output	—			
Interrupted				
4 rising edges and 4 falling edges				
Storage card	—			
Real time clock accu	—			
Real time clock hold time	—			
Performance				
Boolean operation	0.15 μs/instruction			
Mobile word	1.2 μs/instruction			
Real mathematical operation	3.6 μs/instruction			
S7-200 SMART Supported user program elements				
POUs	Type/quantity • Main program: 1 • Subroutine: 128 (0 to 127) • Interrupt program: 128 (0 to 127) Nesting depth • From main program: 8 subroutine levels • From interrupt program: 4 subroutine levels			
Accumulator				
Timer	4 types / quantity • Non-retentive (TON, TOF): 192 • Retention: 64			
Counter	256			
Communication				
Number of ports	Serial port: 1 (RS485)			
HMI device	Serial port: 4 connections per port			
Programming device (PG)	Serial port: 1 connection			
Data transfer rate	RS485 system protocol: 9600, 19200 and 187500 b/s RS485 free port: 1200 to 115200 b/s			
Cable type	RS485: PROFIBUS network cable			
Power Supply				
Voltage range	85 ~ 264 V AC			
Power frequency	47 ~ 63 Hz			
Input current only includes CPU	90mA at 120V AC 60mA at 240V AC		120V AC 130 mA 240V AC 80 mA	90 mA at 120 V AC at 150 mA 240 V AC
Inrush current (MAX)	9.3A at 264V AC		7.3 A at 264 V AC	
Isolation (input power and logic side)	1500 V AC			

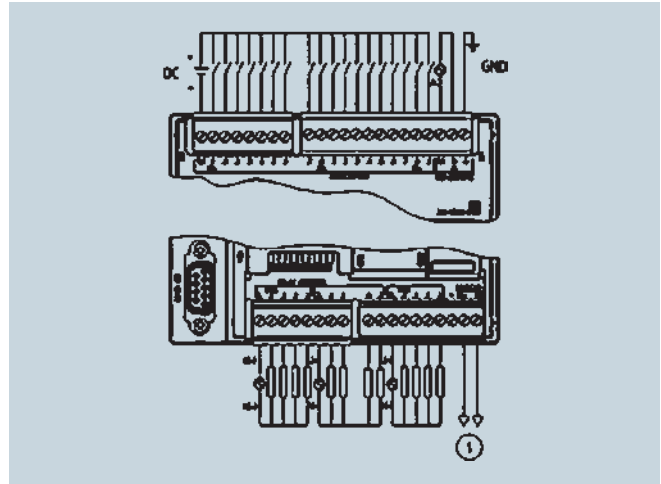
MODEL	CPU CR20s AC/DC/RLY	CPU CR30s AC/DC/RLY	CPU CR40s AC/DC/RLY	CPU CR60s AC/DC/RLY
Leakage current, AC line pair functionally	0.5 mA			
Hold time (power down)	30ms at 120V AC 200ms at 240V AC		50 ms at 120 V AC 400 ms at 240 V AC	
Internal fuse (users cannot replace)	3 A, 250 V, slow blow			
Digital input				
Input Points	12	18	24	36
Types of	Sink/source (IEC Class 1 missing type)			
Rated voltage	24 V DC at 4 mA, rating			
Allowed continuous voltage	30 V DC maximum			
Surge voltage	35 V DC for 0.5 s			
Logic 1 signal (minimum)	15 V DC at 2.5 mA			
Logic 0 signal (maximum)	5 V DC at 1 mA			
Isolation (field side and logic side)	500 V AC for 1 min			
Isolation group	1			
Filtering time	Each channel can be selected individually (points I0.0 to I1.3): 0.2, 0.4, 0.8, 1.6, 3.2,6.4 and 12.8 μs0.2, 0.4, 0.8, 1.6, 3.2,6.4 and 12.8 ms	Each channel can be selected individually (points I0.0 to I1.5): 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 μs 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms Each channel can be selected individually (points I1.6 and larger): 0,6.4,12.8	Each channel can be selected individually (points I0.0 to I1.5): 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 μs 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms Each channel can be selected individually (points I1.6 and larger): 0,6.4,12.8 ms	Each channel can be selected individually (points I0.0 to I1.5): 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 μs 0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms Each channel can be selected individually(points I1.6 and larger): 0,6.4,12.8
HSC clock input frequency (maximum) (logic 1 level = 15 ~ 26 V DC)	Single phase: 4, 100 KHz Quadrature phase: 2, 50 KHz			
Number of inputs simultaneously turned on	12	18	24	36
Cable length	Shield: 500m (normal input), 50m (HSC input);Unshielded: 300m (normal input)			
Digital Output				
Output Points	8	12	16	24
Types of	Relay, dry contact			
Voltage Range	5 ~ 30 V DC or 5 ~ 250 V AC			
Logic 1 signal at maximum current	–			
Logic 0 signal with 10 KΩ load	–			
Rated current per point (maximum)	2.0 A			
Lamp load	30 W DC/200 W AC			
On-state resistance	The new device is maximum 0.2 Ω			
Leakage current at each point	–			
Inrush current	When the contact is closed 7A			
Overload protection	NO			
Isolation (field side and logic side)	1500 V AC for 1 min (coil and electric shock) None (coil and logic side)			
Isolation resistance	The new device is a minimum of 100 MΩ			
Disconnect insulation between contacts	750 V AC for 1 min			
Isolation group	2	3	4	6
Inductive clamping voltage	–			
Switch delay	Up to 10 ms			
Mechanical life (no load)	10,000,000 open/close cycle			
Contact life at rated load	100,000 open/close cycle			
Output status in STOP mode	Previous value or replacement value (default is 0)			
Number of outputs simultaneously turned on	8	12	16	24
cable length	500m (shielded), 150m (unshielded)			

Economical CPU wiring diagram

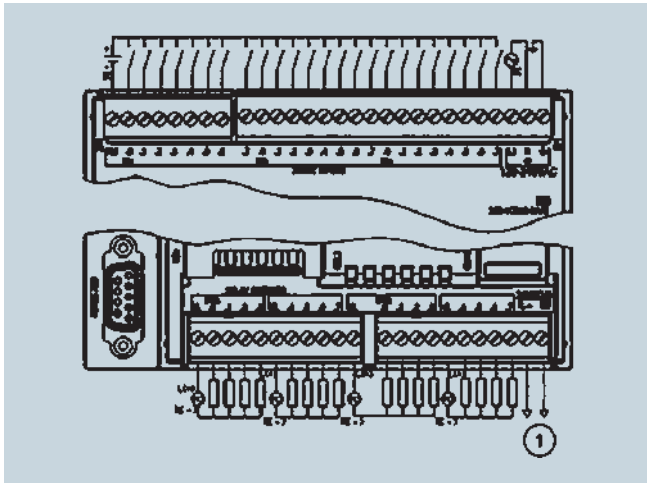
CPU CR20s



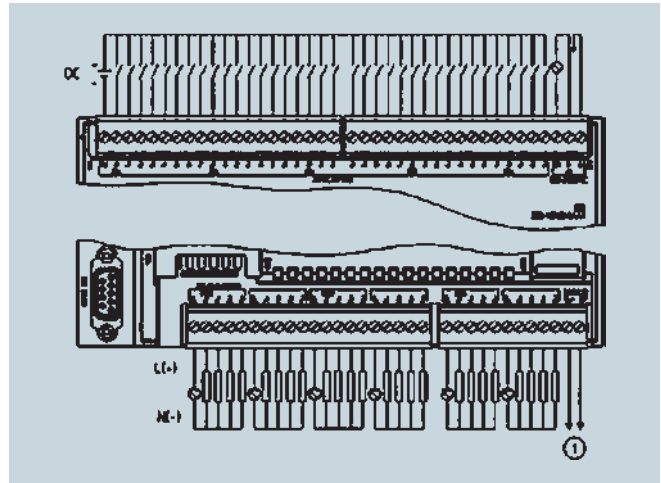
CPU CR30s



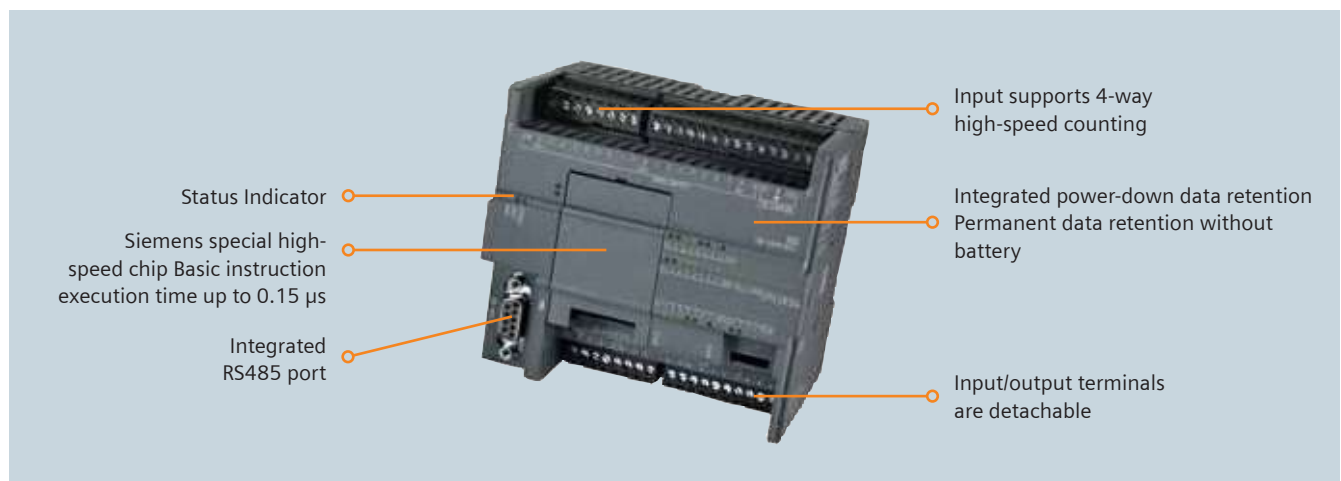
CPU CR40s



CPU CR60s



Economical CPU appearance





Open a new Era of PROFINET

2019.03 officially released

CPU model supporting PROFINET communication

CPU Types of	MLFB
CPU SR20, AC/DC/RLY	6ES7288-1SR20-0AA0
CPU ST20, DC/DC/DC	6ES7288-1ST20-0AA0
CPU SR30, AC/DC/RLY	6ES7288-1SR30-0AA0
CPU ST30, DC/DC/DC	6ES7288-1ST30-0AA0
CPU ST40, DC/DC/RLY	6ES7288-1SR40-0AA0
CPU SR40, AC/DC/DC	6ES7288-1ST40-0AA0
CPU SR60, AC/DC/RLY	6ES7288-1SR60-0AA0
CPU ST60, DC/DC/DC	6ES7288-1ST60-0AA0

Note: 1. The firmware version of the CPU is V2.4 and above.
2. Programming software SETP7 Micro/WIN SMART version is V2.4 and above

PROFINET communication performance

PROFINET Performance	Parameter
PROFINET Maximum number of devices	8
PROFINET Device number of the device	1 to 8
Maximum input size per PROFINET device	128 bytes
Maximum output size per PROFINET device	128 bytes
Maximum number of modules	64
Minimum cycle update time for PROFINET devices Depending on the PN communication component, the no of devices and the amount of user data	

PROFINET communication function

Function Name	Overview
PROFINET device status	Use the LEDs on the CPU panel to indicate the working status of PROFINET
Find PROFINET devices	Find PROFINET devices and assign names to PROFINET devices
PROFINET Programming Wizard	Configure, assign parameters and interconnect the functions of individual PN hardware components
PROFINET program instructions	Read and write data records using the RDREC and WRREC instructions. Read and write multiple input or output bytes of the device using the BLKMOV_BIR and BLKMOV_BIW instructions. PROFINET Network Diagnostics

PROFINET I/O address assignment

PROFINET device number	CPU input process image address	CPU output process image address
1PROFINET device process image register address	I128.0 to I255.7	Q128.0 to Q255.7
2PROFINET device process image register address	I256.0 to I383.7	Q256.0 to Q383.7
3PROFINET device process image register address	I384.0 to I511.7	Q384.0 to Q511.7
4PROFINET device process image register address	I512.0 to I639.7	Q512.0 to Q639.7
5PROFINET device process image register address	I640.0 to I767.7	Q640.0 to Q767.7
6PROFINET device process image register address	I768.0 to I895.7	Q768.0 to Q895.7
7PROFINET device process image register address	I896.0 to I1023.7	Q896.0 to Q1023.7
8PROFINET device process image register address	I1024.0 to I1151.7	Q1024.0 to Q1151.7

Ordering data

SIMATIC S7-200 SMART Ordering data

		MLFB
CPU		
CPU SR20	Standard CPU module, relay output, 220 V AC supply, 12 DI / 8 DO, integrated PN port	6ES7 288-1SR20-0AA0
CPU ST20	Standard CPU module, transistor output, 24 V DC supply, 12 DI / 8 DO, integrated PN port	6ES7 288-1ST20-0AA0
CPU SR30	Standard CPU module, relay output, 220 V AC supply, 18 DI / 12 DO, integrated PN port	6ES7 288-1SR30-0AA0
CPU ST30	Standard CPU module, transistor output, 24 V DC supply, 18 DI / 12 DO, integrated PN port	6ES7 288-1ST30-0AA0
CPU SR40	Standard CPU module, relay output, 220 V AC supply, 24 DI / 16 DO, integrated PN port	6ES7 288-1SR40-0AA0
CPU ST40	Standard CPU module, transistor output, 24 V DC supply, 24 DI / 16 DO, integrated PN port	6ES7 288-1ST40-0AA0
CPU SR60	Standard CPU module, relay output, 220 V AC supply, 36 DI / 24 DO, integrated PN port	6ES7 288-1SR60-0AA0
CPU ST60	Standard CPU module, transistor output, 24 V DC supply, 36 DI / 24 DO, integrated PN port	6ES7 288-1ST60-0AA0
CPU CR20s	Economical CPU module, relay output, 220 V AC supply, 12 DI / 8 DO	6ES7 288-1CR20-0AA1
CPU CR30s	Economical CPU module, relay output, 220 V AC supply, 18 DI / 12 DO	6ES7 288-1CR30-0AA1
CPU CR40s	Economical CPU module, relay output, 220 V AC supply, 24 DI / 16 DO	6ES7 288-1CR40-0AA1
CPU CR60s	Economical CPU module, relay output, 220 V AC supply, 36 DI / 24 DO	6ES7 288-1CR60-0AA1
Expansion Modules		
EM DE08	Digital input module, 8 x 24 V DC input	6ES7 288-2DE08-0AA0
EM DE16	Digital input module, 16 x 24 V DC input	6ES7 288-2DE16-0AA0
EM DR08	Digital output module, 8 x relay output	6ES7 288-2DR08-0AA0
EM DT08	Digital output module, 8 x 24 V DC output	6ES7 288-2DT08-0AA0
EM QT16	Digital output module, 16 x 24 V DC output	6ES7 288-2QT16-0AA0
EM QR16	Digital output module, 16x relay output	6ES7 288-2QR16-0AA0
EM DR16	Digital input/output module, 8 x 24 V DC input / 8 x relay output	6ES7 288-2DR16-0AA0
EM DR32	Digital input/output module, 16x24 V DC input / 16 x relay output	6ES7 288-2DR32-0AA0
EM DT16	Digital input/output module, 8 x 24 V DC input / 8 x 24 V DC output	6ES7 288-2DT16-0AA0
EM DT32	Digital input/output module, 16 x 24 V DC input / 16 x 24 V DC output	6ES7 288-2DT32-0AA0
EM AE04	Analog input module, 4 inputs	6ES7 288-3AE04-0AA0
EM AE08	Analog input module, 8 inputs	6ES7 288-3AE08-0AA0
EM AQ02	Analog output module, 2 outputs	6ES7 288-3AQ02-0AA0
EM AQ04	Analog output module, 4 outputs	6ES7 288-3AQ04-0AA0
EM AM03	Analog input/output module, 2 inputs / 1 output	6ES7 288-3AM03-0AA0
EM AM06	Analog input/output module, 4 inputs / 2 outputs	6ES7 288-3AM06-0AA0
EM AR02	Thermal resistance input module, 2 channels	6ES7 288-3AR02-0AA0
EM AR04	Thermal resistance input module, 4 inputs	6ES7 288-3AR04-0AA0
EM AT04	Thermocouple input module, 4 channels	6ES7 288-3AT04-0AA0
EM DP01	PROFIBUS-DP slave module	6ES7 288-7DP01-0AA0
Signal board SB		
SB CM01	Communication signal board, RS485/RS232	6ES7 288-5CM01-0AA0
SB DT04	Digital expansion signal board, 2 x 24 V DC input / 2 x 24 V DC output	6ES7 288-5DT04-0AA0
SB AE01	Analog expansion signal board, 1 x 12-bit analog input	6ES7 288-5AE01-0AA0
SB AQ01	Analog expansion signal board, 1 x 12-bit analog output	6ES7 288-5AQ01-0AA0
SB BA01	Battery signal board, support CR1025 button battery (battery purchased separately)	6ES7 288-5BA01-0AA0
Accessories		
I/O Extension Cable	S7-200 SMART I/O extension cable, 1 m in length	6ES7 288-6EC01-0AA0
PM207	S7-200 SMART power supply, 24 V DC/3 A	6ES7 288-0CD10-0AA0
PM207	S7-200 SMART power supply, 24 V DC/5 A	6ES7 288-0ED10-0AA0
PM207	S7-200 SMART power supply, 24 V DC/10 A	6ES7 288-0KD10-0AA0
USB/PPI Cable	S7-200 SMART Economy CPU programming cable, USB interface	6ES7 901-3DB30-0XA0

