

SIMATIC S7-1500 advanced controller



4/2	Introduction
4/2	SIMATIC S7-1500/S7-1500F, SIPLUS S7-1500
4/5	Central processing units
4/5	Standard CPUs
4/15	SIPLUS Standard CPUs
4/19	Fail-safe CPUs
4/28	I/O modules
4/28	<u>Digital modules</u>
4/28	SM 521 digital input modules
4/33	SM 522 digital output modules
4/39	SM 523 digital input/output modules
4/41	SIPLUS SM 521 digital modules
4/43	SIPLUS SM 522 digital modules
4/45	<u>Analog modules</u>
4/45	SM 531 analog input modules
4/50	SM 532 analog output modules
4/53	SM 534 analog input/output modules
4/56	SIPLUS SM 531 analog modules
4/57	SIPLUS SM 532 analog modules
4/58	<u>Technology modules</u>
4/58	TM PosInput 2 position detection modules
4/61	TM Count 2x24V counter modules
4/64	TM Timer DIDQ 16x24V time-based IO modules
4/67	SIPLUS TM Count 2x24V counter modules
4/68	<u>Communication</u>
4/68	CM PtP
4/71	CM 1542-5
4/73	CP 1542-5
4/75	CM 1542-1
4/77	CP 1543-1
4/80	SCALANCE W774 RJ45 for use in the control cabinet
4/83	SCALANCE W734 RJ45 for use in the control cabinet
4/86	SIPLUS CM PtP
4/88	SIPLUS CM 1542-5
4/89	Connection system
4/89	Front connectors
4/90	<u>SIMATIC TOP connect system cabling for SIMATIC S7-1500 and ET 200MP</u>
4/91	Fully modular connection
4/95	Front connectors with single cores

4/96	Power supplies
4/96	1-phase, 24 V DC (for S7-1500 and ET 200MP)
4/99	System power supplies
4/101	SIPLUS power supplies
4/101	Single-phase, 24 V DC/3 A (SIPLUS PM 1507)
4/102	Single-phase, 24 V DC/8 A (SIPLUS PM 1507)
4/103	SIPLUS system power supplies
4/105	Operator control and monitoring
4/105	SIMATIC HMI Basic Panels and Comfort Panels
4/106	SIPLUS Basic Panels and Comfort Panels
4/107	Accessories
4/107	Mounting rails
4/108	Spare parts

Brochures

For brochures serving as selection guides for SIMATIC products refer to:

www.siemens.com/simatic/printmaterial

SIMATIC S7-1500 advanced controller

Introduction

SIMATIC S7-1500/S7-1500F, SIPLUS S7-1500

Overview



Modular, scalable, and universally usable system in IP20 level of protection:

- The system solution for a variety of automation applications in discrete automation
- Highest performance with excellent usability
- Configurable exclusively in the Totally Integrated Automation Portal with STEP 7 Professional V12 or higher

Performance

- Increase in performance through:
 - Faster command execution
 - Language extensions
 - New data types
 - Faster backplane bus
 - Optimized code generation
- Powerful communication:
 - PROFINET IO (2-port switch) as standard interface; from CPU 1515-2 PN, one or more additional integrated PROFINET interfaces, e.g. for network separation
 - Expandable with communication modules for bus systems and point-to-point connection

Integrated technology

- Motion Control integrated without additional modules:
 - Standardized blocks (PLCopen) for connection of analog and PROFIdrive-capable drives
 - The Motion Control functionality supports speed-controlled and positioning axes as well as external encoders
 - Positionally precise gearing between axes
- Comprehensive trace functions for all CPU tags for real-time diagnosis and sporadic error detection; for effective commissioning and quick optimization of drives and controls
- Comprehensive control functionalities:
 - E.g. easily configurable blocks for automatic optimization of the control parameters for optimum control quality
- Additional functions through available technology modules:
 - E.g. high-speed counting, position detection, or measurement functions for signals up to 1 MHz

Safety Integrated

Protection of personnel and machinery – within the framework of an integrated complete system

- Failsafe SIMATIC S7-1500F controllers for processing standard and safety programs on the same controller. Generation of the failsafe and standard user program is carried out in the TIA Portal with the same editors; this enables failsafe data to be evaluated like standard data in the standard user program, for example. Due to this integration the system benefits and the comprehensive functionality of SIMATIC are also available for failsafe applications.

Security Integrated

- Password-based know-how protection against unauthorized reading and modification of program blocks
- Copy protection for greater protection against unauthorized copying of program blocks:
 - With copy protection, individual blocks on the SIMATIC Memory Card can be tied to its serial number so that the block can only be run if the configured memory card is inserted into the CPU.
- Rights concept with four different authorization levels:
 - Different access rights can be assigned to various user groups. The new protection level 4 makes it possible to also restrict communication to HMI devices.
- Improved manipulation protection:
 - Changed or unauthorized transfers of engineering data are detected by the controller.
- For use of an Ethernet CP (CP 1543-1):
 - Additional access protection by means of a firewall
 - Setup of secure VPN connections (V12 SP1 or higher)

Design and handling

- CPUs with display for plain text information:
 - Information about article numbers, firmware version, and the serial number of all connected modules can be displayed
 - Setting the IP address of the CPU and additional network settings directly on site, without programming device
 - Display of occurring error messages directly as plain text message, meaning reduction in downtime
- Uniform front connectors for all modules and integrated potential bridges for flexible potential group formation simplify stock keeping and reduce wiring costs
- Integrated DIN rail in the S7-1500 mounting rail:
 - Quick and easy installation of additional components such as miniature circuit breakers, relays, etc.
- Central expansion with signal modules:
 - For flexible adaptation to any application
- System cabling for digital signal modules:
 - For fast and clearly arranged connecting to sensors and actuators in the field and simple wiring inside the control cabinet
- Power supply:
 - Load power supply modules (PMs) for supplying the module with 24 V
 - Power supply modules to supply power to the internal module electronics via the backplane bus
- Distributed expansion:
 - Use of up to 30 signal modules, communication modules, and technology modules via the PROFINET interface module IM 155-5 for the ET 200MP I/O system
 - No difference in terms of handling and system functions in central and distributed operation

Overview (continued)**Integrated system diagnostics**

- Integrated system diagnostics for CPUs, activated by default:
 - Consistent plain text display of system diagnostic information in the display, TIA Portal, HMI, and web server, even for drive messages. Messages are updated even if the CPU is in STOP state.
 - System diagnostics integrated in the CPU firmware. Configuration by user not required. The diagnostics is automatically updated on configuration changes.

Datalog (archives) and recipes

- SIMATIC Memory Card:
 - Plug-in load memory
 - Permits firmware updates
 - Storage option for STEP 7 projects (including comments and symbols), additional documentation, or csv files (for recipes and archives)
 - Easy access to plant-relevant operating data and configuration data with Office tools via the SD Card reader (two-way data exchange from and to the controller)
- Integrated web server:
 - Easy access to plant-relevant operating data and configuration data via a Web browser

Approvals

The SIMATIC S7-1500 complies with the following national and international standards:

- cULus approval
- cULus HazLoc approval
- FM approval
- ATEX approval (only for 24 V; not for 230 V)
- CE
- C-TICK
- KCC
- IECEx (24 V only; not for 230 V)
- EN 61000-6-4
- EN 60068-2-1/ -2/ -6/ -14/ -27/ -30/ -32
- EN 61131-2

You can find the marine approvals available for the S7-1500 on the Internet (SIMATIC Customer Support):
<http://www.siemens.com/automation/support>

Technical specifications

General technical specifications SIMATIC S7-1500	
Degree of protection	IP20 acc. to IEC 60 529
Ambient temperature	
• Horizontal installation	0...60 °C (display: at an operating temperature of typ. 50 °C, the display is switched off.)
• Vertical installation	0... 40 °C (display: at an operating temperature of typ. 40 °C, the display is switched off.)
Relative humidity	5%...95%, no condensation
Atmospheric pressure	From 1080 to 795 hPa (corresponds to an altitude of -1000 to +2000 m)
Insulation	
• < 50 V	707 V DC test voltage (type test)
• < 150 V	2200 V DC test voltage
• < 250 V	2500 V DC test voltage
Electromagnetic compatibility	Requirements of the EMC directive; interference immunity according to IEC 61000-6-2
• Pulse-shaped disturbance variables	Test according to: Electrostatic discharge according to IEC 61000-4-2, burst pulses according to IEC 61000-4-4, energy single pulse (surge) according to IEC 61000-4-5,
• Sinusoidal disturbance variables	Test according to: HF irradiation according to IEC 61000-4-3, HF decoupling according to IEC 61000-4-6
• Emission of radio frequency interference	Requirements of the EMC directive; interference emission according to EN 61000-6-4 Interference emission according to 61000-6-4 Interference emission of electromagnetic fields according to EN 61000-6-4

General technical specifications SIMATIC S7-1500	
Mechanical stress	
• Vibrations	Testing according to EN 60068-2-6 Tested with: 5 Hz ≤ f ≤ 8.4 Hz, constant amplitude 7 mm; 9 Hz ≤ f ≤ 150 Hz, constant acceleration 2 g; duration of vibration: 10 frequency passes per axis in each direction of the 3 mutually perpendicular axes
• Shock	Testing according to EN 60068-2-27 Tested with: Half-wave: strength of shock 15 g peak value, 11 ms duration; shock direction: 3 shocks each in ± direction in each of the 3 mutually vertical axes

SIMATIC S7-1500 advanced controller

Introduction

SIMATIC S7-1500/S7-1500F, SIPLUS S7-1500**Technical specifications (continued)**

General technical specifications of the SIPLUS S7-1500	
Ambient temperature range	-40/-25/-20 ... +55/+60/+70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions.

General technical specifications of the SIPLUS S7-1500	
Ambient conditions	
Extended ambient conditions	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
• against biologically active substances / conformity with EN 60721-3-3	
• against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
• against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

Overview CPU 1511-1 PN



- Entry-level CPU in the S7-1500 controller product range
- Suitable for applications with medium requirements for program scope and processing speed
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1515-2 PN



- The CPU for applications with medium to high requirements for program/data storage in the S7-1500 controller product range
- Medium to high processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1513-1 PN



- The CPU for applications with medium requirements for program/data storage in the S7-1500 controller product range
- Medium to high processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

Overview CPU 1516-3 PN/DP



- The CPU with a large program and data memory in the S7-1500 controller product range for applications with high requirements regarding program scope and networking
- High processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller
- PROFIBUS DP master interface
- Isochronous mode on PROFIBUS and PROFINET
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1517-3 PN/DP



- The CPU with a large program and data memory in the S7-1500 controller product range for applications with high requirements regarding program scope and networking
- High processing speed for binary and floating-point arithmetic
- For cross-industry automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller
- PROFIBUS DP master interface
- Isochronous mode on PROFIBUS and PROFINET
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders, positionally precise gearing between axes
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

Overview CPU 1518-4 PN/DP



- The CPU with a very large program and data memory in the S7-1500 controller product range for demanding applications with extremely high requirements regarding program scope, performance and networking

- Extremely high processing speed for binary and floating-point arithmetic
- For cross-industry automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- Two additional PROFINET interfaces with separate IP address; the PROFINET interface X3 also offers the option of transferring data at a rate of 1 Gbit/s
- PROFINET IO controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller
- PROFIBUS DP master interface
- Isochronous mode on PROFIBUS and PROFINET
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

Technical specifications

Article number	6ES7511-1AK00-0AB0	6ES7513-1AL00-0AB0	6ES7515-2AM00-0AB0
	CPU 1511-1PN, 150KB PROGRAM, 1MB DATA	CPU 1513-1 PN, 300KB PROGRAM, 1,5MB DATA	CPU 1515-2 PN, 500KB PROGRAM, 3MB DATA
Product type designation			
General information			
Engineering with			
• STEP 7 TIA Portal can be configured/integrated as of version	V13 SP1	V13 SP1	V13 SP1
Display			
Screen diagonal (cm)	3.45 cm	3.45 cm	6.1 cm
Supply voltage			
Type of supply voltage	24 V DC	24 V DC	24 V DC
Power losses			
Power loss, typ.	5.7 W	5.7 W	6.3 W
Memory			
Work memory			
• integrated (for program)	150 kbyte	300 kbyte	500 kbyte
• integrated (for data)	1 Mbyte	1.5 Mbyte	3 Mbyte
Load memory			
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte	32 Gbyte	32 Gbyte
CPU processing times			
for bit operations, typ.	60 ns	40 ns	30 ns
for word operations, typ.	72 ns	48 ns	36 ns
for fixed point arithmetic, typ.	96 ns	64 ns	48 ns
for floating point arithmetic, typ.	384 ns	256 ns	192 ns
Counters, timers and their retentivity			
S7 counter			
• Number	2 048	2 048	2 048
IEC counter			
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)
S7 times			
• Number	2 048	2 048	2 048
IEC timer			
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

Technical specifications (continued)

Article number	6ES7511-1AK00-0AB0 CPU 1511-1PN, 150KB PROGRAM, 1MB DATA	6ES7513-1AL00-0AB0 CPU 1513-1 PN, 300KB PROGRAM, 1,5MB DATA	6ES7515-2AM00-0AB0 CPU 1515-2 PN, 500KB PROGRAM, 3MB DATA
Data areas and their retentivity			
Flag			
• Number, max.	16 kbyte	16 kbyte	16 kbyte
Address area			
I/O address area			
• Inputs	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image
Time of day			
Clock			
• Type	Hardware clock	Hardware clock	Hardware clock
Interfaces			
1st interface			
Interface types			
- Number of ports	2	2	2
- Integrated switch	Yes	Yes	Yes
- RJ 45 (Ethernet)	Yes; X1	Yes; X1	Yes; X1
Protocols			
- PROFINET IO Controller	Yes	Yes	Yes
- PROFINET IO Device	Yes	Yes	Yes
- SIMATIC communication	Yes	Yes	Yes
- Open IE communication	Yes	Yes	Yes
- Web server	Yes	Yes	Yes
- Media redundancy	Yes	Yes	Yes
2nd interface			
Interface types			
- Number of ports			1
- Integrated switch			No
- RJ 45 (Ethernet)			Yes; X2
Protocols			
- PROFINET IO Controller			No
- PROFINET IO Device			No
- SIMATIC communication			Yes
- Open IE communication			Yes
- Web server			Yes
Protocols			
Number of connections			
• Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs	128; via integrated interfaces of the CPU and connected CPs / CMs	192; via integrated interfaces of the CPU and connected CPs / CMs
PROFINET IO Controller			
Services			
- Number of connectable IO devices, max.	128; In total, up to 256 distributed I/O devices can be connected via PROFIBUS or PROFINET	128; In total, up to 256 distributed I/O devices can be connected via PROFIBUS or PROFINET	256; In total, up to 512 distributed I/O devices can be connected via PROFIBUS or PROFINET
- Of which IO devices with IRT and "high performance" option, max.	64	64	64
- Max. number of connectable IO devices for RT	128	128	256
Isochronous mode			
Isochronous operation (application synchronized up to terminal)	Yes; With minimum OB 6x cycle of 625 µs	Yes; With minimum OB 6x cycle of 500 µs	Yes; With minimum OB 6x cycle of 500 µs

Technical specifications (continued)

Article number	6ES7511-1AK00-0AB0 CPU 1511-1PN, 150KB PROGRAM, 1MB DATA	6ES7513-1AL00-0AB0 CPU 1513-1 PN, 300KB PROGRAM, 1,5MB DATA	6ES7515-2AM00-0AB0 CPU 1515-2 PN, 500KB PROGRAM, 3MB DATA
supported technology objects			
Motion	Yes	Yes	Yes
• Speed-controlled axis	6; Requirement: There must be no other motion technology objects created	6; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created
- Number of speed-controlled axes, max.			
• Positioning axis	6; Requirement: There must be no other motion technology objects created	6; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created
- Number of positioning axes, max.			
• Synchronized axes (relative gear synchronization)	3; Requirement: There must be no other motion technology objects created	3; Requirement: There must be no other motion technology objects created	15; Requirement: There must be no other motion technology objects created
- Number of axes, max.			
• External encoders	6; Requirement: There must be no other motion technology objects created	6; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created
- Number of external encoders, max.			
Controller			
• PID_Compact	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature
Counting and measuring			
• High-speed counter	Yes	Yes	Yes
Ambient conditions			
Ambient temperature in operation			
• horizontal installation, min.	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	0 °C	0 °C	0 °C
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Configuration			
programming			
Programming language			
- LAD	Yes	Yes	Yes
- FBD	Yes	Yes	Yes
- STL	Yes	Yes	Yes
- SCL	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes
Know-how protection			
• User program protection	Yes	Yes	Yes
• Copy protection	Yes	Yes	Yes
• Block protection	Yes	Yes	Yes
Access protection			
• Password for display	Yes	Yes	Yes
• Protection level: Write protection	Yes	Yes	Yes
• Protection level: Read/write protection	Yes	Yes	Yes
• Protection level: Complete protection	Yes	Yes	Yes
Dimensions			
Width	35 mm	35 mm	70 mm
Height	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm
Weights			
Weight, approx.	430 g	430 g	830 g

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

Technical specifications (continued)

Article number	6ES7516-3AN00-0AB0 CPU 1516-3 PN/DP, 1MB PROG., 5MB DATA	6ES7517-3AP00-0AB0 CPU 1517-3 PN/DP, 2MB PROG./ 8MB DATA	6ES7518-4AP00-0AB0 CPU 1518-4 PN/DP, 4MB PROG., 20MB DATA
Product type designation			
General information			
Engineering with			
• STEP 7 TIA Portal can be configured/integrated as of version	V13 SP1	V13 SP1	V13 SP1
Display			
Screen diagonal (cm)	6.1 cm	6.1 cm	6.1 cm
Supply voltage			
Type of supply voltage	24 V DC	24 V DC	24 V DC
Power losses			
Power loss, typ.	7 W	24 W	24 W
Memory			
Work memory			
• integrated (for program)	1 Mbyte	2 Mbyte	4 Mbyte
• integrated (for data)	5 Mbyte	8 Mbyte	20 Mbyte
Load memory			
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte	32 Gbyte	32 Gbyte
CPU processing times			
for bit operations, typ.	10 ns	2 ns	1 ns
for word operations, typ.	12 ns	3 ns	2 ns
for fixed point arithmetic, typ.	16 ns	3 ns	2 ns
for floating point arithmetic, typ.	64 ns	12 ns	6 ns
Counters, timers and their retentivity			
S7 counter			
• Number	2 048	2 048	2 048
IEC counter			
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)
S7 times			
• Number	2 048	2 048	2 048
IEC timer			
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)
Data areas and their retentivity			
Flag			
• Number, max.	16 kbyte	16 kbyte	16 kbyte
Address area			
I/O address area			
• Inputs	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image
Time of day			
Clock			
• Type	Hardware clock	Hardware clock	Hardware clock
Interfaces			
1st interface			
Interface types			
- Number of ports	2	2	2
- Integrated switch	Yes	Yes	Yes
- RJ 45 (Ethernet)	Yes; X1	Yes; X1	Yes; X1
Protocols			
- PROFINET IO Controller	Yes	Yes	Yes
- PROFINET IO Device	Yes	Yes	Yes
- SIMATIC communication	Yes	Yes	Yes
- Open IE communication	Yes	Yes	Yes
- Web server	Yes	Yes	Yes
- Media redundancy	Yes	Yes	Yes

Technical specifications (continued)

Article number	6ES7516-3AN00-0AB0 CPU 1516-3 PN/DP, 1MB PROG., 5MB DATA	6ES7517-3AP00-0AB0 CPU 1517-3 PN/DP, 2MB PROG./ 8MB DATA	6ES7518-4AP00-0AB0 CPU 1518-4 PN/DP, 4MB PROG., 20MB DATA
2nd interface			
Interface types			
- Number of ports	1	1	1
- Integrated switch	No	No	No
- RJ 45 (Ethernet)	Yes; X2	Yes; X2	Yes; X2
Protocols			
- PROFINET IO Controller	No	No	No
- PROFINET IO Device	No	No	No
- SIMATIC communication	Yes	Yes	Yes
- Open IE communication	Yes	Yes	Yes
- Web server	Yes	Yes	Yes
3rd interface			
Interface types			
- Number of ports	1	1	1
- Integrated switch			No
- RJ 45 (Ethernet)			Yes; X3
- RS 485	Yes	Yes	
Protocols			
- PROFINET IO Controller			No
- PROFINET IO Device			No
- SIMATIC communication	Yes	Yes	Yes
- Open IE communication			Yes
- Web server			Yes
- PROFIBUS DP master	Yes	Yes	
- PROFIBUS DP slave	No	No	
4th interface			
Interface types			
- Number of ports			1
- RS 485			Yes
Protocols			
- SIMATIC communication			Yes
- PROFIBUS DP master			Yes
- PROFIBUS DP slave			No
Protocols			
Number of connections			
• Number of connections, max.	256; via integrated interfaces of the CPU and connected CPs / CMs	320; via integrated interfaces of the CPU and connected CPs / CMs	384; via integrated interfaces of the CPU and connected CPs / CMs
PROFINET IO Controller			
Services			
- Number of connectable IO devices, max.	256; In total, up to 768 distributed I/O devices can be connected via PROFIBUS or PROFINET	512; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET	512; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET
- Of which IO devices with IRT and "high performance" option, max.	64	64	64
- Max. number of connectable IO devices for RT	256	512	512
PROFIBUS DP master			
Services			
- Number of DP slaves	125; In total, up to 768 distributed I/O devices can be connected via PROFIBUS or PROFINET	125; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET	125; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET
Isochronous mode			
Isochronous operation (application synchronized up to terminal)	Yes; With minimum OB 6x cycle of 375 µs	Yes; With minimum OB 6x cycle of 375 µs	Yes; With minimum OB 6x cycle of 250 µs

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

Technical specifications (continued)

Article number	6ES7516-3AN00-0AB0 CPU 1516-3 PN/DP, 1MB PROG., 5MB DATA	6ES7517-3AP00-0AB0 CPU 1517-3 PN/DP, 2MB PROG./ 8MB DATA	6ES7518-4AP00-0AB0 CPU 1518-4 PN/DP, 4MB PROG., 20MB DATA
supported technology objects			
Motion	Yes	Yes	Yes
• Speed-controlled axis	30; Requirement: There must be no other motion technology objects created	96; Requirement: There must be no other motion technology objects created	128; Requirement: There must be no other motion technology objects created
- Number of speed-controlled axes, max.			
• Positioning axis	30; Requirement: There must be no other motion technology objects created	96; Requirement: There must be no other motion technology objects created	128; Requirement: There must be no other motion technology objects created
- Number of positioning axes, max.			
• Synchronized axes (relative gear synchronization)	15; Requirement: There must be no other motion technology objects created	48; Requirement: There must be no other motion technology objects created	64; Requirement: There must be no other motion technology objects created
- Number of axes, max.			
• External encoders	30; Requirement: There must be no other motion technology objects created	96; Requirement: There must be no other motion technology objects created	128; Requirement: There must be no other motion technology objects created
- Number of external encoders, max.			
Controller			
• PID_Compact	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature
Counting and measuring			
• High-speed counter	Yes	Yes	Yes
Ambient conditions			
Ambient temperature in operation			
• horizontal installation, min.	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	0 °C	0 °C	0 °C
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Configuration			
programming			
Programming language			
- LAD	Yes	Yes	Yes
- FBD	Yes	Yes	Yes
- STL	Yes	Yes	Yes
- SCL	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes
Know-how protection			
• User program protection	Yes	Yes	Yes
• Copy protection	Yes	Yes	Yes
• Block protection	Yes	Yes	Yes
Access protection			
• Password for display	Yes	Yes	Yes
• Protection level: Write protection	Yes	Yes	Yes
• Protection level: Read/write protection	Yes	Yes	Yes
• Protection level: Complete protection	Yes	Yes	Yes
Dimensions			
Width	70 mm	175 mm	175 mm
Height	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm
Weights			
Weight, approx.	845 g	1 978 g	1 988 g

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

4

Ordering data	Article No.	Ordering data	Article No.
CPU 1511-1 PN Work memory 150 KB for program, 1 MB for data, PROFINET IO IRT interface, SIMATIC Memory Card required	6ES7511-1AK00-0AB0	Power supply For supplying the backplane bus of the S7-1500 24 V DC input voltage, power 25 W 24/48/60 V DC input voltage, power 60 W 120/230 V AC input voltage, power 60 W	6ES7505-0KA00-0AB0 6ES7505-0RA00-0AB0 6ES7507-0RA00-0AB0
CPU 1513-1 PN Work memory 300 KB for program, 1.5 MB for data, PROFINET IO IRT interface, SIMATIC Memory Card required	6ES7513-1AL00-0AB0	Power connector With coding element for power supply module; spare part, 10 units	6ES7590-8AA00-0AA0
CPU 1515-2 PN 500 KB RAM for program, 3 MB for data, PROFINET IO IRT interface, PROFINET interface; SIMATIC Memory Card required	6ES7515-2AM00-0AB0	Load power supply 24 V DC/3A 24 V DC/8A	6EP1332-4BA00 6EP1333-4BA00
CPU 1516-3 PN/DP 1 MB RAM for program, 5 MB for data, PROFINET IO IRT interface, PROFINET/PROFIBUS interface; SIMATIC Memory Card required	6ES7516-3AN00-0AB0	Power supply connector Spare part; for connecting the 24 V DC supply voltage • with push-in terminals	6ES7193-4JB00-0AA0
CPU 1517-3 PN/DP 2 MB RAM for program, 8 MB for data, PROFINET IO IRT interface, PROFINET/PROFIBUS interface; SIMATIC Memory Card required	6ES7517-3AP00-0AB0	PROFIBUS FastConnect RS 485 bus connector with 90° cable outlet With insulation displacement, max. transmission rate 12 Mbps Without programming device interface, grounding via control cabinet contact surface; 1 unit With programming device interface, grounding via control cabinet contact surface; 1 unit	6ES7972-0BA70-0XA0 6ES7972-0BB70-0XA0
CPU 1518-4 PN/DP Work memory 4 MB for program, 20 MB for data, PROFINET IO IRT interface, 2 PROFIBUS interfaces; SIMATIC Memory Card required	6ES7518-4AP00-0AB0	PROFIBUS FC Standard Cable GP Standard type with special design for fast mounting, 2-wire, shielded; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	6XV1830-0EH10
Accessories		PROFIBUS FC Robust Cable 2-wire, shielded; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	6XV1830-0JH10
SIMATIC Memory Card		PROFIBUS FC Flexible Cable 2-wire, shielded; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	6XV1831-2K
4 MB	6ES7954-8LC02-0AA0	PROFIBUS FC Trailing Cable 2-wire, shielded; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	
12 MB	6ES7954-8LE02-0AA0	Sheath color: Petrol	6XV1830-3EH10
24 MB	6ES7954-8LF02-0AA0	Sheath color: Violet	6XV1831-2L
256 MB	6ES7954-8LL02-0AA0		
2 GB	6ES7954-8LP01-0AA0		
SIMATIC S7-1500 mounting rail			
Fixed lengths, with grounding elements <ul style="list-style-type: none"> • 160 mm • 245 mm • 482 mm • 530 mm • 830 mm For cutting to length by customer, without drill holes; grounding elements must be ordered separately <ul style="list-style-type: none"> • 2000 mm 	6ES7590-1AB60-0AA0 6ES7590-1AC40-0AA0 6ES7590-1AE80-0AA0 6ES7590-1AF30-0AA0 6ES7590-1AJ30-0AA0		
PE connection element for mounting rail 2000 mm	6ES7590-1BC00-0AA0		
20 units	6ES7590-5AA00-0AA0		

SIMATIC S7-1500 advanced controller

Central processing units

Standard CPUs

4

Ordering data	Article No.	Ordering data	Article No.
PROFIBUS FC Food Cable 2-wire, shielded; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	6XV1830-0GH10	IE FC stripping tool Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	6GK1901-1GA00
PROFIBUS FC Ground Cable 2-wire, shielded; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	6XV1830-3FH10	Display for CPU 1511-1 PN and CPU 1513-1 PN; spare part for CPU 1515-2 PN, CPU 1516-3 PN/DP, CPU 1517-3 PN/DP and CPU 1518-4 PN/DP; spare part	6ES7591-1AA00-0AA0 6ES7591-1BA00-0AA0
PROFIBUS FC FRNC Cable GP 2-wire, shielded, flame-retardant, with copolymer outer sheath FRNC; Sold by the meter, max. length 1000 m, minimum order quantity 20 m	6XV1830-0LH10	Front cover for PROFIBUS DP interface for CPU 1517-3 PN/DP and CPU 1518-4 PN/DP; spare part	6ES7591-8AA00-0AA0
PROFIBUS FastConnect stripping tool Preadjusted stripping tool for fast stripping of PROFIBUS FastConnect bus cables	6GK1905-6AA00	SIMATIC S7-1500 Starter Kit Comprising: CPU 1511-1 PN, SIMATIC Memory Card 4 MB, digital input DI 16 x 24 V DC HF, digital output DO 16 x 24 V DC/0.5 A ST, 160 mm mounting rail, front connector, STEP 7 Professional V12, 365-day license, power supply 60 W AC 120/230 V, Standard Ethernet CAT 5 cable (2 m), screwdriver, documentation	6ES7511-1AK01-4YB5
IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal encl- osure and integrated insulation dis- placement contacts for connecting Industrial Ethernet FC installation cables		STEP 7 Professional V13 SP1 Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC Requirement: Windows 7 Professional SP1 (64-bit), Windows 7 Enterprise SP1 (64-bit), Windows 7 Ultimate SP1 (64-bit), Windows 8.1 (64-bit), Windows 8.1 Professional (64-bit), Windows 8.1 Enterprise (64-bit), Windows Server 2008 R2 StdE (full installation), Windows Server 2012 StdE (full installation) Available in: German, English, Chinese, Italian, French, Spanish	
IE FC RJ45 Plug 180 180° cable outlet 1 unit 10 units 50 units	6GK1901-1BB10-2AA0 6GK1901-1BB10-2AB0 6GK1901-1BB10-2AE0	STEP 7 Professional V13 SP1, floating license STEP 7 Professional V13 SP1, floating license, software download incl. license key ¹⁾ Email address required for delivery	6ES7822-1AA03-0YA5 6ES7822-1AE03-0YA5
IE FC TP Standard Cable GP 2 x 2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compliant; with UL approval; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1840-2AH10		
IE FC TP Trailing Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1840-3AH10		
IE FC TP Marine Cable 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 with marine approval, sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1840-4AH10		

¹⁾ For up-to-date information and download availability, see:
<http://www.siemens.com/tia-online-software-delivery>

SIMATIC S7-1500 advanced controller

Central processing units

SIPLUS Standard CPUs

Overview SIPLUS CPU 1511-1 PN



- Entry-level CPU in the S7-1500 controller product range
- Suitable for applications with medium requirements for program scope and processing speed
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode
- SIMATIC Memory Card required for operation of the CPU

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Overview SIPLUS CPU 1513-1 PN



- The CPU for applications with medium/high requirements for program/data storage in the S7-1500 controller product range
- High processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch

- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode
- SIMATIC Memory Card required for operation of the CPU

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Overview SIPLUS CPU 1516-3 PN/DP



- The CPU with large program and data memory in the S7-1500 controller product range for applications with high program scope requirements.
- High processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET.
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller.
- PROFIBUS DP master interface
- Isochronous mode on PROFIBUS and PROFINET
- SIMATIC Memory Card required for operation of the CPU

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

SIMATIC S7-1500 advanced controller

Central processing units

SIPLUS Standard CPUs

Overview SIPLUS CPU 1518-4 PN/DP



- The CPU with a very large program and data memory in the S7-1500 controller product range for demanding applications with extremely high requirements regarding program scope, performance and networking

- Extremely high processing speed for binary and floating-point arithmetic
- For cross-industry automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- Two additional PROFINET interfaces with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET.
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller.
- PROFIBUS DP master interface
- Isochronous mode on PROFIBUS and PROFINET
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

SIMATIC Memory Card required for operating the CPU

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme specific information has been added.

Technical specifications

Article number	6AG1511-1AK00-2AB0	6AG1511-1AK00-7AB0	6AG1513-1AL00-2AB0	6AG1513-1AL00-7AB0
Based on	6ES7511-1AK00-0AB0 SIPLUS S7-1500 CPU 1511-1 PN	6ES7511-1AK00-0AB0 SIPLUS S7-1500 CPU 1511-1 PN	6ES7513-1AL00-0AB0 SIPLUS S7-1500 CPU 1513-1 PN	6ES7513-1AL00-0AB0 SIPLUS S7-1500 CPU 1513-1 PN
Ambient conditions				
Ambient temperature in operation				
• horizontal installation, min.	-40 °C; = Tmin; startup @ -25 °C; startup display @ -20 °C	-40 °C; = Tmin; Startup @ -20 °C	-40 °C; = Tmin; startup @ -25 °C; startup display @ -20 °C	-40 °C; = Tmin; Startup @ -20 °C
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	70 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	70 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	-40 °C; = Tmin; startup @ -25 °C; startup display @ -20 °C	-40 °C; = Tmin; Startup @ -20 °C	-40 °C; = Tmin; startup @ -25 °C; startup display @ -20 °C	-40 °C; = Tmin; Startup @ -20 °C
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Extended ambient conditions				
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity				
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)

Technical specifications (continued)

Article number	6AG1511-1AK00-2AB0	6AG1511-1AK00-7AB0	6AG1513-1AL00-2AB0	6AG1513-1AL00-7AB0
Based on	6ES7511-1AK00-0AB0 SIPLUS S7-1500 CPU 1511-1 PN	6ES7511-1AK00-0AB0 SIPLUS S7-1500 CPU 1511-1 PN	6ES7513-1AL00-0AB0 SIPLUS S7-1500 CPU 1513-1 PN	6ES7513-1AL00-0AB0 SIPLUS S7-1500 CPU 1513-1 PN
Resistance				
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
Article number	6AG1516-3AN00-2AB0	6AG1516-3AN00-7AB0	6AG1518-4AP00-4AB0	
Based on	6ES7516-3AN00-0AB0 SIPLUS S7-1500 CPU 1516-3 PN/DP	6ES7516-3AN00-0AB0 SIPLUS S7-1500 CPU 1516-3 PN/DP	6ES7518-4AP00-0AB0 SIPLUS S7-1500 CPU 1518-4 PN/DP	
Ambient conditions				
Ambient temperature in operation				
• horizontal installation, min.	-40 °C; = Tmin; startup @ -25 °C; startup display @ -20 °C	-40 °C; = Tmin; Startup @ -20 °C	0 °C	
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	70 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	
• vertical installation, min.	-40 °C; = Tmin; startup @ -25 °C; startup display @ -20 °C	-40 °C; = Tmin; Startup @ -20 °C	0 °C	
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	
Extended ambient conditions				
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	
Relative humidity				
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	
Resistance				
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Available soon	
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Available soon	
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Available soon	

SIMATIC S7-1500 advanced controller

Central processing units

SIPLUS Standard CPUs**Ordering data****Article No.****Article No.****SIPLUS CPU 1511-1 PN**

(extended temperature range and medial exposure)

Work memory 150 KB for program, 1 MB for data, PROFINET IO IRT interface; SIMATIC Memory Card required

Temperature range -40 ... +60 °C

Temperature range -40 ... +70 °C

6AG1511-1AK00-2AB0**6AG1511-1AK00-7AB0****SIPLUS CPU 1513-1 PN**

(extended temperature range and medial exposure)

Work memory 300 KB for program, 1.5 MB for data, PROFINET IO IRT interface; SIMATIC Memory Card required

Temperature range -40 ... +60 °C

Temperature range -40 ... +70 °C

6AG1513-1AL00-2AB0**6AG1513-1AL00-7AB0****SIPLUS CPU 1516-3 PN/DP**

(extended temperature range and medial exposure)

1 MB RAM for program, 5 MB for data, PROFINET IO IRT interface, PROFINET/PROFIBUS interface; SIMATIC Memory Card required

Temperature range -40 ... +60 °C

Temperature range -40 ... +70 °C

6AG1516-3AN00-2AB0**6AG1516-3AN00-7AB0****SIPLUS CPU 1518-4 PN/DP**

(medial exposure)

Work memory 3 MB for program, 10 MB for data, PROFINET IO IRT interface, 2 PROFINET/PROFIBUS interfaces; SIMATIC Memory Card required

6AG1518-4AP00-4AB0**Power supply**

(extended temperature range and medial exposure)

24 V DC input voltage, power 25 W

24/48/60 V DC input voltage, power 60 W

120/230 V AC input voltage, power 60 W

6AG1505-0KA00-7AB0**6AG1505-0RA00-7AB0****6AG1507-0RA00-7AB0****Load power supply**

(extended temperature range and medial exposure)

24 V DC/3A

24 V DC/8A

6AG1332-4BA00-7AA0**6AG1333-4BA00-7AA0****Display**

(extended temperature range and medial exposure)

For SIPLUS CPU 1511-1 PN and CPU 1513-1 PN; spare part

For SIPLUS CPU 1516-3 PN/DP and SIPLUS CPU 1518-4 PN/DP; spare part

6AG1591-1AA00-2AA0**6AG1591-1BA00-2AA0****Further accessories**

See SIMATIC S7-1500, Standard CPUs, page 4/13

Overview CPU 1511F-1 PN

- Entry-level CPU in the S7-1500F Controller product range
- Suitable for standard and fail-safe applications with medium requirements for program scope and processing speed
- Used as central controller in production lines with central and distributed I/O
- Supports PROFIsafe in centralized and distributed configuration
- PROFINET IO IRT interface with 2-port switch
- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1513F-1 PN

- The CPU for standard and fail-safe applications with medium/high requirements for program/data storage in the S7-1500 controller product range
- High processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- Supports PROFIsafe in centralized and distributed configuration
- PROFINET IO IRT interface with 2-port switch
- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1515F-2 PN



- The CPU for applications with medium to high requirements for program/data storage in the S7-1500 controller product range
- Can be used for failsafe functions up to SIL 3 according to IEC 61508 and up to PLE according to ISO 13849.
- Medium to high processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- Supports PROFIsafe in centralized and distributed configurations
- PROFINET IO IRT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO Controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET I/O controller
- Isochronous mode
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

SIMATIC S7-1500 advanced controller

Central processing units

Fail-safe CPUs

Overview CPU 1516F-3 PN/DP



- The CPU with a large program and data memory in the S7-1500 controller product range for failsafe applications with high requirements regarding program scope and networking.
- Can be used for failsafe functions up to SIL 3 according to IEC 61508 and up to PLe according to ISO 13849.
- High processing speed for binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O.
- Supports PROFIsafe in centralized and distributed configuration.
- PROFINET IO IRT interface with 2-port switch.
- Additional PROFINET interface with separate IP address.
- PROFINET IO controller for operating distributed I/O on PROFINET.
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller.
- PROFIBUS DP master interface.
- Isochronous mode on PROFIBUS and PROFINET.
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders.
- Integrated Web server with the option of creating user-defined Web pages.

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1517F-3 PN/DP



- The CPU with a very large program and data memory in the S7-1500 controller product range for failsafe applications with high requirements regarding program scope and networking.
- Can be used for failsafe functions up to SIL 3 according to IEC 61508 and up to PLe according to ISO 13849.
- High processing speed for binary and floating-point arithmetic
- For cross-industry automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O
- Supports PROFIsafe in centralized and distributed configurations
- PROFINET IO IRT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET.
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller.
- PROFIBUS DP master interface
- Isochronous mode on PROFIBUS and PROFINET
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders, positionally precise gearing between axes
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1518-4 PN/DP



- The CPU with a very large program and data memory in the S7-1500 controller product range for failsafe applications with highest requirements regarding program scope and networking.
- Can be used for failsafe functions up to SIL 3 according to IEC 61508 and up to PLe according to ISO 13849.
- Extremely high processing speed for binary and floating-point arithmetic.
- For cross-industry automation tasks in series machine, special machine and plant construction.

- Used as central controller in production lines with central and distributed I/O.
- Supports PROFIsafe in centralized and distributed configuration.
- PROFINET IO IRT interface with 2-port switch.
- Two additional PROFINET interfaces with separate IP addresses.
- PROFINET IO controller for operating distributed I/O on PROFINET.
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller.
- PROFIBUS DP master interface.
- Isochronous mode on PROFIBUS and PROFINET.
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- Integrated Web server with the option of creating user-defined Web pages.

Note:

SIMATIC Memory Card required for operation of the CPU

Technical specifications

Article number	6ES7511-1FK00-0A00	6ES7513-1FL00-0A00	6ES7515-2FM00-0A00	6ES7516-3FN00-0A00	6ES7517-3FP00-0A00	6ES7518-4FP00-0A00
	CPU 1511F-1PN, 225KB PROG, 1MB DATA	CPU 1513F-1 PN, 450KB PROG, 1,5MB DATA	CPU 1515F-2 PN, 750KB PROG., 3MB DATA	CPU 1516F-3 PN/DP, 1,5MB PROG, 5MB DATA	CPU 1517F-3 PN/DP, 3MB PROG., 8MB DATA	CPU 1518F-4 PN/DP, 6MB PROG, 20MB DATA
Product type designation						
General information						
Engineering with						
• STEP 7 TIA Portal can be configured/integrated as of version	V13 SP1	V13 SP1	V13 SP1	V13 SP1	V13 SP1	V13 SP1
Display						
Screen diagonal (cm)	3.45 cm	3.45 cm	6.1 cm	6.1 cm	6.1 cm	6.1 cm
Supply voltage						
Type of supply voltage	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Power losses						
Power loss, typ.	5.7 W	5.7 W	6.3 W	7 W	24 W	24 W
Memory						
Work memory						
• integrated (for program)	225 kbyte	450 kbyte	750 kbyte	1.5 Mbyte	3 Mbyte	6 Mbyte
• integrated (for data)	1 Mbyte	1.5 Mbyte	3 Mbyte	5 Mbyte	8 Mbyte	20 Mbyte
Load memory						
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte	32 Gbyte	32 Gbyte	32 Gbyte	32 Gbyte	32 Gbyte
CPU processing times						
for bit operations, typ.	60 ns	40 ns	30 ns	10 ns	2 ns	1 ns
for word operations, typ.	72 ns	48 ns	36 ns	12 ns	3 ns	2 ns
for fixed point arithmetic, typ.	96 ns	64 ns	48 ns	16 ns	3 ns	2 ns
for floating point arithmetic, typ.	384 ns	256 ns	192 ns	64 ns	12 ns	6 ns

SIMATIC S7-1500 advanced controller

Central processing units

Fail-safe CPUs

Technical specifications (continued)

Article number	6ES7511-1FK00-0AB0 CPU 1511F-1PN, 225KB PROG, 1MB DATA	6ES7513-1FL00-0AB0 CPU 1513F-1 PN, 450KB PROG, 1,5MB DATA	6ES7515-2FM00-0AB0 CPU 1515F-2 PN, 750KB PROG.,3MB DATA	6ES7516-3FN00-0AB0 CPU 1516F-3 PN/DP, 1,5MB PROG, 5MB DATA	6ES7517-3FP00-0AB0 CPU 1517F-3 PN/DP, 3MB PROG., 8MB DATA	6ES7518-4FP00-0AB0 CPU 1518F-4 PN/DP, 6MB PROG, 20MB DATA
Counters, timers and their retentivity						
S7 counter						
• Number	2 048	2 048	2 048	2 048	2 048	2 048
IEC counter						
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)
S7 times						
• Number	2 048	2 048	2 048	2 048	2 048	2 048
IEC timer						
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)
Data areas and their retentivity						
Flag						
• Number, max.	16 kbyte	16 kbyte	16 kbyte	16 kbyte	16 kbyte	16 kbyte
Address area						
I/O address area						
• Inputs	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image
Time of day						
Clock						
• Type	Hardware clock	Hardware clock	Hardware clock	Hardware clock	Hardware clock	Hardware clock
Interfaces						
1st interface						
Interface types						
- Number of ports	2	2	2	2	2	2
- Integrated switch	Yes	Yes	Yes	Yes	Yes	Yes
- RJ 45 (Ethernet)	Yes	Yes; X1	Yes; X1	Yes; X1	Yes; X1	Yes; X1
Protocols						
- PROFINET IO Controller	Yes	Yes	Yes	Yes	Yes	Yes
- PROFINET IO Device	Yes	Yes	Yes	Yes	Yes	Yes
- SIMATIC communication	Yes	Yes	Yes	Yes	Yes	Yes
- Open IE communication	Yes	Yes	Yes	Yes	Yes	Yes
- Web server	Yes	Yes	Yes	Yes	Yes	Yes
- Media redundancy	Yes	Yes	Yes	Yes	Yes	Yes
2nd interface						
Interface types						
- Number of ports			1	1	1	1
- Integrated switch			No	No	No	No
- RJ 45 (Ethernet)			Yes; X2	Yes; X2	Yes; X2	Yes; X2
Protocols						
- PROFINET IO Controller			No	No	No	No
- PROFINET IO Device			No	No	No	No
- SIMATIC communication			Yes	Yes	Yes	Yes
- Open IE communication			Yes	Yes	Yes	Yes
- Web server			Yes	Yes	Yes	Yes

SIMATIC S7-1500 advanced controller

Central processing units

Fail-safe CPUs

Technical specifications (continued)

Article number	6ES7511-1FK00-0AB0	6ES7513-1FL00-0AB0	6ES7515-2FM00-0AB0	6ES7516-3FN00-0AB0	6ES7517-3FP00-0AB0	6ES7518-4FP00-0AB0
	CPU 1511F-1PN, 225KB PROG, 1MB DATA	CPU 1513F-1 PN, 450KB PROG, 1,5MB DATA	CPU 1515F-2 PN, 750KB PROG., 3MB DATA	CPU 1516F-3 PN/DP, 1,5MB PROG, 5MB DATA	CPU 1517F-3 PN/DP, 3MB PROG., 8MB DATA	CPU 1518F-4 PN/DP, 6MB PROG, 20MB DATA
3rd interface						
Interface types						
- Number of ports				1	1	1
- Integrated switch						No
- RJ 45 (Ethernet)						Yes; X3
- RS 485				Yes	Yes	
Protocols						
- PROFINET IO Controller						No
- PROFINET IO Device						No
- SIMATIC communication				Yes	Yes	Yes
- Open IE communication						Yes
- Web server						Yes
- PROFIBUS DP master				Yes	Yes	
- PROFIBUS DP slave				No	No	
4th interface						
Interface types						
- Number of ports						1
- RS 485						Yes
Protocols						
- SIMATIC communication						Yes
- PROFIBUS DP master						Yes
- PROFIBUS DP slave						No
Protocols						
Number of connections						
• Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs	128; via integrated interfaces of the CPU and connected CPs / CMs	192; via integrated interfaces of the CPU and connected CPs / CMs	256; via integrated interfaces of the CPU and connected CPs / CMs	320; via integrated interfaces of the CPU and connected CPs / CMs	384; via integrated interfaces of the CPU and connected CPs / CMs
PROFINET IO Controller						
Services						
- Number of connectable IO devices, max.	128; In total, up to 256 distributed I/O devices can be connected via PROFIBUS or PROFINET	128; In total, up to 256 distributed I/O devices can be connected via CPs/CMs via PROFIBUS or PROFINET.	256; In total, up to 512 distributed I/O devices can be connected via PROFIBUS or PROFINET	256; In total, up to 768 distributed I/O devices can be connected via PROFIBUS or PROFINET	512; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET	512; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET
- Of which IO devices with IRT and "high performance" option, max.	64	64	64	64	64	64
- Max. number of connectable IO devices for RT	128	128	256	256	512	512
PROFIBUS DP master						
Services						
- Number of DP slaves				125; In total, up to 768 distributed I/O devices can be connected via PROFIBUS or PROFINET	125; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET	125; In total, up to 1000 distributed I/O devices can be connected via PROFIBUS or PROFINET
Isochronous mode						
Isochronous operation (application synchronized up to terminal)	Yes; With minimum OB 6x cycle of 625 µs	Yes; With minimum OB 6x cycle of 500 µs	Yes; With minimum OB 6x cycle of 500 µs	Yes; With minimum OB 6x cycle of 375 µs	Yes; With minimum OB 6x cycle of 375 µs	Yes; With minimum OB 6x cycle of 250 µs

SIMATIC S7-1500 advanced controller

Central processing units

Fail-safe CPUs

Technical specifications (continued)

Article number	6ES7511-1FK00-0AB0	6ES7513-1FL00-0AB0	6ES7515-2FM00-0AB0	6ES7516-3FN00-0AB0	6ES7517-3FP00-0AB0	6ES7518-4FP00-0AB0
	CPU 1511F-1PN, 225KB PROG, 1MB DATA	CPU 1513F-1 PN, 450KB PROG, 1,5MB DATA	CPU 1515F-2 PN, 750KB PROG., 3MB DATA	CPU 1516F-3 PN/DP, 1,5MB PROG, 5MB DATA	CPU 1517F-3 PN/DP, 3MB PROG., 8MB DATA	CPU 1518F-4 PN/DP, 6MB PROG, 20MB DATA
supported technology objects						
Motion	Yes	Yes	Yes	Yes	Yes	Yes
• Speed-controlled axis						
- Number of speed-controlled axes, max.	6; Max. number of speed-controlled axes (requirement: there must be no other motion technology objects created)	6; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created	96; Requirement: There must be no other motion technology objects created	128; Requirement: There must be no other motion technology objects created
• Positioning axis						
- Number of positioning axes, max.	6; Max. number of positioning axes (requirement: there must be no other motion technology objects created)	6; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created	96; Requirement: There must be no other motion technology objects created	128; Requirement: There must be no other motion technology objects created
• Synchronized axes (relative gear synchronization)						
- Number of axes, max.	3; Max. number of synchronous axes (requirement: there must be no other motion technology objects created)	3; Requirement: There must be no other motion technology objects created	15; Requirement: There must be no other motion technology objects created	15; Requirement: There must be no other motion technology objects created	48; Requirement: There must be no other motion technology objects created	64; Requirement: There must be no other motion technology objects created
• External encoders						
- Number of external encoders, max.	6; Max. number of external encoders (requirement: there must be no other motion technology objects created)	6; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created	30; Requirement: There must be no other motion technology objects created	96; Requirement: There must be no other motion technology objects created	128; Requirement: There must be no other motion technology objects created
Controller						
• PID_Compact	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature
Counting and measuring						
• High-speed counter	Yes	Yes	Yes	Yes	Yes	Yes
Standards, approvals, certificates						
Highest safety class achievable in safety mode						
• Low demand mode: PFDavg	< 2.00E-05	< 2.00E-05	< 2.00E-05	< 2.00E-05	< 2.00E-05	< 2.00E-05
• High demand/continuous mode: PFH	< 1.00E-09	< 1.00E-09	< 1.00E-09	< 1.00E-09	< 1.00E-09	< 1.00E-09

SIMATIC S7-1500 advanced controller

Central processing units

Fail-safe CPUs

Technical specifications (continued)

Article number	6ES7511-1FK00-0AB0 CPU 1511F-1PN, 225KB PROG, 1MB DATA	6ES7513-1FL00-0AB0 CPU 1513F-1 PN, 450KB PROG, 1,5MB DATA	6ES7515-2FM00-0AB0 CPU 1515F-2 PN, 750KB PROG.,3MB DATA	6ES7516-3FN00-0AB0 CPU 1516F-3 PN/DP, 1,5MB PROG, 5MB DATA	6ES7517-3FP00-0AB0 CPU 1517F-3 PN/DP, 3MB PROG., 8MB DATA	6ES7518-4FP00-0AB0 CPU 1518F-4 PN/DP, 6MB PROG, 20MB DATA
Ambient conditions						
Ambient temperature in operation						
• horizontal installation, min.	0 °C	0 °C	0 °C	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temper- ature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temper- ature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temper- ature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temper- ature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temper- ature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temper- ature of typically 50 °C, the display is switched off
• vertical installation, min.	0 °C	0 °C	0 °C	0 °C	0 °C	0 °C
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temper- ature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temper- ature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temper- ature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temper- ature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temper- ature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temper- ature of typically 40 °C, the display is switched off
Configuration						
programming						
Programming language						
- LAD	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe
- FBD	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe
- STL	Yes	Yes	Yes	Yes	Yes	Yes
- SCL	Yes	Yes	Yes	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes	Yes	Yes	Yes
Know-how protection						
• User program protection	Yes	Yes	Yes	Yes	Yes	Yes
• Copy protection	Yes	Yes	Yes	Yes	Yes	Yes
• Block protection	Yes	Yes	Yes	Yes	Yes	Yes
Access protection						
• Password for display	Yes	Yes	Yes	Yes	Yes	Yes
• Protection level: Write protection	Yes; Specific write protection both for Standard and for Failsafe	Yes; Specific write protection both for Standard and for Failsafe	Yes; Specific write protection both for Standard and for Failsafe	Yes; Specific write protection both for Standard and for Failsafe	Yes; Specific write protection both for Standard and for Failsafe	Yes; Specific write protection both for Standard and for Failsafe
• Protection level: Read/write protection	Yes	Yes	Yes	Yes	Yes	Yes
• Protection level: Complete protection	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions						
Width	35 mm	35 mm	70 mm	70 mm	175 mm	175 mm
Height	147 mm	147 mm	147 mm	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm	129 mm	129 mm	129 mm
Weights						
Weight, approx.	430 g	430 g	830 g	845 g	1 978 g	1 988 g

SIMATIC S7-1500 advanced controller

Central processing units

Fail-safe CPUs

Ordering data	Article No.	Article No.
CPU 1511F-1 PN Fail-safe CPU, 230 KB RAM for program, 1 MB for data, PROFINET IO IRT interface; SIMATIC Memory Card required	6ES7511-1FK00-0AB0	
CPU 1513F-1 PN Fail-safe CPU, 450 KB RAM for program, 1.5 MB for data, PROFINET IO IRT interface; SIMATIC Memory Card required	6ES7513-1FL00-0AB0	
CPU 1515F-2 PN Work memory 750 KB for program, 3 MB for data, PROFINET IO IRT interface, PROFINET interface; SIMATIC Memory Card required	6ES7515-2FM00-0AB0	
CPU 1516F-3 PN/DP Fail-safe CPU, 1.5 MB RAM for program, 5 MB for data, PROFINET IO IRT interface, PROFINET/PROFIBUS interface; SIMATIC Memory Card required	6ES7516-3FN00-0AB0	
CPU 1517F-3 PN/DP Failsafe CPU, 3 MB RAM for program, 8 MB for data, PROFINET IO IRT interface, PROFINET/PROFIBUS interface; SIMATIC Memory Card required	6ES7517-3FP00-0AB0	
CPU 1518F-4 PN/DP Fail-safe CPU, work memory 6 MB for program, 20 MB for data, PROFINET IO IRT interface, 2 PROFINET interfaces, PROFIBUS interface; SIMATIC Memory Card required	6ES7518-4FP00-0AB0	
Accessories		
SIMATIC Memory Card		
4 MB	6ES7954-8LC02-0AA0	
12 MB	6ES7954-8LE02-0AA0	
24 MB	6ES7954-8LF02-0AA0	
256 MB	6ES7954-8LL02-0AA0	
2 GB	6ES7954-8LP01-0AA0	
SIMATIC S7-1500 mounting rail Fixed lengths, with grounding elements <ul style="list-style-type: none"> • 160 mm • 245 mm • 482 mm • 530 mm • 830 mm For cutting to length by customer, without drill holes; grounding elements must be ordered separately <ul style="list-style-type: none"> • 2000 mm 	6ES7590-1AB60-0AA0 6ES7590-1AC40-0AA0 6ES7590-1AE80-0AA0 6ES7590-1AF30-0AA0 6ES7590-1AJ30-0AA0 6ES7590-1BC00-0AA0	
PE connection element for mounting rail 2000 mm 20 units	6ES7590-5AA00-0AA0	
		Power supply For supplying the backplane bus of the S7-1500 24 V DC input voltage, power 25 W 24/48/60 V DC input voltage, power 60 W 120/230 V AC input voltage, power 60 W
		6ES7505-0KA00-0AB0 6ES7505-0RA00-0AB0 6ES7507-0RA00-0AB0
		Power connector With coding element for power supply module; spare part, 10 units
		6ES7590-8AA00-0AA0
		Load power supply 24 V DC/3A 24 V DC/8A
		6EP1332-4BA00 6EP1333-4BA00
		Power supply connector Spare part; for connecting the 24 V DC supply voltage <ul style="list-style-type: none"> • With push-in terminals
		6ES7193-4JB00-0AA0
		PROFIBUS FastConnect RS 485 bus connector with 90° cable outlet With insulation displacement, max. transmission rate 12 Mbps Without programming device interface, grounding via control cabinet contact surface; 1 unit With programming device interface, grounding via control cabinet contact surface; 1 unit
		6ES7972-0BA70-0XA0 6ES7972-0BB70-0XA0
		PROFIBUS FC Standard Cable GP Standard type with special design for fast mounting, 2-core, shielded; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m
		6XV1830-0EH10
		PROFIBUS FC Robust Cable 2-wire, shielded; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m
		6XV1830-0JH10
		PROFIBUS FC Flexible Cable 2-wire, shielded; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m
		6XV1831-2K
		PROFIBUS FC Trailing Cable 2-wire, shielded; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m Sheath color: Petrol Sheath color: Violet
		6XV1830-3EH10 6XV1831-2L
		PROFIBUS FC Food Cable 2-wire, shielded; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m
		6XV1830-0GH10

Ordering data	Article No.	Ordering data	Article No.
PROFIBUS FC Ground Cable 2-wire, shielded; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1830-3FH10	IE FC stripping tool Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	6GK1901-1GA00
PROFIBUS FC FRNC Cable GP 2-wire, shielded, flame-retardant, with copolymer outer sheath FRNC; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1830-0LH10	Display for CPU 1511-1 PN and CPU 1513-1 PN; spare part for CPU 1515-2 PN, CPU 1515F-2 PN, CPU 1516-3 PN/DP, CPU 1516F-3 PN/DP, CPU 1517-3 PN/DP, CPU 1517F-3 PN/DP, CPU 1518-4 PN/DP and CPU 1518F-4 PN/DP; spare part	6ES7591-1AA00-0AA0 6ES7591-1BA00-0AA0
PROFIBUS FastConnect stripping tool Preadjusted stripping tool for fast stripping of PROFIBUS FastConnect bus cables	6GK1905-6AA00	STEP 7 Professional V13 SP1 Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC Requirement: Windows 7 Professional SP1 (64-bit), Windows 7 Enterprise SP1 (64-bit), Windows 7 Ultimate SP1 (64-bit), Windows 8.1 (64-bit), Windows 8.1 Professional (64-bit), Windows 8.1 Enterprise (64-bit), Windows Server 2008 R2 StdE (full installation), Windows Server 2012 StdE (full installation) Available in: German, English, Chinese, Italian, French, Spanish	
IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables		STEP 7 Professional V13 SP1, floating license STEP 7 Professional V13 SP1, floating license, software download incl. license key ¹⁾ Email address required for delivery	6ES7822-1AA03-0YA5 6ES7822-1AE03-0YA5
IE FC RJ45 Plug 180 180° cable outlet 1 unit 10 units 50 units	6GK1901-1BB10-2AA0 6GK1901-1BB10-2AB0 6GK1901-1BB10-2AE0	STEP 7 Safety Advanced V13 SP1 Task: Engineering tool for configuring fail-safe user programs for SIMATIC S7-1200 FC, S7-1500F, S7-300F, S7-400F, WinAC RTX F, ET 200SP F Controller, ET 200SP, ET 200S, ET 200M, ET 200iSP, ET 200pro, ET 200eco Requirement: STEP 7 Professional V13 SP1 Floating license for 1 user Floating license for 1 user, license key download without software or documentation ¹⁾ Email address required for delivery	6ES7833-1FA13-0YA5 6ES7833-1FA13-0YH5
IE FC TP Standard Cable GP 2 x 2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compliant; with UL approval; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1840-2AH10		
IE FC TP Trailing Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1840-3AH10		
IE FC TP Marine Cable 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 with marine approval, sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1840-4AH10		

¹⁾ For up-to-date information and download availability, see: <http://www.siemens.com/tia-online-software-delivery>

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 521 digital input modules**Overview**

- 16 and 32-channel digital input modules
- For flexible adaptation of the controller to the corresponding task
- For subsequent expansion of the system with additional inputs
- 35 mm wide modules with parameters and diagnostic functions
- 25 mm wide modules for use in tight spaces: particularly economical, without parameters or diagnostic functions

4

Technical specifications

Article number	6ES7521-1BH0-0AB0	6ES7521-1BL00-0AB0	6ES7521-1BH50-0AA0	6ES7521-1FH00-0AA0
	DI 16X24VDC HF	DI 32X24VDC HF	DI 16X24VDC SRC BA	DI 16X230VAC BA
Product type designation				
General information				
Product function				
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
Engineering with				
• STEP 7 TIA Portal can be configured/integrated as of version			V12 / V12	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -	V2.3 / -	V2.3 / -	V2.3 / -
Operating mode				
• DI		Yes		
• Counter	Yes	Yes		
• MSI	Yes	Yes	Yes	Yes
Supply voltage				
Type of supply voltage	DC	DC		
Rated value (DC)	24 V	24 V		
Reverse polarity protection	Yes	Yes		
Digital inputs				
Number of digital inputs	16	32	16	16
Digital inputs, configurable m/p-reading	Yes p-reading	Yes p-reading	m-reading	p-reading Yes
Input characteristic curve in accordance with IEC 61131, type 1				
Input characteristic curve in accordance with IEC 61131, type 3	Yes	Yes	Yes	
Input voltage				
• Type of input voltage	DC	DC	DC	AC
• Rated value (AC)				230 V
• Rated value (DC)	24 V	24 V	24 V	
• for signal "0"	-30 to +5V	-30 to +5V		0V AC to 40V AC
• for signal "1"	+11 to +30V	+11 to +30V	-11 to -30V	79 to 264 V AC
Input current				
• for signal "1", typ.	2.5 mA	2.5 mA	4.5 mA	11 mA; At 230 V AC and 5.5 mA at 120 V AC

Technical specifications (continued)

Article number	6ES7521-1BH00-0AB0 DI 16X24VDC HF	6ES7521-1BL00-0AB0 DI 32X24VDC HF	6ES7521-1BH50-0AA0 DI 16X24VDC SRC BA	6ES7521-1FH00-0AA0 DI 16X230VAC BA
Input delay (for rated value of input voltage) for standard inputs				
- Parameterizable	Yes; 0.05 / 0.1 / 0.4 / 1.6 / 3.2 / 12.8 / 20 ms	Yes; 0.05 / 0.1 / 0.4 / 1.6 / 3.2 / 12.8 / 20 ms	No	No
for interrupt inputs				
- Parameterizable	Yes	Yes	No	No
for counter/technological functions				
- Parameterizable	Yes			
Cable length				
• shielded, max.	1 000 m	1 000 m	1 000 m	1 000 m
• Unshielded, max.	600 m	600 m	600 m	600 m
Encoder				
Connectable encoders				
• 2-wire sensor	Yes	Yes	Yes	Yes
- Permissible quiescent current (2-wire sensor), max.	1.5 mA	1.5 mA	1.5 mA	2 mA
Isochronous mode				
Isochronous operation (application synchronized up to terminal)	Yes	Yes	No	No
Filtering and processing time (TCI), min.	80 µs; At 50 µs filter time	80 µs; At 50 µs filter time		
Bus cycle time (TDP), min.	250 µs	250 µs		
Interrupts/diagnostics/ status information				
Alarms				
• Diagnostic alarm	Yes	Yes	No	No
• Hardware interrupt	Yes	Yes	No	No
Diagnostic messages				
• Diagnostics	Yes	Yes	No	
• Monitoring the supply voltage	Yes	Yes	No	No
• Wire break	Yes; to I < 350 µA	Yes; to I < 350 µA	No	No
• Short circuit	No	No	No	No
• Fuse blown	No	No	No	No
Diagnostics indication LED				
• RUN LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED	Yes; Green LED	No	No
• Channel status display	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• for channel diagnostics	Yes; Red LED	Yes; Red LED	No	No
• for module diagnostics	Yes; Red LED	Yes; Red LED	No	Yes; Red LED
Galvanic isolation				
Electrical isolation channels				
• between the channels and the backplane bus	Yes	Yes	Yes	Yes
Isolation				
Isolation checked with	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)	2500 V DC
Decentralized operation				
Fast Startup supported	Yes; 500 ms	Yes; 500 ms		
Prioritized startup	Yes	Yes	Yes	Yes
Dimensions				
Width	35 mm	35 mm	35 mm	35 mm
Height	147 mm	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm	129 mm
Weights				
Weight, approx.	240 g	260 g	230 g	300 g

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 521 digital input modules**Technical specifications (continued)**

Article number	6ES7521-1BH10-0AA0 DI 16X24VDC BA	6ES7521-1BL10-0AA0 DI 32X24VDC BA
Product type designation		
General information		
Product function		
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
Engineering with		
• STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13	V13 / V13
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -	V2.3 / -
Operating mode		
• MSI	Yes	Yes
Supply voltage		
Type of supply voltage	DC	DC
Rated value (DC)	24 V	24 V
Digital inputs		
Number of digital inputs	16	32
m/p-reading	p-reading	p-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes	Yes
Input voltage		
• Type of input voltage	DC	DC
• Rated value (DC)	24 V	24 V
• for signal "0"	-30 to +5V	-30 to +5V
• for signal "1"	+11 to +30V	+11 to +30V
Input current		
• for signal "1", typ.	2.7 mA	2.7 mA
Input delay (for rated value of input voltage)		
for standard inputs		
- Parameterizable	No	No
for interrupt inputs		
- Parameterizable	No	No
Cable length		
• shielded, max.	1 000 m	1 000 m
• Unshielded, max.	600 m	600 m
Encoder		
Connectable encoders		
• 2-wire sensor	Yes	Yes
- Permissible quiescent current (2-wire sensor), max.	1.5 mA	1.5 mA
Isochronous mode		
Isochronous operation (application synchronized up to terminal)	No	No

Technical specifications (continued)

Article number	6ES7521-1BH10-0AA0 DI 16X24VDC BA	6ES7521-1BL10-0AA0 DI 32X24VDC BA
Interrupts/diagnostics/ status information		
Alarms		
• Diagnostic alarm	No	No
• Hardware interrupt	No	No
Diagnostic messages		
• Diagnostics	No	No
• Monitoring the supply voltage	No	No
• Wire break	No	No
• Short circuit	No	No
• Fuse blown	No	No
Diagnostics indication LED		
• RUN LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED
• MAINT LED	No	No
• Monitoring of the supply voltage (PWR-LED)	No	No
• Channel status display	Yes; Green LED	Yes; Green LED
• for channel diagnostics	No	No
• for module diagnostics	No	No
Galvanic isolation		
Electrical isolation channels		
• between the channels and the backplane bus	Yes	Yes
Isolation		
Isolation checked with	707 V DC (type test)	707 V DC (type test)
Decentralized operation		
Prioritized startup	Yes	Yes
Dimensions		
Width	25 mm	25 mm
Height	147 mm	147 mm
Depth	129 mm	129 mm
Weights		
Weight, approx.	230 g	260 g
other		
Note:	Supplied incl. 40-pole push-in front connectors	Supplied incl. 40-pole push-in front connectors

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 521 digital input modules**Ordering data****Article No.****Article No.****SM 521 digital input modules**

Module width 35 mm;
with parameters and
diagnostic functions

16 inputs, 24 V DC, isolated,
parameterizable diagnostics and
hardware interrupts

6ES7521-1BH00-0AB0

32 inputs, 24 V DC, isolated,
parameterizable diagnostics and
hardware interrupts

6ES7521-1BL00-0AB0

16 inputs, 24 V DC, isolated,
input delay 3.2 ms

6ES7521-1BH50-0AA0

16 inputs, 230 V AC, isolated,
input delay 20 ms

6ES7521-1FH00-0AA0

Module width 25 mm;
without parameters or
diagnostic functions;
front connector (push-in)
included in delivery package

16 inputs, 24 V DC, isolated

6ES7521-1BH10-0AA0

32 inputs, 24 V DC, isolated

6ES7521-1BL10-0AA0**Accessories****Front connectors**

For 35 mm modules;
including four potential bridges,
cable ties and individual labeling
strips, 40-pin

- Screw terminals
- Push-in

6ES7592-1AM00-0XB0**6ES7592-1BM00-0XB0**

For 25 mm modules;
including cable ties and individual
labeling strips; push-in terminal
40-pin;
Spare part

6ES7592-1BM00-0XA0**Potential bridges
for front connectors****6ES7592-3AA00-0AA0**

For 35 mm modules;
20 units; spare part

DIN A4 labeling sheets

For 35 mm modules;
10 sheets with 10 labeling strips
each for I/O modules; perforated,
Al gray

6ES7592-2AX00-0AA0

For 25 mm modules;
10 sheets with 20 labeling strips
each for I/O modules; perforated,
Al gray

6ES7592-1AX00-0AA0**U connector****6ES7590-0AA00-0AA0**

5 units; spare part

**Universal front door
for I/O modules**

For 35 mm modules;
5 front doors; with 5 labeling strips
(front) and 5 cabling diagrams per
front door; spare part

6ES7528-0AA00-7AA0

For 25 mm modules;
5 front doors; with 5 labeling strips
(front) and 5 cabling diagrams per
front door; spare part

6ES7528-0AA00-0AA0

Overview



- 8, 16 and 32-channel digital output modules
- For flexible adaptation of the controller to the corresponding task
- For subsequent expansion of the system with additional outputs
- 35 mm wide modules with parameters and diagnostic functions
- 25 mm wide modules for use in tight spaces: particularly economical, without parameters or diagnostic functions

Technical specifications

Article number	6ES7522-1BH00-0AB0	6ES7522-1BL00-0AB0	6ES7522-1BF00-0AB0	6ES7522-5HF00-0AB0	6ES7522-5FF00-0AB0
	DQ 16X24VDC/ 0.5A ST	DQ 32X24VDC/ 0.5A ST	DQ 8X24VDC/2A HF	DQ 8X230VAC/5A ST (RELAY)	DQ 8X230VAC/2A ST (TRIAC)
Product type designation					
General information					
Product function					
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
Engineering with					
• STEP 7 TIA Portal can be configured/integrated as of version	V12 / V12	V12 / V12	V12 / V12	V12 / V12	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -	V2.3 / -	V2.3 / -	V2.3 / -	V2.3 / -
Operating mode					
• MSO	Yes	Yes	Yes	Yes	Yes
Supply voltage					
Type of supply voltage	DC	DC	DC	DC	
Rated value (DC)	24 V	24 V	24 V	24 V	
Reverse polarity protection	Yes; through internal protection with 7 A per group	Yes; through internal protection with 7 A per group	Yes; through internal protection with 10 A per group	Yes	
Digital outputs					
Type of digital output	Transistor	Transistor	Transistor	Relays	Triac
Number of digital outputs	16	32	8	8	8
Current-sinking				Yes	
Current-sourcing	Yes	Yes	Yes	Yes	Yes
Digital outputs, configurable	Yes	Yes	Yes	Yes	Yes
short-circuit protection	Yes; Clocked electronically	Yes; Clocked electronically	Yes; Clocked electronically	No	No
Limitation of inductive shutdown voltage to	L+ (-53 V)	L+ (-53 V)	-17 V		
Controlling a digital input	Yes	Yes	Yes	possible	
Switching capacity of the outputs					
• with resistive load, max.	0.5 A	0.5 A	2 A		2 A
• on lamp load, max.	5 W	5 W	10 W	1 500 W; 10,000 operating cycles	50 W
• Low energy/fluorescent lamps with electronic control gear				10 X 58 W (25,000 operating cycles)	
• Fluorescent tubes, conventionally compensated				1 X 58 W (25,000 operating cycles)	
• Fluorescent tubes, uncompensated				10 X 58 W (25,000 operating cycles)	

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 522 digital output modules

Technical specifications (continued)

Article number	6ES7522-1BH00-0AB0 DQ 16X24VDC/ 0.5A ST	6ES7522-1BL00-0AB0 DQ 32X24VDC/ 0.5A ST	6ES7522-1BF00-0AB0 DQ 8X24VDC/2A HF	6ES7522-5HF00-0AB0 DQ 8X230VAC/5A ST (RELAY)	6ES7522-5FF00-0AB0 DQ 8X230VAC/2A ST (TRIAC)
Load resistance range					
• lower limit	48 Ω	48 Ω	12 Ω		
• upper limit	12 kΩ	12 kΩ	4 kΩ		
Output voltage					
• Type of output voltage	DC	DC	DC		AC
• for signal "1", min.	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)		L1 (-1.5 V) at maximum output current; L1 (-8.5 V) at minimum output current
Output current					
• for signal "1" rated value	0.5 A	0.5 A	2 A	5 A	2 A
• for signal "0" residual current, max.	0.5 mA	0.5 mA	0.5 mA	0 A	2 mA
Output delay with resistive load					
• "0" to "1", max.	100 μs	100 μs	100 μs		1 AC cycle
• "1" to "0", max.	500 μs	500 μs	500 μs		1 AC cycle
Parallel switching of 2 outputs					
• for logic links	Yes	Yes	Yes	Yes	No
• for increased power	No	No	No	No	No
• for redundant control of a load	Yes	Yes	Yes	Yes	Yes
Switching frequency					
• with resistive load, max.	100 Hz	100 Hz	100 Hz	2 Hz	10 Hz
• with inductive load, max.	0.5 Hz; to IEC 947-5-1, DC-13	0.5 Hz; to IEC 947-5-1, DC-13	0.5 Hz; to IEC 947-5-1, DC-13	0.5 Hz	0.5 Hz
• on lamp load, max.	10 Hz	10 Hz	10 Hz	2 Hz	1 Hz
Aggregate current of the outputs					
• Current per channel, max.	0.5 A; see additional description in the manual	0.5 A; see additional description in the manual	2 A; see additional description in the manual	8 A; see additional description in the manual	2 A; see additional description in the manual
• Current per group, max.	4 A; see additional description in the manual	4 A; see additional description in the manual	8 A; see additional description in the manual	8 A; see additional description in the manual	2 A; see additional description in the manual
• Current per module, max.	8 A; see additional description in the manual	16 A; see additional description in the manual	16 A; see additional description in the manual	64 A; see additional description in the manual	10 A; see additional description in the manual
Relay outputs					
• Number of relay outputs				8	
• Rated input voltage of relay coil L+ (DC)				24 V	
• Current consumption of relays (coil current of all relays), max.				80 mA	
• external protection for relay outputs				With miniature circuit breaker with characteristic B for: $\cos \varphi 1.0$: 600 A $\cos \varphi 0.5 \dots 0.7$: 900 A with 8 A Diazed fuse: 1000 A	
• Contact connection (internal)				No	
• Size of motor starters according to NEMA, max.				5	
• Number of operating cycles, max.				4 000 000; see additional description in the manual	
• Relay approved acc. to UL 508				Yes; 250 V AC/5 A g.p.; 120 V AC TV-4 tungsten; A300, R300	

Technical specifications (continued)

Article number	6ES7522-1BH00-0AB0 DQ 16X24VDC/ 0.5A ST	6ES7522-1BL00-0AB0 DQ 32X24VDC/ 0.5A ST	6ES7522-1BF00-0AB0 DQ 8X24VDC/2A HF	6ES7522-5HF00-0AB0 DQ 8X230VAC/5A ST (RELAY)	6ES7522-5FF00-0AB0 DQ 8X230VAC/2A ST (TRIAC)
Switching capacity of contacts					
- with inductive load, max.				see additional description in the manual	
- with resistive load, max.				see additional description in the manual	
Triac outputs					
• Size of motor starters according to NEMA, max.					5
Cable length					
• shielded, max.	1 000 m	1 000 m	1 000 m	1 000 m	1 000 m
• Unshielded, max.	600 m	600 m	600 m	600 m	600 m
Isochronous mode					
Isochronous operation (application synchronized up to terminal)	Yes	Yes	No	No	No
Execution and activation time (TCO), min.	70 µs	70 µs			
Bus cycle time (TDP), min.	250 µs	250 µs			
Interrupts/diagnostics/status information					
Substitute values connectable	Yes	Yes	Yes	Yes	Yes
Alarms					
• Diagnostic alarm	Yes	Yes	Yes	Yes	No
Diagnostic messages					
• Diagnostics	Yes	Yes	Yes	Yes	No
• Monitoring the supply voltage	Yes	Yes	Yes	Yes	No
• Wire break	No	No	No	No	No
• Short circuit	Yes	Yes	Yes	No	No
• Fuse blown	No	No	No	No	No
Diagnostics indication LED					
• RUN LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	No
• Channel status display	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• for channel diagnostics	No	No	Yes; Red LED	No	No
• for module diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
Galvanic isolation					
Electrical isolation channels					
• between the channels and the backplane bus	Yes	Yes	Yes	Yes	Yes
Isolation					
Isolation checked with	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)	Between the channels: 2500 V DC; between the channels and backplane bus: 2500 V DC; between L+ backplane bus 707 V DC (type test)	2500 V DC
Decentralized operation					
Prioritized startup	Yes	Yes	Yes	Yes	Yes
Dimensions					
Width	35 mm	35 mm	35 mm	35 mm	35 mm
Height	147 mm	147 mm	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm	129 mm	129 mm
Weights					
Weight, approx.	230 g	280 g	240 g	350 g	290 g

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 522 digital output modules**Technical specifications (continued)**

Article number	6ES7522-1BH10-0AA0 DQ 16X24VDC/0.5A BA	6ES7522-1BL10-0AA0 DQ 32X24VDC/0.5A BA
Product type designation		
General information		
Product function		
• I&M data	Yes	Yes
Engineering with		
• STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13	V13 / V13
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -	V2.3 / -
Operating mode		
• MSO	Yes	Yes
Supply voltage		
Type of supply voltage	DC	DC
Rated value (DC)	24 V	24 V
Reverse polarity protection	Yes; through internal protection with 7 A per group	Yes; through internal protection with 7 A per group
Digital outputs		
Type of digital output	Transistor	Transistor
Number of digital outputs	16	32
Current-sourcing	Yes	Yes
Digital outputs, configurable	No	No
short-circuit protection	Yes	Yes
Limitation of inductive shutdown voltage to	L+ (-53 V)	L+ (-53 V)
Controlling a digital input	Yes	Yes
Switching capacity of the outputs		
• with resistive load, max.	0.5 A	0.5 A
• on lamp load, max.	5 W	5 W
Load resistance range		
• lower limit	48 Ω	48 Ω
• upper limit	12 kΩ	12 kΩ
Output voltage		
• Type of output voltage	DC	DC
• for signal "1", min.	L+ (-0.8 V)	L+ (-0.8 V)
Output current		
• for signal "1" rated value	0.5 A	0.5 A
• for signal "0" residual current, max.	0.5 mA	0.5 mA
Output delay with resistive load		
• "0" to "1", max.	100 μs	100 μs
• "1" to "0", max.	500 μs	500 μs
Parallel switching of 2 outputs		
• for logic links	Yes	Yes
• for increased power	No	No
• for redundant control of a load	Yes	Yes
Switching frequency		
• with resistive load, max.	100 Hz	100 Hz
• with inductive load, max.	0.5 Hz; to IEC 947-5-1, DC-13	0.5 Hz; to IEC 947-5-1, DC-13
• on lamp load, max.	10 Hz	10 Hz
Aggregate current of the outputs		
• Current per channel, max.	0.5 A; see additional description in the manual	0.5 A; see additional description in the manual
• Current per group, max.	4 A; see additional description in the manual	4 A; see additional description in the manual
• Current per module, max.	8 A; see additional description in the manual	16 A; see additional description in the manual
Cable length		
• shielded, max.	1 000 m	1 000 m
• Unshielded, max.	600 m	600 m

Technical specifications (continued)

Article number	6ES7522-1BH10-0AA0 DQ 16X24VDC/0.5A BA	6ES7522-1BL10-0AA0 DQ 32X24VDC/0.5A BA
Interrupts/diagnostics/ status information		
Substitute values connectable	No	No
Alarms		
• Diagnostic alarm	No	No
Diagnostic messages		
• Diagnostics	No	No
Diagnostics indication LED		
• RUN LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED
• MAINT LED	No	No
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED	Yes; Green LED
• Channel status display	Yes; Green LED	Yes; Green LED
Galvanic isolation		
Electrical isolation channels		
• between the channels and the backplane bus	Yes	Yes
Isolation		
Isolation checked with	707 V DC (type test)	707 V DC (type test)
Decentralized operation		
Prioritized startup	Yes	Yes
Dimensions		
Width	25 mm	25 mm
Height	147 mm	147 mm
Depth	129 mm	129 mm
Weights		
Weight, approx.	230 g	280 g
other		
Note:	Supplied incl. 40-pole push-in front connectors	Supplied incl. 40-pole push-in front connectors

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 522 digital output modules**Ordering data****Article No.****Article No.****SM 522 digital output modules**

Module width 35 mm;
with parameters and
diagnostic functions

8 outputs, 24 V DC; 2 A, isolated

6ES7522-1BF00-0AB0

16 outputs, 24 V DC; 0.5 A, isolated

6ES7522-1BH00-0AB0

32 outputs, 24 V DC; 0.5 A, isolated

6ES7522-1BL00-0AB0

8 relay outputs, 230 V AC, 5 A

6ES7522-5HF00-0AB0

8 outputs (triac), 230 V AC, 2 A

6ES7522-5FF00-0AB0

Module width 25 mm;
without parameters or
diagnostic functions;
front connector (push-in)
included in delivery package

16 outputs, 24 V DC; 0.5 A, isolated

6ES7 522-1BH10-0AA0

32 outputs, 24 V DC; 0.5 A, isolated

6ES7 522-1BL10-0AA0**Accessories****Front connectors**

For 35 mm modules;
including four potential bridges,
cable ties and individual labeling
strips, 40-pin

- Screw terminals
- Push-in

6ES7592-1AM00-0XB0**6ES7592-1BM00-0XB0**

For 25 mm modules;
including cable ties and individual
labeling strips; push-in terminal
40-pin;
Spare part

6ES7592-1BM00-0XA0**Potential bridges
for front connectors****6ES7592-3AA00-0AA0**

For 35 mm modules;
20 units; spare part

DIN A4 labeling sheets

For 35 mm modules;
10 sheets with 10 labeling strips
each for I/O modules; perforated,
Al gray

6ES7592-2AX00-0AA0

For 25 mm modules;
10 sheets with 20 labeling strips
each for I/O modules; perforated,
Al gray

6ES7592-1AX00-0AA0**U connector****6ES7590-0AA00-0AA0**

5 units; spare part

**Universal front door
for I/O modules**

For 35 mm modules;
5 front doors; with 5 labeling strips
(front) and 5 cabling diagrams per
front door; spare part

6ES7528-0AA00-7AA0

For 25 mm modules;
5 front doors; with 5 labeling strips
(front) and 5 cabling diagrams per
front door; spare part

6ES7528-0AA00-0AA0

Overview



- 16 digital inputs and 16 digital outputs
- For flexible adaptation of the controller to the corresponding task
- For subsequent expansion of the system with additional inputs and outputs
- For use in the tightest spaces: particularly economical, without parameters or diagnostic functions

Technical specifications

Article number	6ES7523-1BL00-0AA0 DI/DQ 16X24CDV/16X24VDC/ 0.5A BA
Product type designation	
General information	
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -
Operating mode	
• MSI	Yes
• MSO	Yes
Supply voltage	
Type of supply voltage	DC
Rated value (DC)	24 V
Reverse polarity protection	Yes; through internal protection with 7 A per group
Digital inputs	
Number of digital inputs	16
m/p-reading	p-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Input voltage	
• Type of input voltage	DC
• Rated value (DC)	24 V
• for signal "0"	-30 to +5V
• for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	2.7 mA

Article number	6ES7523-1BL00-0AA0 DI/DQ 16X24CDV/16X24VDC/ 0.5A BA
Input delay (for rated value of input voltage) for standard inputs	
- Parameterizable	No
for interrupt inputs	
- Parameterizable	No
Cable length	
• shielded, max.	1 000 m
• Unshielded, max.	600 m
Digital outputs	
Type of digital output	transistor
Number of digital outputs	16
Current-sourcing	Yes
short-circuit protection	Yes
Limitation of inductive shutdown voltage to	L+ (-53 V)
Controlling a digital input	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A
• on lamp load, max.	5 W
Load resistance range	
• lower limit	48 Ω
• upper limit	12 kΩ
Output voltage	
• Type of output voltage	DC
• for signal "1", min.	L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A
• for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	100 μs
• "1" to "0", max.	500 μs
Parallel switching of 2 outputs	
• for logic links	Yes
• for increased power	No
• for redundant control of a load	Yes

SIMATIC S7-1500 advanced controller

I/O modules

Digital modules

SM 523 digital input/output modules**Technical specifications (continued)**

Article number	6ES7523-1BL00-0AA0 DI/DQ 16X24CDV/16X24VDC/ 0.5A BA
Switching frequency	
• with resistive load, max.	100 Hz
• with inductive load, max.	0.5 Hz
• on lamp load, max.	10 Hz
Aggregate current of the outputs	
• Current per channel, max.	0.5 A; see additional description in the manual
• Current per group, max.	4 A; see additional description in the manual
• Current per module, max.	8 A; see additional description in the manual
Cable length	
• shielded, max.	1 000 m
• Unshielded, max.	600 m
Encoder	
Connectable encoders	
• 2-wire sensor	Yes
- Permissible quiescent current (2-wire sensor), max.	1.5 mA
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	No
Interrupts/diagnostics/status information	
Substitute values connectable	No
Alarms	
• Diagnostic alarm	No
• Hardware interrupt	No
Diagnostic messages	
• Diagnostics	No
• Monitoring the supply voltage	No
• Wire break	No
• Short circuit	No
Diagnostics indication LED	
• RUN LED	Yes; Green LED
• ERROR LED	Yes; Red LED
• MAINT LED	No
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED
• Channel status display	Yes; Green LED
• for channel diagnostics	No
• for module diagnostics	No
Electrical isolation channels	
• between the channels and the backplane bus	Yes
Isolation	
Isolation checked with	707 V DC (type test)
Standards, approvals, certificates	
Suitable for safety functions	No
Decentralized operation	
Prioritized startup	Yes
Dimensions	
Width	25 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	280 g
other	
Note:	Supplied incl. 40-pole push-in front connectors

Ordering data**Article No.****SM 523 digital input/output module**

Module width 25 mm;
without parameters or
diagnostic functions;
front connector (push-in)
included in delivery package

16 inputs, 24 V DC, isolated;
16 outputs, 24 V DC; 0.5 A, isolated

6ES7523-1BL00-0AA0**Accessories****Front connectors**

For 25 mm modules;
including cable ties and individual
labeling strips; push-in terminal
40-pin;
Spare part

6ES7592-1BM00-0XA0**DIN A4 labeling sheets**

For 25 mm modules;
10 sheets with 20 labeling strips
each for I/O modules; perforated,
Al gray

6ES7592-1AX00-0AA0**U connector**

5 units; spare part

6ES7590-0AA00-0AA0**Universal front door for I/O modules**

For 25 mm modules;
5 front doors; with 5 labeling strips
(front) and 5 cabling diagrams per
front door; spare part

6ES7528-0AA00-0AA0

Overview



- 16 and 32-channel digital input modules
- For flexible adaptation of the controller to the corresponding task
- For subsequent expansion of the system with additional inputs

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Technical specifications

Article number	6AG1521-1BH00-7AB0	6AG1521-1BL00-7AB0	6AG1521-1BH50-7AA0	6AG1521-1FH00-7AA0
Based on	6ES7521-1BH00-0AB0 SIPLUS S7-1500 DI 16X24VDC HF	6ES7521-1BL00-0AB0 SIPLUS S7-1500 DI 32X24VDC HF	6ES7521-1BH50-0AA0 SIPLUS S7-1500 DI 16X24VDC SRC BA	6ES7521-1FH00-0AA0 SIPLUS S7-1500 DI 16X230VAC BA
Ambient conditions				
Ambient temperature in operation				
• horizontal installation, min.	-40 °C; = Tmin	-40 °C; = Tmin	-40 °C; = Tmin	-40 °C; = Tmin
• horizontal installation, max.	70 °C; = Tmax	70 °C; = Tmax; > +60 °C number of simultaneously controllable inputs max. 16	70 °C; = Tmax; > +60 °C number of simultaneously controllable inputs max. 8	70 °C; = Tmax; > +60 °C number of simultaneously controllable inputs max. 8
• vertical installation, min.	-40 °C; = Tmin	-40 °C; = Tmin	-40 °C; = Tmin	-40 °C; = Tmin
• vertical installation, max.	40 °C; = Tmax	40 °C; = Tmax	40 °C; = Tmax	40 °C; = Tmax
Extended ambient conditions				
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)
Relative humidity				
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance				
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

SIMATIC S7-1500 advanced controller

I/O modules

SIPLUS digital modules

SIPLUS SM 521 digital modules**Ordering data****Article No.****SIPLUS SM 521 digital input modules**

(extended temperature range and media exposure)

16 inputs, 24 V DC, isolated, parameterizable diagnostics and hardware interrupts

6AG1521-1BH00-7AB0

32 inputs, 24 V DC, isolated, parameterizable diagnostics and hardware interrupts

6AG1521-1BL00-7AB0

16 inputs, 24 V DC, isolated, input delay 3.2 ms

6AG1521-1BH50-7AA0

16 inputs, 230 V AC, isolated, input delay 20 ms

6AG1521-1FH00-7AA0**Article No.****Accessories**

See SIMATIC S7-1500 SM 521 digital input modules, page 4/32

Overview

- 8, 16 and 32-channel digital output modules
- For flexible adaptation of the controller to the task in hand
- For subsequent expansion of the system with additional outputs

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme specific information has been added.

Technical specifications

Article number	6AG1522-1BF00-7AB0	6AG1522-1BH00-7AB0	6AG1522-1BL00-7AB0	6AG1522-5HF00-2AB0	6AG1522-5FF00-7AB0
Based on	6ES7522-1BF00-0AB0 SIPLUS S7-1500 DQ 8X24VDC/2A HF	6ES7522-1BH00-0AB0 SIPLUS S7-1500 DQ 16X24VDC/0.5A ST	6ES7522-1BL00-0AB0 SIPLUS S7-1500 DQ 32X24VDC/0.5A ST	6ES7522-5HF00-0AB0 SIPLUS S7-1500 DO 8X230VAC/5A ST	6ES7522-5FF00-0AB0 SIPLUS S7-1500 DO 8X230VAC/2A ST (TRIAC)
Ambient conditions					
Ambient temperature in operation					
• horizontal installation, min.	-40 °C; = Tmin	-25 °C; = Tmin	-40 °C; = Tmin	-25 °C; = Tmin	-40 °C; = Tmin
• horizontal installation, max.	70 °C; = Tmax; > +60 °C Number of simultaneously control- lable outputs max. 8x 0.5 A, max. total current per group 2 A	70 °C; = Tmax; > +60 °C Number of simultaneously control- lable outputs max. 8x 0.5 A, max. total current per group 2 A	70 °C; = Tmax	60 °C; = Tmax	70 °C; = Tmax; > +60 °C number of simultaneously control- lable outputs max. 8x 0.25 A, max. total current 2 A
• vertical installation, min.	-40 °C; = Tmin	-25 °C; = Tmin	-40 °C; = Tmin	-25 °C; = Tmin	-40 °C; = Tmin
• vertical installation, max.	40 °C; = Tmax	40 °C; = Tmax	50 °C; = Tmax	40 °C; = Tmax	40 °C; = Tmax
Extended ambient conditions					
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)
Relative humidity					
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation condi- tions)	100 %; RH incl. condensation/frost (no commissioning under condensation condi- tions)	100 %; RH incl. condensation/frost (no commissioning under condensation condi- tions)	100 %; RH incl. condensation/frost (no commissioning under condensation condi- tions)	100 %; RH incl. condensation/frost (no commissioning under condensation condi- tions)

SIMATIC S7-1500 advanced controller

I/O modules

SIPLUS digital modules

SIPLUS SM 522 digital modules**Technical specifications** (continued)

Article number	6AG1522-1BF00-7AB0	6AG1522-1BH00-7AB0	6AG1522-1BL00-7AB0	6AG1522-5HF00-2AB0	6AG1522-5FF00-7AB0
Based on	6ES7522-1BF00-0AB0 SIPLUS S7-1500 DQ 8X24VDC/2A HF	6ES7522-1BH00-0AB0 SIPLUS S7-1500 DQ 16X24VDC/0.5A ST	6ES7522-1BL00-0AB0 SIPLUS S7-1500 DQ 32X24VDC/0.5A ST	6ES7522-5HF00-0AB0 SIPLUS S7-1500 DO 8X230VAC/5A ST	6ES7522-5FF00-0AB0 SIPLUS S7-1500 DO 8X230VAC/2A ST (TRIAC)
Resistance					
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**SIPLUS SM 522 digital output modules**

(extended temperature range and medial exposure)

8 outputs, 24 V DC; 2 A, isolated	6AG1522-1BF00-7AB0
16 outputs, 24 V DC; 0.5 A, isolated	6AG1522-1BH00-7AB0
32 outputs, 24 V DC; 0.5 A, isolated	6AG1522-1BL00-7AB0
8 relay outputs, 230 V AC, 5 A	6AG1522-5HF00-2AB0
8 outputs (triac), 230 V AC, 2 A	6AG1522-5FF00-7AB0

Article No.**Article No.****Accessories**

See SIMATIC S7-1500 SM 522 digital output modules, page 4/38

Overview

- 4 or 8-channel analog input modules
- Optionally with extremely short conversion times
- For the connection of analog sensors without additional amplifiers
- Even solves more complex automation tasks

Technical specifications

Article number	6ES7531-7QD00-0AB0 AI 4XU//RTD/TC ST	6ES7531-7KF00-0AB0 AI 8XU//RTD/TC ST	6ES7531-7NF10-0AB0 AI 8XU/I HS
Product type designation			
General information			
Product function			
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
Engineering with			
• STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13.0.2	V12 / V12	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -	V2.3 / -	V2.3 / -
Operating mode			
• MSI	Yes	Yes	Yes
CiR - Configuration in RUN			
Reparameterization possible in RUN	Yes	Yes	
Calibration possible in RUN	Yes	Yes	
Supply voltage			
Type of supply voltage	DC	DC	DC
Rated value (DC)	24 V	24 V	24 V
Reverse polarity protection	Yes	Yes	Yes
Analog inputs			
Number of analog inputs	4	8	8
• For current measurement	4	8	8
• For voltage measurement	4	8	8
• For resistance/resistance thermometer measurement	2	4	
• For thermocouple measurement	4	8	
permissible input voltage for voltage input (destruction limit), max.	28.8 V	28.8 V	28.8 V
Technical unit for temperature measurement adjustable	Yes	Yes	

SIMATIC S7-1500 advanced controller

I/O modules

Analog modules

SM 531 analog input modules**Technical specifications (continued)**

Article number	6ES7531-7QD00-0AB0 AI 4XU/I/RTD/TC ST	6ES7531-7KF00-0AB0 AI 8XU/I/RTD/TC ST	6ES7531-7NF10-0AB0 AI 8XU/I HS
Input ranges (rated values), voltages			
• 1 V to 5 V	Yes	Yes	Yes
• -1 V to +1 V	Yes	Yes	
• -10 V to +10 V	Yes	Yes	Yes
• -2.5 V to +2.5 V	Yes	Yes	
• -250 mV to +250 mV	Yes	Yes	
• -5 V to +5 V	Yes	Yes	Yes
• -50 mV to +50 mV	Yes	Yes	
• -500 mV to +500 mV	Yes	Yes	
• -80 mV to +80 mV	Yes	Yes	
Input ranges (rated values), currents			
• 0 to 20 mA	Yes	Yes	Yes
• -20 mA to +20 mA	Yes	Yes	Yes
• 4 mA to 20 mA	Yes	Yes	Yes
Input ranges (rated values), thermoelements			
• Type B	Yes	Yes	
• Type E	Yes	Yes	
• Type J	Yes	Yes	
• Type K	Yes	Yes	
• Type N	Yes	Yes	
• Type R	Yes	Yes	
• Type S	Yes	Yes	
• Type T	Yes	Yes	
Input ranges (rated values), resistance thermometer			
• Ni 100	Yes; Standard/climate	Yes; Standard/climate	
• Ni 1000	Yes; Standard/climate	Yes; Standard/climate	
• LG-Ni 1000	Yes; Standard/climate	Yes; Standard/climate	
• Pt 100	Yes; Standard/climate	Yes; Standard/climate	
• Pt 1000	Yes; Standard/climate	Yes; Standard/climate	
• Pt 200	Yes; Standard/climate	Yes; Standard/climate	
• Pt 500	Yes; Standard/climate	Yes; Standard/climate	
Input ranges (rated values), resistors			
• 0 to 150 ohms	Yes	Yes	
• 0 to 300 ohms	Yes	Yes	
• 0 to 600 ohms	Yes	Yes	
• 0 to 6000 ohms	Yes	Yes	
• PTC	Yes	Yes	
Thermocouple (TC)			
• Technical unit for temperature measurement	°C/°F/K	°C/°F/K	
Temperature compensation			
- Parameterizable	Yes	Yes	
Resistance thermometer (RTD)			
• Technical unit for temperature measurement	°C/°F/K	°C/°F/K	
Cable length			
• shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC	800 m; for U/I, 200 m for R/RTD, 50 m for TC	800 m

Technical specifications (continued)

Article number	6ES7531-7QD00-0AB0 AI 4XU/I/RTD/TC ST	6ES7531-7KF00-0AB0 AI 8XU/I/RTD/TC ST	6ES7531-7NF10-0AB0 AI 8XU/I HS
Analog value generation for the inputs			
Integration and conversion time/resolution per channel			
• Resolution with overrange (bit including sign), max.	16 bit	16 bit	16 bit
• Integration time, parameterizable	Yes	Yes	
• Integration time (ms)	2,5 / 16,67 / 20 / 100 ms	2,5 / 16,67 / 20 / 100 ms	
• Basic conversion time, including integration time (ms)	9 / 23 / 27 / 107 ms	9 / 23 / 27 / 107 ms	
- additional conversion time for wire break monitoring	9 ms	9 ms	
- additional conversion time for resistance measurement	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms	
• Basic execution time of the module (all channels released)			62.5 µs; independent of number of activated channels
Smoothing of measured values			
• Parameterizable	Yes	Yes	Yes
Encoder			
Connection of signal encoders			
• for voltage measurement	Yes	Yes	Yes
• for current measurement as 2-wire transducer	Yes	Yes	Yes
- Burden of 2-wire transmitter, max.	820 Ω	820 Ω	820 Ω
• for current measurement as 4-wire transducer	Yes	Yes	Yes
• for resistance measurement with two-wire connection	Yes; Only for PTC	Yes; Only for PTC	
• for resistance measurement with three-wire connection	Yes; All measuring ranges except PTC; internal compensation of the cable resistances	Yes; All measuring ranges except PTC; internal compensation of the cable resistances	
• for resistance measurement with four-wire connection	Yes; All measuring ranges except PTC	Yes; All measuring ranges except PTC	
Errors/accuracies			
Basic error limit (operational limit at 25 °C)			
• Voltage, relative to input area, (+/-)	0.1 %	0.1 %	0.2 %
• Current, relative to input area, (+/-)	0.1 %	0.1 %	0.2 %
• Resistance, relative to input area, (+/-)	0.1 %	0.1 %	
• Resistance thermometer, relative to input area, (+/-)	0.1 %; Pt xxx standard: ±0.7 K, Pt xxx climate: ±0.2 K, Ni xxx standard: ±0.3 K, Ni xxx climate: ±0.15 K	Pt xxx standard: ±0.7 K, Pt xxx climate: ±0.2 K, Ni xxx standard: ±0.3 K, Ni xxx climate: ±0.15 K	
• Thermocouple, relative to input area, (+/-)	0.1 %; Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K	Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K	
Interference voltage suppression for $f = n \times (f_1 \pm 1 \%)$, $f_1 =$ interference frequency			
• Series mode interference (peak value of interference < rated value of input range), min.	40 dB	40 dB	
• common mode voltage, max.	10 V	10 V	10 V
• Common mode interference, min.	60 dB	60 dB	60 dB; at 400 Hz: 50 dB

SIMATIC S7-1500 advanced controller

I/O modules

Analog modules

SM 531 analog input modules**Technical specifications (continued)**

Article number	6ES7531-7QD00-0AB0 AI 4XU/I/RTD/TC ST	6ES7531-7KF00-0AB0 AI 8XU/I/RTD/TC ST	6ES7531-7NF10-0AB0 AI 8XU/I HS
Isochronous mode			
Isochronous operation (application synchronized up to terminal)			Yes
Filtering and processing time (TCI), min.			80 µs
Bus cycle time (TDP), min.			250 µs
Interrupts/diagnostics/status information			
Alarms			
• Diagnostic alarm	Yes	Yes	Yes
• Limit value alarm	Yes; two upper and two lower limit values in each case	Yes; two upper and two lower limit values in each case	Yes; two upper and two lower limit values in each case
Diagnostic messages			
• Diagnostics	Yes	Yes	Yes
• Monitoring the supply voltage	Yes	Yes	Yes
• Wire break	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD	Yes; only for 1 ... 5 V and 4 ... 20 mA
• Overflow/underflow	Yes	Yes	Yes
Diagnostics indication LED			
• RUN LED	Yes; Green LED	Yes; Green LED	
• ERROR LED	Yes; Red LED	Yes; Red LED	
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED	Yes; Green LED	Yes; Green LED
• Channel status display	Yes; Green LED	Yes; Green LED	Yes; Green LED
• for channel diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED
• for module diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED
Electrical isolation channels			
• between the channels and the backplane bus	Yes	Yes	Yes
Isolation			
Isolation checked with	707 V DC (type test)	707 V DC (type test)	707 V DC
Ambient conditions			
Ambient temperature in operation			
• horizontal installation, min.			0 °C
• horizontal installation, max.			60 °C
• vertical installation, min.			0 °C
• vertical installation, max.			40 °C
Decentralized operation			
Prioritized startup	No	No	No
Dimensions			
Width	25 mm	35 mm	35 mm
Height	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm
Weights			
Weight, approx.	210 g	310 g	200 g
Other			
Note:	Supplied incl. 40-pole push-in front connectors. Additional basic error and noise for integration time = 2.5 ms: Voltage: ±250 mV (±0.02%), ±80 mV (±0.05%), ±50 mV (±0.05%); resistance: 150 Ohms (±0.02%); resistance thermometer: Pt100 climate: ±0.08 K, Ni100 climate: ±0.08 K; thermocouple: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K	Additional basic error and noise for integration time = 2.5 ms: Voltage: ±250 mV (±0.02%), ±80 mV (±0.05%), ±50 mV (±0.05%); resistance: 150 ohms ±0.02%; resistance thermometer: Pt100 climate: ±0.08 K, Ni100 climate: ±0.08 K; thermocouple: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K	

Ordering data	Article No.	Accessories	Article No.
SM 531 analog input modules <u>Module width: 25 mm</u> 4 analog inputs $\pm 10\text{ V}$, $\pm 5\text{ V}$, $\pm 2.5\text{ V}$, $\pm 1\text{ V}$, $\pm 500\text{ mV}$, $\pm 250\text{ mV}$, $\pm 80\text{ mV}$, $\pm 50\text{ mV}$, 1 ... 5 V, 0/4 ... 20 mA, $\pm 20\text{ mA}$, thermocouples type B, E, J, K, N, R, S, T, resistance thermometers Ni 100, Ni 1000, LG-Ni 1000, Pt 100, Pt 1000, Pt 250, Pt 500, resistors 0...150/300/600/ 6000 ohms, 16 bit; incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door	6ES7531-7QD00-0AB0	Front connectors For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin <ul style="list-style-type: none"> Screw terminals Push-in For 25 mm modules; including cable ties and individual labeling strips; push-in terminal 40-pin; Spare part	6ES7592-1AM00-0XB0 6ES7592-1BM00-0XB0 6ES7592-1BM00-0XA0
<u>Module width: 35 mm</u> 8 analog inputs, $\pm 10\text{ V}$, $\pm 5\text{ V}$, 1 ... 5 V or 0/4 ... 20 mA, $\pm 20\text{ mA}$, 16 bit + sign; incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door	6ES7531-7NF10-0AB0	DIN A4 labeling sheets For 35 mm modules; 10 sheets with 10 labeling strips each for I/O modules; perforated, Al gray For 25 mm modules; 10 sheets with 20 labeling strips each for I/O modules; perforated, Al gray	6ES7592-2AX00-0AA0 6ES7592-1AX00-0AA0
8 analog inputs $\pm 10\text{ V}$, $\pm 5\text{ V}$, $\pm 2.5\text{ V}$, $\pm 1\text{ V}$, $\pm 500\text{ mV}$, $\pm 250\text{ mV}$, $\pm 80\text{ mV}$, $\pm 50\text{ mV}$, 1 ... 5 V, 0/4 ... 20 mA, $\pm 20\text{ mA}$, thermocouples type B, E, J, K, N, R, S, T, resistance thermometers Ni 100, Ni 1000, LG-Ni 1000, Pt 100, Pt 1000, Pt 250, Pt 500, resistors 0...150/300/600/ 6000 ohms, 16 bit; incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door	6ES7531-7KF00-0AB0	U connector 5 units; spare part	6ES7590-0AA00-0AA0
		Universal front door for I/O modules For 35 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part For 25 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part	6ES7528-0AA00-7AA0 6ES7528-0AA00-0AA0
		Shielding set I/O For 35 mm modules; Infeed element, shield clamp, and shield terminal; 5 units, spare part (one shield set supplied with the module). For 25 mm modules; Infeed element, shield clamp, and shield terminal; 4 units, spare part (one shield set supplied with the module).	6ES7590-5CA00-0AA0 6ES7590-5CA10-0XA0
		Shield terminal element 10 units; spare part	6ES7590-5BA00-0AA0

SIMATIC S7-1500 advanced controller

I/O modules

Analog modules

SM 532 analog output modules**Overview**

- 2, 4 and 8-channel analog output modules
- Optionally with extremely short conversion times
- For connecting analog actuators without additional amplifiers
- Even solves more complex automation tasks

4

Technical specifications

Article number	6ES7532-5NB00-0AB0 AQ 2XU/I ST	6ES7532-5HD00-0AB0 AQ 4XU/I ST	6ES7532-5HF00-0AB0 AQ 8XU/I HS
Product type designation			
General information			
Product function			
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
Engineering with			
• STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13.0.2	V12 / V12	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -	V2.3 / -	V2.3 / -
Operating mode			
• MSO	Yes	Yes	Yes
CiR - Configuration in RUN			
Reparameterization possible in RUN	Yes	Yes	Yes
Calibration possible in RUN	Yes	Yes	Yes
Supply voltage			
Type of supply voltage	DC	DC	DC
Rated value (DC)	24 V	24 V	24 V
Reverse polarity protection	Yes	Yes	Yes
Analog outputs			
Number of analog outputs	2	4	8
Cycle time (all channels), min.	3.2 ms; independent of number of activated channels	3.2 ms; independent of number of activated channels	125 µs; independent of number of activated channels
Output ranges, voltage			
• 0 to 10 V	Yes	Yes	Yes
• 1 V to 5 V	Yes	Yes	Yes
• -10 V to +10 V	Yes	Yes	Yes
Output ranges, current			
• 0 to 20 mA	Yes	Yes	Yes
• -20 mA to +20 mA	Yes	Yes	Yes
• 4 mA to 20 mA	Yes	Yes	Yes
Connection of actuators			
• for voltage output two-wire connection	Yes	Yes	Yes
• for voltage output four-wire connection	Yes	Yes	Yes
• for current output two-wire connection	Yes	Yes	Yes

Technical specifications (continued)

Article number	6ES7532-5NB00-0AB0 AQ 2XU/I ST	6ES7532-5HD00-0AB0 AQ 4XU/I ST	6ES7532-5HF00-0AB0 AQ 8XU/I HS
Load impedance (in rated range of output)			
• with voltage outputs, min.	1 k Ω ; 0.5 k Ω hm at 1 to 5 V	1 k Ω ; 0.5 k Ω hm at 1 to 5 V	1 k Ω
• with voltage outputs, capacitive load, max.	1 μ F	1 μ F	100 nF
• with current outputs, max.	750 Ω	750 Ω	500 Ω
• with current outputs, inductive load, max.	10 mH	10 mH	1 mH
Cable length			
• shielded, max.	800 m; for current, 200 m for voltage	800 m; for current, 200 m for voltage	200 m
Analog value generation for the outputs			
Integration and conversion time/ resolution per channel			
• Resolution with overrange (bit including sign), max.	16 bit	16 bit	16 bit
• Conversion time (per channel)	0.5 ms	0.5 ms	50 μ s
Settling time			
• for resistive load	1.5 ms	1.5 ms	30 μ s; see additional description in the manual
• for capacitive load	2.5 ms	2.5 ms	100 μ s; see additional description in the manual
• for inductive load	2.5 ms	2.5 ms	100 μ s; see additional description in the manual
Errors/accuracies			
Basic error limit (operational limit at 25 °C)			
• Voltage, relative to output area, (+/-)	0.2 %	0.2 %	0.2 %
• Current, relative to output area, (+/-)	0.2 %	0.2 %	0.2 %
Isochronous mode			
Isochronous operation (application synchronized up to terminal)	No		Yes
Execution and activation time (TCO), min.			100 μ s
Bus cycle time (TDP), min.			250 μ s
Interrupts/diagnostics/ status information			
Substitute values connectable	Yes	Yes	Yes
Alarms			
• Diagnostic alarm	Yes	Yes	Yes
Diagnostic messages			
• Diagnostics	Yes	Yes	Yes
• Monitoring the supply voltage	Yes	Yes	Yes
• Wire break	Yes; Only for output type "current"	Yes; Only for output type "current"	Yes; Only for output type "current"
• Short circuit	Yes; Only for output type "voltage"	Yes; Only for output type "voltage"	Yes; Only for output type "voltage"
• Overflow/underflow	Yes	Yes	Yes
Diagnostics indication LED			
• RUN LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED	Yes; Green LED	Yes; Green LED
• Channel status display	Yes; Green LED	Yes; Green LED	Yes; Green LED
• for channel diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED
• for module diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED
Electrical isolation channels			
• between the channels and the backplane bus	Yes	Yes	Yes

SIMATIC S7-1500 advanced controller

I/O modules

Analog modules

SM 532 analog output modules**Technical specifications** (continued)

Article number	6ES7532-5NB00-0AB0 AQ 2XU/I ST	6ES7532-5HD00-0AB0 AQ 4XU/I ST	6ES7532-5HF00-0AB0 AQ 8XU/I HS
Isolation			
Isolation checked with	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)
Decentralized operation			
Prioritized startup	No	No	No
Dimensions			
Width	25 mm	35 mm	35 mm
Height	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm
Weights			
Weight, approx.	200 g	310 g	325 g
other			
Note:	Supplied incl. 40-pole push-in front connectors		

Ordering data**Article No.****Article No.****SM 532 analog output modules**Module width 25 mm

2 analog outputs, ± 10 V, 1 ... 5 V, 0 ... 10 V or ± 20 mA, 0/4 ... 20 mA, 16 bit;
incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door

6ES7532-5NB00-0AB0Module width 35 mm

4 analog outputs, ± 10 V, 1 ... 5 V, 0 ... 10 V or ± 20 mA, 0/4 ... 20 mA, 16 bit;
incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door

6ES7532-5HD00-0AB0

8 analog outputs, ± 10 V, 1 ... 5 V, 0 ... 10 V or ± 20 mA, 0/4 ... 20 mA, 16 bit;
incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door

6ES7532-5HF00-0AB0**Accessories****Front connectors**

For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin

- Screw terminals
- Push-in

6ES7592-1AM00-0XB0**6ES7592-1BM00-0XB0****6ES7592-1BM00-0XA0**

For 25 mm modules; including cable ties and individual labeling strips; push-in terminal 40-pin;
Spare part

DIN A4 labeling sheets

For 35 mm modules; 10 sheets with 10 labeling strips each for I/O modules; perforated, Al gray

6ES7592-2AX00-0AA0

For 25 mm modules; 10 sheets with 20 labeling strips each for I/O modules; perforated, Al gray

6ES7592-1AX00-0AA0**U connector**

5 units; spare part

6ES7590-0AA00-0AA0**Universal front door for I/O modules**

For 35 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part

6ES7528-0AA00-7AA0

For 25 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part

6ES7528-0AA00-0AA0**Shielding set I/O**

For 35 mm modules; Infeed element, shield clamp, and shield terminal;
5 units, spare part (one shield set supplied with the module).

6ES7590-5CA00-0AA0

For 25 mm modules; Infeed element, shield clamp, and shield terminal;
4 units, spare part (one shield set supplied with the module).

6ES7590-5CA10-0XA0**Shield connection clamp**

10 units; spare part

6ES7590-5BA00-0AA0

Overview



- 4 analog inputs/ 2 analog outputs
- For flexible adaptation of the controller to the corresponding task
- For subsequent expansion of the system with additional inputs and outputs
- For use in the tightest spaces

Technical specifications

Article number	6ES7534-7QE00-0AB0 AI/AQ 4XU/I/RTD/TC; 2XU, I ST
Product type designation	
General information	
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13.0.2
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -
Operating mode	
• MSI	Yes
• MSO	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	Yes
Supply voltage	
Type of supply voltage	DC
Rated value (DC)	24 V
Reverse polarity protection	Yes
Analog inputs	
Number of analog inputs	4
• For current measurement	4
• For voltage measurement	4
• For resistance/resistance thermometer measurement	2
• For thermocouple measurement	4
permissible input voltage for voltage input (destruction limit), max.	28.8 V
Technical unit for temperature measurement adjustable	Yes

Article number	6ES7534-7QE00-0AB0 AI/AQ 4XU/I/RTD/TC; 2XU, I ST
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
• -1 V to +1 V	Yes
• -10 V to +10 V	Yes
• -2.5 V to +2.5 V	Yes
• -250 mV to +250 mV	Yes
• -5 V to +5 V	Yes
• -50 mV to +50 mV	Yes
• -500 mV to +500 mV	Yes
• -80 mV to +80 mV	Yes
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes
• 4 mA to 20 mA	Yes
Input ranges (rated values), thermoelements	
• Type B	Yes
• Type E	Yes
• Type J	Yes
• Type K	Yes
• Type N	Yes
• Type R	Yes
• Type S	Yes
• Type T	Yes
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes; Standard/climate
• Ni 1000	Yes; Standard/climate
• LG-Ni 1000	Yes; Standard/climate
• Pt 100	Yes; Standard/climate
• Pt 1000	Yes; Standard/climate
• Pt 200	Yes; Standard/climate
• Pt 500	Yes; Standard/climate
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes
• 0 to 300 ohms	Yes
• 0 to 600 ohms	Yes
• 0 to 6000 ohms	Yes
• PTC	Yes

SIMATIC S7-1500 advanced controller

I/O modules

Analog modules

SM 534 analog input/output modules

Technical specifications (continued)

Article number	6ES7534-7QE00-0AB0 AI/AQ 4XU/I/RTD/TC; 2XU, I ST
Thermocouple (TC)	
• Technical unit for temperature measurement	°C/°F/K
Temperature compensation	
- Parameterizable	Yes
Resistance thermometer (RTD)	
• Technical unit for temperature measurement	°C/°F/K
Cable length	
• shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC
Analog outputs	
Number of analog outputs	2
Cycle time (all channels), min.	3.2 ms; ±0.5 ms, regardless of the number of activated channels
Output ranges, voltage	
• 0 to 10 V	Yes
• 1 V to 5 V	Yes
• -10 V to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes
• 4 mA to 20 mA	Yes
Connection of actuators	
• for voltage output two-wire connection	Yes
• for voltage output four-wire connection	Yes
• for current output two-wire connection	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 kΩ; 0.5 kΩ at 1 to 5 V
• with voltage outputs, capacitive load, max.	1 μF
• with current outputs, max.	750 Ω
• with current outputs, inductive load, max.	10 mH
Cable length	
• shielded, max.	800 m; for current, 200 m for voltage
Analog value generation for the inputs	
Integration and conversion time/ resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes
• Integration time (ms)	2.5 / 16.67 / 20 / 100
• Basic conversion time, including integration time (ms)	9 / 23 / 27 / 107 ms
- additional conversion time for wire break monitoring	9 ms
- additional conversion time for resistance measurement	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10
Smoothering of measured values	
• Parameterizable	Yes

Article number	6ES7534-7QE00-0AB0 AI/AQ 4XU/I/RTD/TC; 2XU, I ST
Analog value generation for the outputs	
Integration and conversion time/ resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Conversion time (per channel)	0.5 ms
Settling time	
• for resistive load	1.5 ms
• for capacitive load	2.5 ms
• for inductive load	2.5 ms
Encoder	
Connection of signal encoders	
• for voltage measurement	Yes
• for current measurement as 2-wire transducer	Yes
- Burden of 2-wire transmitter, max.	820 Ω
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes; Only for PTC
• for resistance measurement with three-wire connection	Yes; All measuring ranges except PTC; internal compensation of the cable resistances
• for resistance measurement with four-wire connection	Yes; All measuring ranges except PTC
Errors/accuracies	
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input area, (+/-)	0.1 %
• Current, relative to input area, (+/-)	0.1 %
• Resistance, relative to input area, (+/-)	0.1 %
• Resistance thermometer, relative to input area, (+/-)	0.1 %; Pt xxx standard: ±0.7 K, Pt xxx climate: ±0.2 K, Ni xxx standard: ±0.3 K, Ni xxx climate: ±0.15 K
• Thermocouple, relative to input area, (+/-)	0.1 %; Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K
• Voltage, relative to output area, (+/-)	0.2 %
• Current, relative to output area, (+/-)	0.2 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency	
• Series mode interference (peak value of interference < rated value of input range), min.	40 dB
• common mode voltage, max.	10 V
• Common mode interference, min.	60 dB
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	No

Technical specifications (continued)

Article number	6ES7534-7QE00-0AB0 AI/AQ 4XU/I/RTD/TC; 2XU, I ST
Interrupts/diagnostics/ status information	
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes
• Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnostic messages	
• Diagnostics	Yes
• Monitoring the supply voltage	Yes
• Wire break	Yes; only for input type 1 ... 5 V, 4 ... 20 mA, TC, R, RTD and output type current
• Short circuit	Yes; Only for output type "voltage"
• Overflow/underflow	Yes
Diagnostics indication LED	
• RUN LED	Yes; Green LED
• ERROR LED	Yes; Red LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED
• Channel status display	Yes; Green LED
• for channel diagnostics	Yes; Red LED
• for module diagnostics	Yes; Red LED
Galvanic isolation	
Galvanic isolation analog inputs	
• between the channels and the backplane bus	Yes
Galvanic isolation analog outputs	
• between the channels and the backplane bus	Yes
Isolation	
Isolation checked with	707 V DC (type test)
Decentralized operation	
Prioritized startup	No
Dimensions	
Width	25 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	250 g
other	
Note:	Supplied incl. 40-pole push-in front connectors. Additional basic error and noise for integration time = 2.5 ms: Voltage: ± 250 mV ($\pm 0.02\%$), ± 80 mV ($\pm 0.05\%$), ± 50 mV ($\pm 0.05\%$); resistance: 150 Ohms ($\pm 0.02\%$); resistance thermometer: Pt100 climate: ± 0.08 K, Ni100 climate: ± 0.08 K; thermoelement: Type B, R, S: ± 3 K, type E, J, K, N, T: ± 1 K

Ordering data

Article No.

SM 534 analog input/output module

Module width 25 mm

4 analog inputs ± 10 V, ± 5 V, ± 2.5 V, ± 1 V, ± 500 mV, ± 250 mV, ± 80 mV, ± 50 mV, 1 ... 5 V, 0/4 ... 20 mA, ± 20 mA, thermocouples type B, E, J, K, N, R, S, T, resistance thermometers Ni 100, Ni 1000, LG-Ni 1000, Pt 100, Pt 1000, Pt 250, Pt 500, resistors 0...150/300/600/6000 Ohm, 16 bit; 2 analog outputs, ± 10 V, 1 ... 5 V, 0 ... 10 V or ± 20 mA, 0/4 ... 20 mA, 16 bit; incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door

6ES7534-7QE00-0AB0**Accessories****Front connectors**

For 25 mm modules; including cable ties and individual labeling strips; push-in terminal 40-pin; Spare part

6ES7592-1BM00-0XA0**DIN A4 labeling sheets**

For 25 mm modules; 10 sheets with 20 labeling strips each for I/O modules; perforated, Al gray

6ES7592-1AX00-0AA0**U connector**

5 units; spare part

6ES7590-0AA00-0AA0**Universal front door for I/O modules**

For 25 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part

6ES7528-0AA00-0AA0**Shielding set I/O**

For 25 mm modules; Infeed element, shield clamp, and shield terminal; 4 units, spare part (one shield set supplied with the module).

6ES7590-5CA10-0XA0**Shield terminal element**

10 units; spare part

6ES7590-5BA00-0AA0

SIMATIC S7-1500 advanced controller

I/O modules

SIPLUS analog modules

SIPLUS SM 531 analog modules**Overview**

- 8-channel analog input modules
- Optionally with extremely short conversion times
- For the connection of analog sensors without additional amplifiers
- Even solves more complex automation tasks

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Technical specifications

Article number	6AG1531-7NF10-7AB0	6AG1531-7KF00-7AB0
Based on	6ES7531-7NF10-0AB0 SIPLUS S7-1500 AI 8XU/I HS	6AG1531-7KF00-7AB0 SIPLUS S7-1500 AI 8XU/I/RTD/TC ST
Ambient conditions		
Ambient temperature in operation		
• horizontal installation, min.	-40 °C; = Tmin; startup @ -25 °C	-25 °C; = Tmin
• horizontal installation, max.	70 °C; = Tmax; > +60 °C max. 4x ±20 mA or 4x ±10 V permissible	70 °C; = Tmax
• vertical installation, min.	-40 °C; = Tmin; startup @ -25 °C	-25 °C; = Tmin
• vertical installation, max.	40 °C; = Tmax	50 °C; = Tmax
Extended ambient conditions		
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity		
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance		
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**SIPLUS SM 531 analog input modules**

(extended temperature range and medial exposure)

8 analog inputs, ±10 V, ±5 V, 1 ... 5 V or 0/4 ... 20 mA, ±20 mA, 16 bit + sign; incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door

Article No.**6AG1531-7NF10-7AB0****Article No.****6AG1531-7KF00-7AB0**

8 analog inputs
±10 V, ±5 V, ±2.5 V, ±1 V, ±500 mV, ±250 mV, ±80 mV, ±50 mV, 1 ... 5 V, 0/4 ... 20 mA, ±20 mA, thermocouples type B, E, J, K, N, R, S, T, resistance thermometers Ni 100, Ni 1000, LG-Ni 1000, Pt 100, Pt 1000, Pt 250, Pt 500, resistors 0...150/300/600/6000 Ohm, 16 bit

Accessories

See SIMATIC S7-1500 SM 531 analog input modules, page 4/49

Overview

- 4 and 8-channel analog output modules
- Optionally with extremely short conversion times
- For connecting analog actuators without additional amplifiers
- Even solves more complex automation tasks

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Technical specifications

Article number	6AG1532-5HD00-7AB0	6AG1532-5HF00-7AB0
Based on	6ES7532-5HD00-0AB0 SIPLUS S7-1500 AO 4XU/I ST	6ES7532-5HF00-0AB0 SIPLUS S7-1500 AO 8XU/I HS
Ambient conditions		
Ambient temperature in operation		
• horizontal installation, min.	-25 °C; = Tmin	-40 °C; = Tmin; startup @ -25 °C
• horizontal installation, max.	70 °C; = Tmax; > +60 °C max. 4x ±10 V permissible	70 °C; = Tmax; > +60 °C max. 4x ±10 V permissible
• vertical installation, min.	-25 °C; = Tmin	-40 °C; = Tmin; startup @ -25 °C
• vertical installation, max.	40 °C; = Tmax	40 °C; = Tmax
Extended ambient conditions		
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity		
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance		
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**SIPLUS SM 532 analog output modules**

(extended temperature range and medial exposure)

4 analog outputs, ±10 V, 1 ... 5 V, 0 ... 10 V or ±20 mA, 0/4 ... 20 mA, 16 bit

8 analog outputs, ±10 V, 1 ... 5 V, 0 ... 10 V or ±20 mA, 0/4 ... 20 mA, 16 bit; incl. infeed element, shield clamp, shield terminal, labeling strips, U connector, printed front door

Article No.**6AG1532-5HD00-7AB0****6AG1532-5HF00-7AB0****Article No.****Accessories**

See SIMATIC S7-1500 SM 532 analog output modules, page 4/52

SIMATIC S7-1500 advanced controller

I/O modules

Technology modules

TM PosInput 2 position detection modules**Overview**

- 2-channel counting and position detection module with RS 422 interface
- Extensive parameterization options for optimum task-specific adaptation
- Reduces load on controller due to preprocessing on the module
- Position detection with incremental and SSI absolute encoders
- Speed and time period measuring
- Storage and comparison functions
- Connection of encoders with RS 422 signals or 5V-TTL signals

Technical specifications

Article number	6ES7551-1AB00-0AB0 S7-1500, TM POSINPUT 2
Product type designation	
General information	
Product function	
• I&M data	Yes; I&M 0
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	V12 SP1 / V12 SP1
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -
• PROFINET as of GSD version/GSD revision	V2.3 / -
Installation type/mounting	
Type of fitting, rail mounting	Yes; S7-1500 mounting rail
Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	19.2 V
• permissible range, upper limit (DC)	28.8 V
• Reverse polarity protection	Yes
Input current	
Current consumption, max.	75 mA; without load
Encoder supply	
Number of outputs	4; One 5 V and 24 V encoder supply per channel
5 V encoder supply	
• 5 V	Yes; 5.2 V +/-2%
• short-circuit protection	Yes
• Output current, max.	300 mA; Per channel
24 V encoder supply	
• 24 V	Yes; L+ (-0.8 V)
• short-circuit protection	Yes
• Output current, max.	300 mA; Per channel
Power	
Power available from the backplane bus	1.3 W
Power losses	
Power loss, typ.	5.5 W

Article number	6ES7551-1AB00-0AB0 S7-1500, TM POSINPUT 2
Digital inputs	
Number of digital inputs	4; 2 per channel
Digital inputs, configurable	Yes
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
• Gate start/stop	Yes; only for pulse and incremental encoders
• Capture	Yes
• Synchronization	Yes; only for pulse and incremental encoders
• Freely usable digital input	Yes
Input voltage	
• Type of input voltage	DC
• Rated value (DC)	24 V
• for signal "0"	-30 to +5V
• for signal "1"	+11 to +30V
• permissible voltage at input, min.	-30 V
• permissible voltage at input, max.	30 V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage) for standard inputs	
- Parameterizable	Yes; none / 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
- at "0" to "1", min.	6 µs; for parameterization "none"
- at "1" to "0", min.	6 µs; for parameterization "none"
for counter/technological functions	
- Parameterizable	Yes
Cable length	
• shielded, max.	1 000 m
• Unshielded, max.	600 m

Technical specifications (continued)

Article number	6ES7551-1AB00-0AB0 S7-1500, TM POSINPUT 2	Article number	6ES7551-1AB00-0AB0 S7-1500, TM POSINPUT 2
Digital outputs		Encoder signals, incremental encoder (asymmetrical)	
Type of digital output	Transistor	• Input voltage	5 V TTL (push-pull encoders only)
Number of digital outputs	4; 2 per channel	• Input frequency, max.	1 MHz
Digital outputs, configurable short-circuit protection	Yes	• Counting frequency, max.	4 MHz; with quadruple evaluation
Limitation of inductive shutdown voltage to	Yes; electronic/thermal	• Signal filter, can be parameterized	Yes
Controlling a digital input	L+ (-33 V)	• Incremental encoder with A/B tracks, 90° out of phase	Yes
	Yes	• Incremental encoder with A/B tracks, 90° out of phase and zero track	Yes
Digital output functions, parameterizable		• Pulse encoder	Yes
• Switching tripped by comparison values	Yes	• Pulse encoder with direction	Yes
• Freely usable digital output	Yes	• Pulse encoder with one impulse signal per count direction	Yes
Switching capacity of the outputs		Encoder signals, absolute encoder (SSI)	
• with resistive load, max.	0.5 A; Per digital output	• Input signal	to RS-422
• on lamp load, max.	5 W	• Message frame length, parameterizable	10 ... 40 bit
Load resistance range		• Clock frequency, max.	2 MHz; 125 kHz, 250 kHz, 500 kHz, 1 MHz, 1.5 MHz or 2 MHz
• lower limit	48 Ω	• Binary code	Yes
• upper limit	12 kΩ	• Gray code	Yes
Output voltage		• Cable length, shielded, max.	320 m; Cable length, RS-422 SSI absolute encoders, Siemens type 6FX2001-5, 24 V supply: 125 kHz, 320 meters shielded, max.; 250 kHz, 160 meters shielded, max.; 500 kHz, 60 meters shielded, max.; 1 MHz, 20 meters shielded, max.; 1.5 MHz, 10 meters shielded, max.; 2 MHz, 8 meters shielded, max.
• Type of output voltage	DC	• Parity bit, parameterizable	Yes
• for signal "1", min.	23.2 V; L+ (-0.8 V)	• Monoflop time	16, 32, 48, 64 μs & automatic
Output current		• Multiturn	Yes
• for signal "1" rated value	0.5 A; Per digital output	• Singleturn	Yes
• for signal "0" residual current, max.	0.5 mA	Interface types	
Output delay with resistive load		• RS422	Yes
• "0" to "1", max.	50 μs	• TTL 5 V	Yes; push-pull encoders only
• "1" to "0", max.	50 μs	Isochronous mode	
Switching frequency		Isochronous operation (application synchronized up to terminal)	Yes
• with resistive load, max.	10 kHz	Filtering and processing time (TCI), min.	130 μs; only for pulse and incremental encoders
• with inductive load, max.	0.5 Hz; Acc. to IEC 947-5-1, DC-13; observe derating curve	Bus cycle time (TDP), min.	250 μs
• on lamp load, max.	10 Hz	Interrupts/diagnostics/status information	
Aggregate current of the outputs		Alarms	
• Current per module, max.	2 A	• Diagnostic alarm	Yes
Cable length		• Hardware interrupt	Yes
• shielded, max.	1 000 m	Diagnostic messages	
• Unshielded, max.	600 m	• Monitoring the supply voltage	Yes
Encoder signals, incremental encoder (symmetrical)		• Wire break	Yes
• Input voltage	RS 422	• Short circuit	Yes
• Input frequency, max.	1 MHz	• A/B transition error at incremental encoder	Yes
• Counting frequency, max.	4 MHz; with quadruple evaluation	• Frame error at SSI encoder	Yes
• Signal filter, can be parameterized	Yes	Diagnostics indication LED	
• Cable length, shielded, max.	32 m; at 1 MHz	• RUN LED	Yes; Green LED
• Incremental encoder with A/B tracks, 90° out of phase	Yes	• ERROR LED	Yes; Red LED
• Incremental encoder with A/B tracks, 90° out of phase and zero track	Yes	• MAINT LED	Yes; yellow LED
• Pulse encoder	Yes	• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED
• Pulse encoder with direction	Yes	• Channel status display	Yes; Green LED
• Pulse encoder with one impulse signal per count direction	Yes	• for channel diagnostics	Yes; Red LED

SIMATIC S7-1500 advanced controller

I/O modules

Technology modules

TM PosInput 2 position detection modules

Technical specifications (continued)

Article number	6ES7551-1AB00-0AB0 S7-1500, TM POSINPUT 2
Integrated Functions	
Number of counters	2
Counter frequency (counter) max.	4 MHz; with quadruple evaluation
Counting functions	
• Can be used with TO High_Speed_Counter	Yes; only for pulse and incremental encoders
• Continuous counting	Yes
• Counter response can be parameterized	Yes
• Hardware gate via digital input	Yes
• Software gate	Yes
• Event-controlled stop	Yes
• Synchronization via digital input	Yes
• Counting range, parameterizable	Yes
Comparator	
- Number of comparators	2; Per channel
- Direction dependency	Yes
- Can be changed from user program	Yes
Position detection	
• Incremental acquisition	Yes
• Absolute acquisition	Yes
• Suitable for S7-1500 Motion Control	Yes
Measuring functions	
• Measuring time, parameterizable	Yes
• Dynamic measurement period adjustment	Yes
• Number of thresholds, parameterizable	2
Measuring range	
- Frequency measurement, min.	0.04 Hz
- Frequency measurement, max.	4 MHz
- Period measurement, min.	0.25 µs
- Period measurement, max.	25 s
Accuracy	
- Frequency measurement	100 ppm; depending on measuring interval and signal evaluation
- Cycle duration measurement	100 ppm; depending on measuring interval and signal evaluation
- Speed measurement	100 ppm; depending on measuring interval and signal evaluation

Article number	6ES7551-1AB00-0AB0 S7-1500, TM POSINPUT 2
Electrical isolation channels	
• between the channels	No
• between the channels and the backplane bus	Yes
• between the channels and the load voltage L+	No
Permissible potential difference	
between different circuits	75 V DC/60 V AC (base isolation)
Isolation	
Isolation checked with	707 V DC (type test)
Ambient conditions	
Ambient temperature in operation	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C; Please note derating for inductive loads
• vertical installation, min.	0 °C
• vertical installation, max.	40 °C; Please note derating for inductive loads
Decentralized operation	
To SIMATIC S7-1500	Yes
To standard PROFINET controller	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	325 g

Ordering data

Ordering data	Article No.
Counter and positioning module TM PosInput 2 with 2 channels, max. 1 MHz counting frequency; for SSI encoders and incremental encoders with RS 422 or 5V TTL interface	6ES7551-1AB00-0AB0
Accessories	
Front connectors For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin	
• Screw terminals	6ES7592-1AM00-0XB0
• Push-in	6ES7592-1BM00-0XB0
DIN A4 labeling sheets	6ES7592-2AX00-0AA0
10 sheets with 10 labeling strips each for I/O modules; perforated, Al grey	

Ordering data	Article No.
U connector 5 units; spare part	6ES7590-0AA00-0AA0
Universal front door for I/O modules 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part	6ES7528-0AA00-7AA0
Shielding set I/O Infeed element, shield clamp, and shield terminal; 5 units; spare part	6ES7590-5CA00-0AA0
Shield terminal element 10 units; spare part	6ES7590-5BA00-0AA0

Overview



- 2-channel high-speed counter module
- With comprehensive parameterization options for an optimum adaptation to the task and reduction of control load
- Speed and time period measuring
- Storage and comparison functions
- Connection of 24 V encoders

Technical specifications

Article number	6ES7550-1AA00-0AB0 S7-1500, TM COUNT 2X24V
Product type designation	
General information	
Product function	
• I&M data	Yes; I&M 0
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP3 / -
• PROFINET as of GSD version/GSD revision	V2.3 / -
Installation type/mounting	
Type of fitting, rail mounting	Yes; S7-1500 mounting rail
Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	19.2 V
• permissible range, upper limit (DC)	28.8 V
• Reverse polarity protection	Yes
Input current	
Current consumption, max.	75 mA; without load
Encoder supply	
Number of outputs	1; A common 24 V encoder supply for both channels
24 V encoder supply	
• 24 V	Yes; L+ (-0.8 V)
• short-circuit protection	Yes
• Output current, max.	1 A; total current of all encoders/channels
Power	
Power available from the backplane bus	1.3 W
Power losses	
Power loss, typ.	4 W

Article number	6ES7550-1AA00-0AB0 S7-1500, TM COUNT 2X24V
Digital inputs	
Number of digital inputs	6; 3 per channel
Digital inputs, configurable	Yes
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
• Gate start/stop	Yes
• Capture	Yes
• Synchronization	Yes
• Freely usable digital input	Yes
Input voltage	
• Type of input voltage	DC
• Rated value (DC)	24 V
• for signal "0"	-30 to +5V
• for signal "1"	+11 to +30V
• permissible voltage at input, min.	-30 V
• permissible voltage at input, max.	30 V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage) for standard inputs	
- Parameterizable	Yes; none / 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
- at "0" to "1", min.	6 µs; for parameterization "none"
- at "1" to "0", min.	6 µs; for parameterization "none"
for counter/technological functions	
- Parameterizable	Yes
Cable length	
• shielded, max.	1 000 m
• Unshielded, max.	600 m

SIMATIC S7-1500 advanced controller

I/O modules

Technology modules

TM Count 2x24V counter modules

Technical specifications (continued)

Article number	6ES7550-1AA00-0AB0 S7-1500, TM COUNT 2X24V
Digital outputs	
Type of digital output	Transistor
Number of digital outputs	4; 2 per channel
Digital outputs, configurable	Yes
short-circuit protection	Yes; electronic/thermal
Limitation of inductive shutdown voltage to	L+ (-33 V)
Controlling a digital input	Yes
Digital output functions, parameterizable	
• Switching tripped by comparison values	Yes
• Freely usable digital output	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A; Per digital output
• on lamp load, max.	5 W
Load resistance range	
• lower limit	48 Ω
• upper limit	12 kΩ
Output voltage	
• Type of output voltage	DC
• for signal "1", min.	23.2 V; L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A; Per digital output
• for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	50 μs
• "1" to "0", max.	50 μs
Switching frequency	
• with resistive load, max.	10 kHz
• with inductive load, max.	0.5 Hz; Acc. to IEC 947-5-1, DC-13; observe derating curve
• on lamp load, max.	10 Hz
Aggregate current of the outputs	
• Current per module, max.	2 A
Cable length	
• shielded, max.	1 000 m
• Unshielded, max.	600 m
Encoder	
Connectable encoders	
• 2-wire sensor	Yes
- Permissible quiescent current (2-wire sensor), max.	1.5 mA
Encoder signals, incremental encoder (asymmetrical)	
• Input voltage	24 V
• Input frequency, max.	200 kHz
• Counting frequency, max.	800 kHz; with quadruple evaluation
• Signal filter, can be parameterized	Yes
• Cable length, shielded, max.	600 m; depending on input frequency, encoder and cable quality; max. 50 m at 200 kHz
• Incremental encoder with A/B tracks, 90° out of phase	Yes
• Incremental encoder with A/B tracks, 90° out of phase and zero track	Yes
• Pulse encoder	Yes
• Pulse encoder with direction	Yes
• Pulse encoder with one impulse signal per count direction	Yes

Article number	6ES7550-1AA00-0AB0 S7-1500, TM COUNT 2X24V
Encoder signal 24 V	
- Permissible voltage at input, min.	-30 V
- Permissible voltage at input, max.	30 V
Interface types	
• Input characteristic curve in accordance with IEC 61131, type 3	Yes
• m/p-reading	Yes
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes
Filtering and processing time (TCI), min.	130 μs
Bus cycle time (TDP), min.	250 μs
Interrupts/diagnostics/status information	
Alarms	
• Diagnostic alarm	Yes
• Hardware interrupt	Yes
Diagnostic messages	
• Monitoring the supply voltage	Yes
• Wire break	Yes
• Short circuit	Yes
• A/B transition error at incremental encoder	Yes
Diagnostics indication LED	
• RUN LED	Yes; Green LED
• ERROR LED	Yes; Red LED
• MAINT LED	Yes; yellow LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED
• Channel status display	Yes; Green LED
• for channel diagnostics	Yes; Red LED
• Status indicator backward counting (green)	Yes
• Status indicator forward counting (green)	Yes
Integrated Functions	
Number of counters	2
Counter frequency (counter) max.	800 kHz; with quadruple evaluation
Counting functions	
• Continuous counting	Yes
• Counter response can be parameterized	Yes
• Hardware gate via digital input	Yes
• Software gate	Yes
• Event-controlled stop	Yes
• Synchronization via digital input	Yes
• Counting range, parameterizable	Yes
Comparator	
- Number of comparators	2; Per channel
- Direction dependency	Yes
- Can be changed from user program	Yes
Position detection	
• Incremental acquisition	Yes
• Suitable for S7-1500 Motion Control	Yes

Technical specifications (continued)

Article number	6ES7550-1AA00-0AB0 S7-1500, TM COUNT 2X24V
Measuring functions	
• Measuring time, parameterizable	Yes
• Dynamic measurement period adjustment	Yes
• Number of thresholds, parameterizable	2
Measuring range	
- Frequency measurement, min.	0.04 Hz
- Frequency measurement, max.	800 kHz
- Period measurement, min.	1.25 µs
- Period measurement, max.	25 s
Accuracy	
- Frequency measurement	100 ppm; depending on measuring interval and signal evaluation
- Cycle duration measurement	100 ppm; depending on measuring interval and signal evaluation
- Speed measurement	100 ppm; depending on measuring interval and signal evaluation
Electrical isolation channels	
• between the channels	No
• between the channels and the backplane bus	Yes
• between the channels and the load voltage L+	No
Permissible potential difference	
between different circuits	75 V DC/60 V AC (base isolation)
Isolation	
Isolation checked with	707 V DC (type test)
Ambient conditions	
Ambient temperature in operation	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C; Please note derating for inductive loads
• vertical installation, min.	0 °C
• vertical installation, max.	40 °C; Please note derating for inductive loads
Decentralized operation	
To SIMATIC S7-1500	Yes
To standard PROFINET controller	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	250 g

Ordering data**Article No.**

TM Count 2x24V counter module	6ES7550-1AA00-0AB0
With 2 channels, max. 200 kHz; for 24 V encoder	
Accessories	
Front connectors	
For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin	
• Screw terminals	6ES7592-1AM00-0XB0
• Push-in	6ES7592-1BM00-0XB0
DIN A4 labeling sheets	6ES7592-2AX00-0AA0
10 sheets with 10 labeling strips each for I/O modules; perforated, Al grey	
U connector	6ES7590-0AA00-0AA0
5 units; spare part	
Universal front door for I/O modules	6ES7528-0AA00-7AA0
5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part	
Shielding set I/O	6ES7590-5CA00-0AA0
Infeed element, shield clamp, and shield terminal; 5 units, spare part	
Shield terminal element	6ES7590-5BA00-0AA0
10 units; spare part	

SIMATIC S7-1500 advanced controller

I/O modules

Technology modules

TM Timer DIDQ 16x24V time-based IO modules**Overview**

- 8 digital inputs, 16 digital outputs, of which up to 16 can be used in different configurations as technological, time-controlled channels
- Inputs for detecting the input edges with μs accuracy
- Outputs for outputting switching signals with μs accuracy
- 32x oversampling
- PWM output
- Counter function
- Outputs can be switched between 0.5 A standard and especially fast 0.1 A high-speed operation

Technical specifications

Article number	6ES7552-1AA00-0AB0 S7-1500, TM TIMER DIDQ 16X24V
Product type designation	
General information	
Product function	
• I&M data	Yes; I&M 0
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	V13 Update 3
Installation type/mounting	
Type of fitting, rail mounting	Yes; S7-1500 mounting rail
Load voltage 1L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	19.2 V
• permissible range, upper limit (DC)	28.8 V
• Reverse polarity protection	Yes; against destruction
Load voltage 2L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	19.2 V
• permissible range, upper limit (DC)	28.8 V
• Reverse polarity protection	Yes; against destruction
Input current	
from load voltage 1L+ (without load), max.	40 mA; without load
from load voltage 2L+ (without load), max.	30 mA; without load
Encoder supply	
Number of outputs	8; max. depending on parameterization
24 V encoder supply	
• 24 V	Yes; L+ (-0.8 V)
• short-circuit protection	Yes
• Output current, max.	1.2 A; Total current of all encoders / channels, max. 0.5 A per output
Power	
Power available from the backplane bus	1.3 W
Power losses	
Power loss, typ.	5 W

Article number	6ES7552-1AA00-0AB0 S7-1500, TM TIMER DIDQ 16X24V
Digital inputs	
Number of digital inputs	8; max. depending on parameterization
• In groups of	8
Digital inputs, configurable	Yes
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
• Digital input with time stamp	Yes
- Number, max.	8
• Counter	Yes
- Number, max.	4
• Counter for incremental encoder	Yes
- Number, max.	4
• Digital input with oversampling	Yes
- Number, max.	8
• HW enable for digital input	Yes
- Number, max.	4
• HW enable for digital output	Yes
- Number, max.	4
Input voltage	
• Type of input voltage	DC
• Rated value (DC)	24 V
• for signal "0"	-30 to +5V
• for signal "1"	+11 to +30V
• permissible voltage at input, min.	-30 V
• permissible voltage at input, max.	30 V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
• Minimum pulse width for program reactions	3 μs for parameterization "none"
for standard inputs	
- Parameterizable	Yes; none / 0.05 / 0.1 / 0.4 / 0.8 ms
- at "0" to "1", min.	4 μs ; for parameterization "none"
- at "1" to "0", min.	4 μs ; for parameterization "none"
Cable length	
• shielded, max.	1 000 m; Depending on sensor, cable quality and rate of change
• Unshielded, max.	600 m; Depending on sensor, cable quality and rate of change

Technical specifications (continued)

Article number	6ES7552-1AA00-0AB0 S7-1500, TM TIMER DIDQ 16X24V
Digital outputs	
Type of digital output	Transistor
Number of digital outputs	16; max. depending on parameterization
• In groups of	8
Current-sinking	Yes; With High Speed output
Current-sourcing	Yes
Digital outputs, configurable	Yes
short-circuit protection	Yes; electronic/thermal
Limitation of inductive shutdown voltage to	-0.8 V
Controlling a digital input	Yes
Digital output functions, parameterizable	
• Digital output with time stamp	Yes
- Number, max.	16
• PWM output	Yes
- Number, max.	16
• Digital output with oversampling	Yes
- Number, max.	16
Switching capacity of the outputs	
• with resistive load, max.	0.5 A; 0.1 A with High Speed output
• on lamp load, max.	5 W; 1 W with High Speed output
Load resistance range	
• lower limit	48 Ω; 240 ohm with High Speed output
• upper limit	12 kΩ
Output voltage	
• Type of output voltage	DC
• for signal "0", max.	1 V; With High Speed output
• for signal "1", min.	23.2 V; L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A; 0.1 A with High Speed output, observe derating
• for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	1 μs; With High Speed output, 5 μs with Standard output
• "1" to "0", max.	1 μs; With High Speed output, 6 μs with Standard output
Switching frequency	
• with resistive load, max.	10 kHz
• on lamp load, max.	10 Hz
Aggregate current of the outputs	
• Current per group, max.	4 A
• Current per module, max.	8 A; Observe derating
Cable length	
• shielded, max.	1 000 m; Depending on load and cable quality
• Unshielded, max.	600 m; Depending on load and cable quality

Article number	6ES7552-1AA00-0AB0 S7-1500, TM TIMER DIDQ 16X24V
Encoder	
Connectable encoders	
• Incremental encoder (asymmetrical)	Yes
• 24 V initiator	Yes
• 2-wire sensor	Yes
- Permissible quiescent current (2-wire sensor), max.	1.5 mA
Encoder signals, incremental encoder (asymmetrical)	
• Input voltage	24 V
• Input frequency, max.	50 kHz
• Counting frequency, max.	200 kHz; with quadruple evaluation
• Cable length, shielded, max.	600 m; Depending on input frequency, encoder and cable quality; max. 200 m at 50 kHz
• Incremental encoder with A/B tracks, 90° out of phase	Yes
• Pulse encoder	Yes
Encoder signal 24 V	
- Permissible voltage at input, min.	-30 V
- Permissible voltage at input, max.	30 V
Interface types	
• Input characteristic curve in accordance with IEC 61131, type 3	Yes
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes
Bus cycle time (TDP), min.	250 μs
Interrupts/diagnostics/status information	
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnostic messages	
• Diagnostics	Yes
• Monitoring the supply voltage	Yes
• Short circuit	Yes
Diagnostics indication LED	
• RUN LED	Yes; Green LED
• ERROR LED	Yes; Red LED
• MAINT LED	Yes; yellow LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED
• Channel status display	Yes; Green LED
• for channel diagnostics	Yes; Red LED
Integrated Functions	
Number of counters	4
Counter frequency (counter) max.	200 kHz; with quadruple evaluation
Counting functions	
• Continuous counting	Yes
Electrical isolation channels	
• between the channels and the backplane bus	Yes

SIMATIC S7-1500 advanced controller

I/O modules

Technology modules

TM Timer DIDQ 16x24V time-based IO modules**Technical specifications (continued)**

Article number	6ES7552-1AA00-0AB0 S7-1500, TM TIMER DIDQ 16X24V
Permissible potential difference between different circuits	75 V DC/60 V AC (base isolation)
Isolation Isolation checked with	707 V DC (type test)
Ambient conditions Ambient temperature in operation	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	0 °C
• vertical installation, max.	40 °C; Observe derating
Decentralized operation To SIMATIC S7-1500	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights Weight, approx.	320 g

Ordering data**Article No.**

Time-based IO module TM Timer DIDQ 16x24V	6ES7552-1AA00-0AB0
Max. 16 time-controlled inputs or outputs	
Accessories	
Front connector	
For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin	
• Screw terminals	6ES7592-1AM00-0XB0
• Push-in	6ES7592-1BM00-0XB0
DIN A4 labeling sheets	6ES7592-2AX00-0AA0
10 sheets with 10 labeling strips each for I/O modules; perforated, Al grey	
U connector	6ES7590-0AA00-0AA0
5 units; spare part	
Universal front door for I/O modules	6ES7528-0AA00-7AA0
5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part	
Shielding set I/O	6ES7590-5CA00-0AA0
Infeed element, shield clamp, and shield terminal; 5 units, spare part: Note: Only shield clamps and shield terminal are required for the TM Timer DIDQ 16x24V	
Shield terminal element	6ES7590-5BA00-0AA0
10 units; spare part	

Overview

- 2-channel high-speed counter module
- With comprehensive parameterization options for an optimum adaptation to the task and reduction of control load
- Speed and time period measuring
- Storage and comparison functions
- Connection of 24 V encoders

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Technical specifications

Article number	6AG1550-1AA00-7AB0
Based on	6ES7550-1AA00-0AB0 SIPLUS S7-1500 TM COUNT 2X24V
Ambient conditions	
Ambient temperature in operation	
<ul style="list-style-type: none"> • horizontal installation, min. • horizontal installation, max. 	-40 °C; = Tmin; startup @ -25 °C 70 °C; = Tmax; note derating for inductive loads; > +60 °C total current of the encoder supply max. 0.5 A, total current of the outputs max. 1 A
<ul style="list-style-type: none"> • vertical installation, min. • vertical installation, max. 	-40 °C; = Tmin; startup @ -25 °C 40 °C; Please note derating for inductive loads
Extended ambient conditions	
<ul style="list-style-type: none"> • Relative to ambient temperature-atmospheric pressure-installation altitude 	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity	
<ul style="list-style-type: none"> - With condensation, tested in accordance with IEC 60068-2-38, max. 	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance	
<ul style="list-style-type: none"> - against biologically active substances / conformity with EN 60721-3-3 	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
<ul style="list-style-type: none"> - against chemically active substances / conformity with EN 60721-3-3 	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
<ul style="list-style-type: none"> - against mechanically active substances / conformity with EN 60721-3-3 	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**Article No.**

SIPLUS TM Count 2x24V counter modules	6AG1550-1AA00-7AB0
(extended temperature range and medial exposure)	
With 2 channels, max. 200 kHz; for 24 V encoder	
Accessories	See SIMATIC S7-1500, TM Count 2x24V counter module, page 4/63

SIMATIC S7-1500 advanced controller

I/O modules

Communication

CM PtP**Overview**

- Modules for serial communication connections, scaled according to interface types, protocols, and performance
- 4 versions with different physical transmission characteristics:
 - RS 232C, max. 19.2 Kbit/s
 - RS 232C, max. 115.2 Kbit/s
 - RS 422/RS 485, max. 19.2 Kbit/s
 - RS 422/RS 485, max. 115.2 Kbit/s
- Protocols supported
 - Freepoint: User-parameterizable telegram format for universal communication
 - 3964(R) for improved transmission reliability
 - Modbus RTU Master
 - Modbus RTU Slave
 - USS, implemented through instructions

Technical specifications

Article number	6ES7540-1AD00-0AA0	6ES7541-1AD00-0AB0	6ES7540-1AB00-0AA0	6ES7541-1AB00-0AB0
	CM PTP RS 232 BA	CM PTP RS 232 HF	CM PTP RS 422/485 BA	CM PTP RS 422/485 HF
Product type designation				
General information				
Product function				
• I&M data	Yes; I&M 0	Yes; I&M 0	Yes; I&M 0	Yes; I&M 0
Engineering with				
• STEP 7 TIA Portal can be configured/integrated as of version	V12 / V12	V12 / V12	V12 / V12	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP2 with GSD file	V5.5 SP2 with GSD file	V5.5 SP2 with GSD file	V5.5 SP2 with GSD file
• PROFIBUS as of GSD version/GSD revision	- / -	- / -	- / -	- / -
• PROFINET as of GSD version/GSD revision	V2.3	V2.3 / -	V2.3	V2.3 / -
Installation type/mounting				
Type of fitting, rail mounting	Yes; S7-1500 mounting rail	Yes; S7-1500 mounting rail	Yes; S7-1500 mounting rail	Yes; S7-1500 mounting rail
Supply voltage				
Type of supply voltage	system power supply	system power supply	system power supply	system power supply
Input current				
Current consumption (rated value)	35 mA; From the backplane bus	35 mA; From the backplane bus	33 mA; From the backplane bus	33 mA; From the backplane bus
Power				
Power available from the backplane bus	0.65 W	0.65 W	0.65 W	0.65 W
Power losses				
Power loss, typ.	0.6 W	0.6 W	0.6 W	0.6 W
Interfaces				
1st interface				
Interface types				
- RS 232	Yes	Yes	Yes	Yes
- RS 422			Yes	Yes
- RS 485			Yes	Yes
RS 232				
• Transmission rate, max.	19.2 kbit/s	115.2 kbit/s		
• Cable length, max.	15 m	15 m		
• RS-232 accompanying signals	RTS, CTS, DTR, DSR, RI, DCD	RTS, CTS, DTR, DSR, RI, DCD		
RS 485				
• Transmission rate, max.			19.2 kbit/s	115.2 kbit/s
• Cable length, max.			1 200 m	1 200 m

Technical specifications (continued)

Article number	6ES7540-1AD00-0AA0 CM PTP RS 232 BA	6ES7541-1AD00-0AB0 CM PTP RS 232 HF	6ES7540-1AB00-0AA0 CM PTP RS 422/485 BA	6ES7541-1AB00-0AB0 CM PTP RS 422/485 HF
RS 422				
• Transmission rate, max.			19.2 kbit/s	115.2 kbit/s
• Cable length, max.			1 200 m	1 200 m
• 4-wire full duplex connection			Yes	Yes
• 4-wire multipoint connection			No	No
Integrated protocols				
Freepoint				
- Telegram length, max.	1 kbyte	4 kbyte	1 kbyte	4 kbyte
- Bits per character	7 or 8	7 or 8	7 or 8	7 or 8
- Number of stop bits	1 or 2 bit	1 or 2 bit	1 or 2 bit	1 or 2 bit
- Parity	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any
3964 (R)				
- Telegram length, max.	1 kbyte	4 kbyte	1 kbyte	4 kbyte
- Bits per character	7 or 8	7 or 8	7 or 8	7 or 8
- Number of stop bits	1 or 2 bit	1 or 2 bit	1 or 2 bit	1 or 2 bit
- Parity	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any
Modbus RTU master				
- Address area		1 to 247, extended 1 to 65535		1 to 247, extended 1 to 65535
- Number of slaves, max.		1		32
MODBUS RTU slave				
- Address area		1 to 247, extended 1 to 65535		1 to 247, extended 1 to 65535
Frame buffer				
• Buffer memory for message frames	2 kbyte	8 kbyte	2 kbyte	8 kbyte
• Number of message frames which can be buffered	255	255	255	255
Interrupts/diagnostics/status information				
Alarms				
• Diagnostic alarm	Yes	Yes	Yes	Yes
• Hardware interrupt	No	No	No	No
Diagnostic messages				
• Diagnostics	Yes	Yes	Yes	Yes
• Wire break	Yes	Yes	Yes	Yes
Diagnostics indication LED				
• RUN LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
• Receive RxD	Yes; yellow LED	Yes; yellow LED	Yes; yellow LED	Yes; yellow LED
• Send TxD	Yes; yellow LED	Yes; yellow LED	Yes; yellow LED	Yes; yellow LED
Galvanic isolation				
between the backplane bus and interface	Yes	Yes	Yes	Yes
Isolation				
Isolation checked with	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)
Ambient conditions				
Ambient temperature in operation				
• horizontal installation, min.	0 °C	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C	60 °C	60 °C	60 °C
• vertical installation, min.	0 °C	0 °C	0 °C	0 °C
• vertical installation, max.	40 °C	40 °C	40 °C	40 °C

SIMATIC S7-1500 advanced controller

I/O modules

Communication

CM PtP**Technical specifications** (continued)

Article number	6ES7540-1AD00-0AA0 CM PTP RS 232 BA	6ES7541-1AD00-0AB0 CM PTP RS 232 HF	6ES7540-1AB00-0AA0 CM PTP RS 422/485 BA	6ES7541-1AB00-0AB0 CM PTP RS 422/485 HF
Decentralized operation				
To SIMATIC S7-300	Yes	Yes	Yes	Yes
To SIMATIC S7-400	Yes	Yes	Yes	Yes
To SIMATIC S7-1500	Yes	Yes	Yes	Yes
To standard PROFINET controller	Yes	Yes	Yes	Yes
Fast Startup supported	Yes	Yes	Yes	Yes
Dimensions				
Width	35 mm	35 mm	35 mm	35 mm
Height	147 mm	147 mm	147 mm	147 mm
Depth	127 mm	127 mm	127 mm	127 mm
Weights				
Weight, approx.	0.22 kg	0.22 kg	0.22 kg	0.22 kg

Ordering data**Article No.****Article No.**

CM PtP RS 232 BA communication modules	6ES7540-1AD00-0AA0	Accessories	
Basic communication module with 1 interface RS 232, Freepport, 3964(R) and USS protocols, 9-pin sub D connector, max. 19.2 Kbit/s		RS 232 connecting cables	
		For linking to SIMATIC S7	
		5 m	6ES7902-1AB00-0AA0
		10 m	6ES7902-1AC00-0AA0
		15 m	6ES7902-1AD00-0AA0
CM PtP RS 232 HF communication modules	6ES7541-1AD00-0AB0	RS 422/485 connecting cables	
High Feature communication module with 1 interface RS 232, Freepport, 3964(R), USS and Modbus RTU protocols, 9-pin sub D connector, max. 115.2 Kbit/s		For linking to SIMATIC S7	
		5 m	6ES7902-3AB00-0AA0
		10 m	6ES7902-3AC00-0AA0
		50 m	6ES7902-3AG00-0AA0
CM PtP RS 422/485 BA communication modules	6ES7540-1AB00-0AA0		
Basic communication module with 1 interface RS 422/485, Freepport, 3964(R) and USS protocols, 15-pin sub D socket, max. 19.2 Kbit/s			
CM PtP RS 422/485 HF communication modules	6ES7541-1AB00-0AB0		
High Feature communication module with 1 interface RS 422/485, Freepport, 3964(R), USS and Modbus RTU protocols, 15-pin sub D socket, max. 115.2 Kbit/s			

Overview



DP-M	DP-S	FMS	PG/OP	S7	
●	●		●	●	●

The CM 1542-5 communication module expands the SIMATIC S7-1500 controller with an additional PROFIBUS connection for communication with lower-level PROFIBUS devices in bandwidths from 9.6 kbps to 12 Mbps. The module also allows the implementation of separate PROFIBUS lines; in other words, the control of multiple field devices via several PROFIBUS segments. The CM 1542-5 assumes all communication tasks, thus reducing the CPU workload.

The CM 1542-5 is suitable for S7 communication as well as for conventional PROFIBUS communication. This makes it possible to establish communication between the S7-1500 controller and other devices, for example those from the SIMATIC S7-300/400 range.

- PROFIBUS DP master or DP slave with electrical interface for connecting the SIMATIC S7-1500 to PROFIBUS at up to 12 Mbit/s (including 45.45 Kbit/s)
- Communication services:
 - PROFIBUS DP
 - PG/OP communication
 - S7 communication
- Time synchronization
- Simple programming and configuration over PROFIBUS
- Cross-network PG communication using S7 routing
- Module replacement without a PG
- Data record routing (PROFIBUS DP)
- Adding or modifying distributed I/O during operation

Technical specifications

Article number	6GK7542-5DX00-0XE0
Product type designation	CM 1542-5
Transmission rate	
Transfer rate	
• at the 1st interface acc. to PROFIBUS	9.6 kbit/s ... 12 Mbit/s
Interfaces	
Number of interfaces acc. to Industrial Ethernet	0
Number of electrical connections	
• at the 1st interface acc. to PROFIBUS	1
Type of electrical connection	
• at the 1st interface acc. to PROFIBUS	9-pin Sub-D socket (RS485)
Supply voltage, current consumption, power loss	
Type of voltage of the supply voltage	DC
Supply voltage 1 from backplane bus	15 V
Relative symmetrical tolerance for DC	
• at 15 V	3 %
Consumed current	
• from backplane bus for DC at 15 V typical	0.2 A
Active power loss	3 W
Permitted ambient conditions	
Ambient temperature	
• for vertical installation during operation	0 ... 40 °C
• for horizontally arranged busbars during operation	0 ... 60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Relative humidity at 25 °C without condensation during operation maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	Compact module S7-1500 single width
Width	35 mm
Height	142 mm
Depth	129 mm
Net weight	0.4 kg
Mounting type	
• S7-1500 rail mounting	Yes
Product properties, functions, components general	
Number of units	
• per CPU maximum	8
• Note	depending on CPU type

SIMATIC S7-1500 advanced controller

I/O modules

Communication

CM 1542-5**Technical specifications (continued)**

Article number	6GK7542-5DX00-0XE0
Product type designation	CM 1542-5
Performance data PROFIBUS DP	
Service as DP master	
• DPV1	Yes
Number of DP slaves on DP master usable	125
Amount of data	
• of the address area of the inputs as DP master total	8 192 byte
• of the address area of the outputs as DP master total	8 192 byte
• of the address area of the inputs per DP slave	244 byte
• of the address area of the outputs per DP slave	244 byte
Service as DP slave	
• DPV0	Yes
• DPV1	Yes
Amount of data	
• of the address area of the inputs as DP slave total	240 byte
• of the address area of the outputs as DP slave total	240 byte
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	40
• Note	depending on the system upper limit
Performance data multi-protocol mode	
Number of active connections with multi-protocol mode	40
Performance data telecontrol	
Protocol is supported	
• TCP/IP	No
Product functions management, configuration	
Configuration software	
• required	STEP 7 Professional V12 (TIA Portal) or higher
Identification & maintenance function	
• I&M0 - device-specific information	Yes
• I&M1 – higher-level designation/ location designation	Yes
Product functions Diagnosis	
Product function Web-based diagnostics	Yes; yes, via S7-1500 CPU
Product functions Time	
Product function pass on time synchronization	Yes

Ordering data**Article No.****CM 1542-5 communication modules**

Communication module for electrical connection of SIMATIC S7-1500 to PROFIBUS as a DP master or DP slave

6GK7542-5DX00-0XE0**Accessories****PROFIBUS RS 485 FastConnect connector**

With 90° cable outlet; insulation displacement technology, max. transmission rate 12 Mbps

- Without PG interface
- with PG interface

6ES7972-0BA52-0XA0
6ES7972-0BB52-0XA0**PROFIBUS FC standard cable**

2-core bus cable, shielded, special design for fast mounting, delivery unit: max. 1000 m, minimum order 20 m, sold by the meter

6XV1830-0EH10**PROFIBUS FastConnect stripping tool**

Stripping tool for fast stripping of the PROFIBUS FastConnect bus cable

6GK1905-6AA00**PROFIBUS bus terminal 12M**

Bus terminal for connection of PROFIBUS nodes up to 12 Mbps with connecting cable

6GK1500-0AA10Note:

You can find order information for software for communication with PC systems in the IK PI catalog.

Overview



DP-M	DP-S	FMS	PG/OP	S7/S5	
●	●		●		

The CP 1542-5 communications processor expands the SIMATIC S7-1500 controller with an additional PROFIBUS connection for communication with lower-level PROFIBUS devices in bandwidths from 9.6 kbps to 12 Mbit/s. The processor also allows the implementation of separate PROFIBUS lines; in other words, the control of multiple field devices via several PROFIBUS segments. The CP 1542-5 handles all communication tasks, thus reducing the CPU load.

- PROFIBUS DP master or DP slave with electrical interface for connecting the SIMATIC S7-1500 to PROFIBUS at up to 12 Mbit/s (including 45.45 Kbit/s)

Communication services:

- PROFIBUS DP
- PG/OP communication
- Time synchronization
- Simple programming and configuration over PROFIBUS
- Cross-network PG communication using S7 routing
- Module replacement without a PG

Technical specifications

Article number	6GK7542-5FX00-0XE0
Product type designation	CP 1542-5
Transmission rate	
Transfer rate	
• at the 1st interface acc. to PROFIBUS	9.6 kbit/s ... 12 Mbit/s
Interfaces	
Number of interfaces acc. to Industrial Ethernet	0
Number of electrical connections	
• at the 1st interface acc. to PROFIBUS	1
Type of electrical connection	
• at the 1st interface acc. to PROFIBUS	9-pin Sub-D socket (RS485)
Supply voltage, current consumption, power loss	
Type of voltage of the supply voltage	DC
Supply voltage 1 from backplane bus	15 V
Relative symmetrical tolerance for DC	
• at 15 V	3 %
Consumed current	
• from backplane bus for DC at 15 V typical	0.1 A
Active power loss	1.5 W
Permitted ambient conditions	
Ambient temperature	
• for vertical installation during operation	0 ... 40 °C
• for horizontally arranged busbars during operation	0 ... 60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Relative humidity at 25 °C without condensation during operation maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	Compact module S7-1500 single width
Width	35 mm
Height	142 mm
Depth	129 mm
Net weight	0.27 kg
Mounting type	
• S7-1500 rail mounting	Yes
Product properties, functions, components general	
Number of units	
• per CPU maximum	8
• Note	depending on CPU type

SIMATIC S7-1500 advanced controller

I/O modules

Communication

CP 1542-5**Technical specifications (continued)**

Article number	6GK7542-5FX00-0XE0
Product type designation	CP 1542-5
Performance data PROFIBUS DP	
Service as DP master	
• DPV1	Yes
Number of DP slaves on DP master usable	32
Amount of data	
• of the address area of the inputs as DP master total	2 048 byte
• of the address area of the outputs as DP master total	2 048 byte
• of the address area of the inputs per DP slave	244 byte
• of the address area of the outputs per DP slave	244 byte
Service as DP slave	
• DPV0	Yes
• DPV1	Yes
Amount of data	
• of the address area of the inputs as DP slave total	240 byte
• of the address area of the outputs as DP slave total	240 byte
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	16
• Note	depending on the system upper limit
Performance data multi-protocol mode	
Number of active connections with multi-protocol mode	16
Performance data telecontrol	
Protocol is supported	
• TCP/IP	No
Product functions management, configuration	
Configuration software	
• required	STEP 7 Professional V12 SP1 (TIA Portal) or higher
Identification & maintenance function	
• I&M0 - device-specific information	Yes
• I&M1 – higher-level designation/ location designation	Yes
Product functions Diagnosis	
Product function Web-based diagnostics	Yes; yes, via S7-1500 CPU
Product functions Time	
Product function pass on time synchronization	Yes

Ordering data**Article No.****CP 1542-5****communications processors**

Communication module for electrical connection of SIMATIC S7-1500 to PROFIBUS as DP master or DP slave; PG/OP communication, time synchronization, diagnostics

6GK7542-5FX00-0XE0**Accessories****PROFIBUS FastConnect connection plugs**

With 90° cable outlet; insulation displacement technology, max. transmission rate 12 Mbit/s

• without programming device interface

6ES7972-0BA52-0XA0

• with programming device interface

6ES7972-0BB52-0XA0**PROFIBUS FC standard cable**

2-core bus cable, shielded, special design for fast mounting, delivery unit: max. 1000 m, minimum order 20 m, sold by the meter

6XV1830-0EH10**PROFIBUS FastConnect stripping tool**

Stripping tool for fast stripping of the PROFIBUS FastConnect bus cable

6GK1905-6AA00**PROFIBUS bus terminal 12M**

Bus terminal for connection of PROFIBUS stations for up to 12 Mbps with connecting cable

6GK1500-0AA10Note:

You can find order information for software for communication with PC systems in the IK PI catalog.

Overview



ISO	TCP/UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
	●	●	●	●		●	●

Communication module for connecting a SIMATIC S7-1500 to PROFINET networks as PROFINET IO controller.

The CM 1542-1 supports the following communication services:

- PG/OP communication
- S7 communication
- Open communication (SEND/RECEIVE)
- PROFINET communication
- IT communication;
web diagnose by means of access to the Web server of the S7-1500 system

Technical specifications

Article number	6GK7542-1AX00-0XE0
Product type designation	CM 1542-1
Transmission rate	
Transfer rate	
• at the 1st interface	10 ... 100 Mbit/s
Interfaces	
Number of interfaces acc. to Industrial Ethernet	1
Number of electrical connections	
• at the 1st interface acc. to Industrial Ethernet	2
Type of electrical connection	
• at the 1st interface acc. to Industrial Ethernet	RJ45 port
Supply voltage, current consumption, power loss	
Type of voltage of the supply voltage	DC
Supply voltage 1 from backplane bus	15 V
Relative symmetrical tolerance for DC	
• at 15 V	3 %
Consumed current	
• from backplane bus for DC at 15 V typical	0.22 A
Active power loss	3.3 W

Article number	6GK7542-1AX00-0XE0
Product type designation	CM 1542-1
Permitted ambient conditions	
Ambient temperature	
• for vertical installation during operation	0 ... 40 °C
• for horizontally arranged busbars during operation	0 ... 60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Relative humidity at 25 °C without condensation during operation maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	Compact module S7-1500 single width
Width	35 mm
Height	142 mm
Depth	129 mm
Net weight	0.4 kg
Mounting type	
• S7-1500 rail mounting	Yes
Product properties, functions, components general	
Number of units	
• per CPU maximum	8
• Note	depending on CPU type
Performance data open communication	
Number of possible connections for open communication	
• by means of T blocks maximum	64; depending on the system upper limit
Amount of data	
• as user data per ISO on TCP connection for open communication by means of T blocks maximum	65 536 byte
Number of Multicast stations	6
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	64
• Note	depending on the system upper limit
Performance data multi-protocol mode	
Number of active connections with multi-protocol mode	64
Performance data PROFINET communication as PN IO-Controller	
Product function PROFINET IO controller	Yes
Number of PN IO devices on PROFINET IO controller usable total	128
Number of PN IO IRT devices on PROFINET IO controller usable	64
Number of external PN IO lines with PROFINET per rack	10

SIMATIC S7-1500 advanced controller

I/O modules

Communication

CM 1542-1

Technical specifications (continued)

Article number	6GK7542-1AX00-0XE0
Product type designation	CM 1542-1
Amount of data	
• as user data for input variables as PROFINET IO controller maximum	8 Kibyte
• as user data for input variables as PROFINET IO controller maximum	8 Kibyte
• as user data for input variables per PN IO device as PROFINET IO controller maximum	1 433 byte
• as user data for output variables per PN IO device as PROFINET IO controller maximum	1 433 byte
• as user data for input variables per PN IO device for each sub-module as PROFINET IO controller maximum	256 byte
• as user data for output variables per PN IO device for each sub-module as PROFINET IO controller maximum	256 byte
Performance data telecontrol	
Protocol is supported	
• TCP/IP	Yes
Product functions management, configuration	
Product function MIB support	Yes
Protocol is supported	
• SNMP v1	Yes
• DCP	Yes
• LLDP	Yes
Configuration software	
• required	STEP 7 Professional V13 (TIA Portal) or higher
Identification & maintenance function	
• I&MO - device-specific information	Yes
• I&M1 – higher-level designation/location designation	Yes
Product functions Diagnosis	
Product function Web-based diagnostics	Yes; yes, via S7-1500 CPU
Product functions switch	
Product feature Switch	Yes
Product function	
• switch-managed	No
• with IRT PROFINET IO switch	Yes
• Configuration with STEP 7	Yes
Product functions Redundancy	
Product function	
• Ring redundancy	Yes
• Redundancy manager	Yes
Protocol is supported Media Redundancy Protocol (MRP)	Yes
Product functions Security	
Product function	
• switch-off of non-required services	Yes
• Blocking of communication via physical ports	No
• log file for unauthorized access	No
Product functions Time	
Product function SICLOCK support	Yes
Product function pass on time synchronization	Yes
Protocol is supported NTP	Yes

Ordering data

Article No.

CM 1542-1 communication module **6GK7542-1AX00-0XE0**

for connection of SIMATIC S7-1500 to PROFINET IO via TCP/IP, ISO-on-TCP, UDP S7 communication, IP broadcast/multicast, SNMPV1, time synchronization via NTP; 1 x RJ45 interface with 10/100 Mbit/s;

Accessories

IE FC RJ45 Plug 4 x 2

RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a sturdy metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPU with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1901-1BB11-2AA0
6GK1901-1BB11-2AB0
6GK1901-1BB11-2AE0

IE FC TP Standard Cable GP 4 x 2

8-core, shielded TP installation cable for connection to IE FC RJ45 Modular Outlet for universal applications; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m

- AWG22, for connection to IE FC RJ45 Modular Outlet
- AWG24, for connection to IE FC RJ45 Plug 4 x 2

6XV1870-2E

6XV1878-2A

SCALANCE X204-2 Industrial Ethernet Switch

Industrial Ethernet Switches with integral SNMP access, Web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports

6GK5204-2BB10-2AA3

Industrial Ethernet Switch SCALANCE X308-2

2 x 1000 Mbit/s multimode fiber-optic cable ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cable (multimode) up to max. 750 m

6GK5308-2FL00-2AA3

Overview



ISO	TCP/UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●			●		●	●

The SIMATIC CP 1543-1 communications processor securely connects the new SIMATIC S7-1500 controller to Industrial Ethernet networks. By combining a variety of security features such as an SPI (Stateful Packet Inspection) firewall, VPN and data encryption protocols such as FTPS and SNMPv3, the communications processor protects individual S7-1500 stations or even entire automation cells against unauthorized access.

The CP can also be used for linking the S7-1500 station into an IPv6-based network. All functions are configured by means of STEP 7 Professional V12 (TIA Portal) or higher.

The CP 1543-1 supports the following communications services:

- PG/OP communication
- S7 communication
- Open communication (SEND/RECEIVE, FETCH/WRITE)
- IT communication
 - FTP functions (File Transfer Protocol FTP/FTPS) for file management and access to data blocks in the CPU (client and server function)
 - Sending e-mails via SMTP or ESMTP with "SMTP-Auth" for authentication on an e-mail server (also with IPv6)
- Security functions
 - Stateful Packet Inspection (layers 3 and 4) firewall
 - Secure communication via VPN (IPsec)
 - Secure access to the Web server of the CPU via the HTTPS protocol
 - Secure file transfer using FTPS
 - Secure transfer of the time of day (NTP)
 - SNMPv3 for tap-proof transfer of network analysis information
- Integration of the S7-1500 into IPv6-based networks; An IPv6-compliant IP address can be used for the following communication services:
 - FETCH/WRITE access (CP as server)
 - FTP server mode
 - FTP client mode with addressing by program block
 - E-mail transfer with addressing by program block

Technical specifications

Article number	6GK7543-1AX00-0XE0
Product type designation	CP 1543-1
Transmission rate	
Transfer rate	
• at the 1st interface	10 ... 1 000 Mbit/s
Interfaces	
Number of interfaces acc. to Industrial Ethernet	1
Number of electrical connections	
• at the 1st interface acc. to Industrial Ethernet	1
Type of electrical connection	
• at the 1st interface acc. to Industrial Ethernet	RJ45 port
Supply voltage, current consumption, power loss	
Type of voltage of the supply voltage	DC
Supply voltage 1 from backplane bus	15 V
Relative symmetrical tolerance for DC	
• at 15 V	3 %
Consumed current	
• from backplane bus for DC at 15 V typical	0.35 A
Active power loss	5.3 W
Permitted ambient conditions	
Ambient temperature	
• for vertical installation during operation	0 ... 40 °C
• for horizontally arranged busbars during operation	0 ... 60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Relative humidity at 25 °C without condensation during operation maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	Compact module S7-1500 single width
Width	35 mm
Height	142 mm
Depth	129 mm
Net weight	0.35 kg
Mounting type	
• S7-1500 rail mounting	Yes
Product properties, functions, components general	
Number of units	
• per CPU maximum	8
• Note	depending on CPU type
Performance data open communication	
Number of possible connections for open communication	
• by means of T blocks maximum	118; depending on the system upper limit
Amount of data	
• as user data per ISO on TCP connection for open communication by means of T blocks maximum	65 536 byte
Number of Multicast stations	118

SIMATIC S7-1500 advanced controller

I/O modules

Communication

CP 1543-1**Technical specifications (continued)**

Article number	6GK7543-1AX00-0XE0
Product type designation	CP 1543-1
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	118
• Note	depending on the system upper limit
Performance data multi-protocol mode	
Number of active connections with multi-protocol mode	118
Performance data IT functions	
Number of possible connections	
• as client by means of FTP maximum	32
• as server by means of FTP maximum	16
• as server by means of HTTP maximum	4
• as e-mail client maximum	1
Amount of data as user data for email maximum	64 Kibyte
Performance data telecontrol	
Protocol is supported	
• TCP/IP	Yes
Product functions management, configuration	
Product function MIB support	Yes
Protocol is supported	
• SNMP v1	Yes
• DCP	Yes
• LLDP	No
Configuration software	
• required	STEP 7 Professional V12 (TIA Portal) or higher
Identification & maintenance function	
• I&M0 - device-specific information	Yes
• I&M1 – higher-level designation/location designation	Yes

Article number	6GK7543-1AX00-0XE0
Product type designation	CP 1543-1
Product functions Diagnosis	
Product function Web-based diagnostics	Yes; yes, via S7-1500 CPU
Product functions Security	
Firewall version	stateful inspection
Product function with VPN connection	IPSec
Type of encryption algorithms with VPN connection	AES-256, AES-192, AES-128, 3DES-168, DES-56
Type of authentication procedure with VPN connection	Preshared key (PSK), X.509v3 certificates
Type of hashing algorithms with VPN connection	MD5, SHA-1
Number of possible connections with VPN connection	16
Product function	
• password protection for Web applications	No
• ACL - IP-based	No
• ACL - IP-based for PLC/routing	No
• switch-off of non-required services	Yes
• Blocking of communication via physical ports	No
• log file for unauthorized access	Yes
Product functions Time	
Product function SICLOCK support	Yes
Product function pass on time synchronization	Yes
Protocol is supported NTP	Yes

Ordering data	Article No.	Article No.	
CP 1543-1 communications processor for connection of SIMATIC S7-1500 to Industrial Ethernet via TCP/IP, ISO and UDP and Security functions; 1 x RJ45 interface with 10/100/1000 Mbit/s; electronic manual on DVD	6GK7543-1AX00-0XE0	IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order quantity 20 m	6XV1840-2AH10
Accessories IE FC RJ45 Plug 180 2 x 2 RJ45 plug-in connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface <ul style="list-style-type: none"> • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units 	6GK1901-1BB10-2AA0 6GK1901-1BB10-2AB0 6GK1901-1BB10-2AE0	IE FC TP Standard Cable GP 4 x 2 8-core, shielded TP installation cable for connection to IE FC RJ45 Modular Outlet for universal applications; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m <ul style="list-style-type: none"> • AWG22, for connection to IE FC RJ45 Modular Outlet • AWG24, for connection to IE FC RJ45 Plug 4 x 2 	6XV1870-2E 6XV1878-2A
IE FC RJ45 Plug 4 x 2 RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a sturdy metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface <ul style="list-style-type: none"> • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units 	6GK1901-1BB11-2AA0 6GK1901-1BB11-2AB0 6GK1901-1BB11-2AE0	IE FC stripping tool Preadjusted stripping tool for fast stripping of the Industrial Ethernet FC cables	6GK1901-1GA00
		Industrial Ethernet Switch SCALANCE X204-2 Industrial Ethernet Switches with integral SNMP access, Web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5204-2BB10-2AA3
		Industrial Ethernet Switch SCALANCE X308-2 2 x 1000 Mbit/s multimode fiber-optic cable ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cable (multimode) up to max. 750 m	6GK5308-2FL00-2AA3

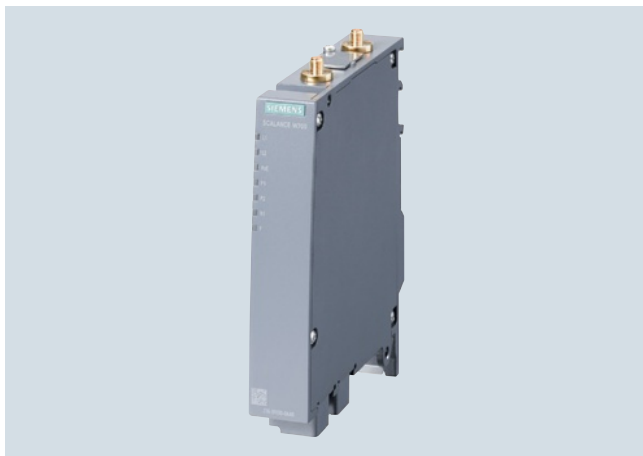
Note:

You can find order information for software for communication with PC systems in the IK PI catalog.

SIMATIC S7-1500 advanced controller

I/O modules

Communication

SCALANCE W774 RJ45 for use in the control cabinet**Overview**

- Access points in SIMATIC design suitable for applications where the device is to be mounted in the control cabinet

Product versions

SCALANCE W774-1 RJ45

- A radio card is permanently installed; functional scope can be expanded by using a KEY-PLUG W780 IFeatures

Technical specifications

Article number	6GK5774-1FX00-0AA0 6GK5774-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W774-1 RJ45
Transmission rate	
Transfer rate	
• with WLAN maximum	300 Mbit/s
• 1 for Industrial Ethernet	10 Mbit/s
• 2 for Industrial Ethernet	100 Mbit/s
• for Industrial Ethernet	10 Mbit/s, 100 Mbit/s
Interfaces	
Number of electrical connections	
• for network components or terminal equipment	2
• for power supply	1
• for redundant voltage supply	1
Type of electrical connection	
• for network components or terminal equipment	RJ45 socket
• for power supply	4-pole screw terminal, PoE
design of the removable storage	
• C-PLUG	Yes
• KEY-PLUG	Yes
Interfaces wireless	
Number of radio cards permanently installed	1
Transmission mode for multiple input multiple output (MIMO)	2x2
Number of spatial streams	2
Number of electrical connections for external antenna(s)	2
Type of electrical connection for external antenna(s)	R-SMA (socket)
Product property external antenna can be mounted directly on device	Yes

Article number	6GK5774-1FX00-0AA0 6GK5774-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W774-1 RJ45
Supply voltage, current consumption, power loss	
Type of voltage of the supply voltage	DC
Supply voltage 1	
• from terminal block	19.2 V
Supply voltage 2	
• from terminal block	28.8 V
Supply voltage	
• from Power-over-Ethernet acc. to IEEE802.3at for type 1 and IEEE802.3af	48 V
Consumed current	
• for DC at 24 V typical	0.25 A
• with Power-over-Ethernet according to IEEE802.3at for type 1 and IEEE802.3af typical	0.125 A
Active power loss	
• for DC at 24 V typical	6 W
• with Power-over-Ethernet according to IEEE802.3at for type 1 and IEEE802.3af typical	6 W
Permitted ambient conditions	
Ambient temperature	
• during operation	-20 ... +60 °C
• during storage	-40 ... +85 °C
• during transport	-40 ... +85 °C
Relative humidity at 25 °C without condensation during operation maximum	97 %
Ambient condition for operation	When used under hazardous conditions (Zone 2), the SCALANCE W774-1 RJ45 or W734-1 RJ45 product must be installed in an enclosure. To comply with EN 50021, this enclosure must meet the requirements of at least IP 54 in compliance with EN 60529.
Protection class IP	IP30

¹⁾ Wireless approval in the USA

Technical specifications (continued)

Article number	6GK5774-1FX00-0AA0 6GK5774-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W774-1 RJ45
Design, dimensions and weight	
Width	26 mm
Height	156 mm
Depth	127 mm
Width of the enclosure w/o antenna	26 mm
Height of the enclosure w/o antenna	147 mm
Depth of the enclosure w/o antenna	127 mm
Net weight	0.52 kg
Mounting type	wall mounting only if flat mounted
• S7-300 rail mounting	Yes
• S7-1500 rail mounting	Yes
• wall mounting	Yes
Wireless frequencies	
Operating frequency	
• for WLAN in 2.4 GHz frequency band	2.41 ... 2.48 GHz
• for WLAN in 5 GHz frequency band	4.9 ... 5.8 GHz
Product properties, functions, components general	
Product function Access Point Mode	Yes
Product function Client Mode	Yes
Number of SSIDs	4
Product function	
• Dual Client	No
• iPCF Access Point	Yes; Only in combination with the 'KEY-PLUG W780 iFeatures'
• iPCF client	Yes; Only in combination with the 'KEY-PLUG W740 iFeatures'
• iPCF-MC Access Point	No
• iPCF-MC client	Yes; Only in combination with the 'KEY-PLUG W740 iFeatures'
Number of iPCF-capable radio modules	1
Product function iREF	No
Number of iREF-capable radio modules	0
Product functions management, configuration	
No. of manageable IP addr. in client	8
Product function	
• CLI	Yes
• web-based management	Yes
• MIB support	Yes
• TRAPs via email	Yes
• Configuration with STEP 7	No
• configuration with STEP 7 in the TIA Portal	No
• forced roaming with IWLAN	No
• WDS	Yes
Protocol is supported	
• Address Resolution Protocol (ARP)	Yes
• ICMP	Yes
• Telnet	Yes
• HTTP	Yes
• HTTPS	Yes
• TFTP	Yes
• DCP	Yes
• LLDP	Yes
Identification & maintenance function	
• I&M0 - device-specific information	Yes
• I&M1 - higher-level designation/location designation	Yes

Article number	6GK5774-1FX00-0AA0 6GK5774-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W774-1 RJ45
Product functions Diagnosis	
Product function	
• PROFINET IO diagnosis	No
• Link Check	No
• connection monitoring IP-Alive	No
• localization via Aeroscout	No
• SysLog	Yes
Protocol is supported	
• SNMP v1	Yes
• SNMP v2	Yes
• SNMP v3	Yes
Product functions VLAN	
Product function	
• function VLAN with IWLAN	Yes
Product functions DHCP	
Product function	
• DHCP client	Yes
• in Client Mode DHCP server via LAN	No
Product functions Redundancy	
Protocol is supported	
• STP/RSTP	Yes
Product functions Security	
Product function	
• ACL - MAC-based	No
• Management security, ACL-IP based	Yes
• IEEE 802.1x (radius)	Yes
• NAT/NAPT	No
• access protection according to IEEE802.11i	Yes
• WPA/WPA2	Yes
• TKIP/AES	Yes
Protocol is supported	
• SSH	Yes
Product functions Time	
Protocol is supported	
• SNTP	Yes
• SIMATIC Time	Yes

1) Wireless approval in the USA

SIMATIC S7-1500 advanced controller

I/O modules

Communication

SCALANCE W774 RJ45 for use in the control cabinet

Technical specifications (continued)

Article number	6GK5774-1FX00-0AA0 6GK5774-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W774-1 RJ45
Standards, specifications, approvals	
Standard	
• for FM	FM 3611: Class I, Division 2, Groups A,B,C,D, T4 / Class 1, Zone 2, Group IIC, T4
• for hazardous zone	EN 60079-15:2005, EN 60079-0:2006, II 3 G Ex nA II T4 KEMA 07 ATEX 0145X
• for safety from CSA and UL	UL 60950-1 CSA C22.2 No. 60950-1
• for hazardous zone from CSA and UL	ANSI/ISA 12.12.01-2013, CAN/CSA C22.2 No.213-M1987, CL. 1, Div. 2, GP. A,B,C,D, T4 / CL. 1, Zone 2, GP IIC
Certificate of suitability	
• EC declaration of conformity	Yes
• CE marking	Yes
• C-Tick	Yes
• CCC	No
• E1 approval	No
• Railway application in accordance with EN 50155	No
• Fire protection in accordance with EN 45545-2	No
• NEMA TS2	No
• IEC 61375	No
• IEC 61850-3	No
• NEMA4X	No
• Power-over-Ethernet according IEEE802.3at for type 1 and IEEE802.3af	Yes
• Power-over-Ethernet according to IEEE802.3at for type 2	Yes
Standard for wireless communication	
• IEEE 802.11a	Yes
• IEEE 802.11b	Yes
• IEEE 802.11e	Yes
• IEEE 802.11g	Yes
• IEEE 802.11h	Yes
• IEEE 802.11i	Yes
• IEEE 802.11n	Yes
Wireless approval	You will find the current list of countries at: www.siemens.com/wireless-approvals
Marine classification association	
• American Bureau of Shipping Europe Ltd. (ABS)	No
• Bureau Veritas (BV)	No
• Det Norske Veritas (DNV)	No
• Germanische Lloyd (GL)	No
• Lloyds Register of Shipping (LRS)	No
• Nippon Kaiji Kyokai (NK)	No
• Polski Rejestr Statkow (PRS)	No
Accessories	
accessories	24 V DC screw terminal included in scope of delivery

1) Wireless approval in the USA

Ordering data

Article No.

SCALANCE W774 access points

IWLAN access points with built-in wireless interface for establishing wireless connections with iFeatures; wireless networks IEEE 802.11a/b/g/h/n at 2.4/5 GHz up to 300 Mbit/s; WPA2/AES; integrated 2-port switch; Power over Ethernet (PoE), IP30 degree of protection (-20 °C to +60°C); scope of delivery: Mounting hardware, 4-pin screw terminal for 24V DC; manual on CD-ROM; German/English

SCALANCE W774-1 RJ45

IWLAN Access Point with one built-in wireless interface

- National approvals for operation outside the USA
- National approvals for operation within the USA ²⁾

6GK5774-1FX00-0AA0**6GK5774-1FX00-0AB0***Accessories***KEY-PLUG W780 iFeatures**

Swap medium for enabling additional iFeatures, for simple device replacement if a fault occurs and for storage of configuration data; can be used in SCALANCE W access points with PLUG compartment

6GK5907-8PA00**C-PLUG**

Swap medium for simple replacement of devices if a fault occurs; for storing configuration data; can be used in SIMATIC NET products with PLUG compartment

6GK1900-0AB00**IE FC RJ45 Plug 180 2 x 2**

RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation-displacement contacts for connecting Industrial Ethernet FC installation cables; with a 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1901-1BB10-2AA0**6GK1901-1BB10-2AB0****6GK1901-1BB10-2AE0****IE FC Standard Cable GP 2 x 2**

4-core, shielded TP installation cable for connection to IE FC outlet RJ45 plug / IE FC RJ45 plug; PROFINET-compliant; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m

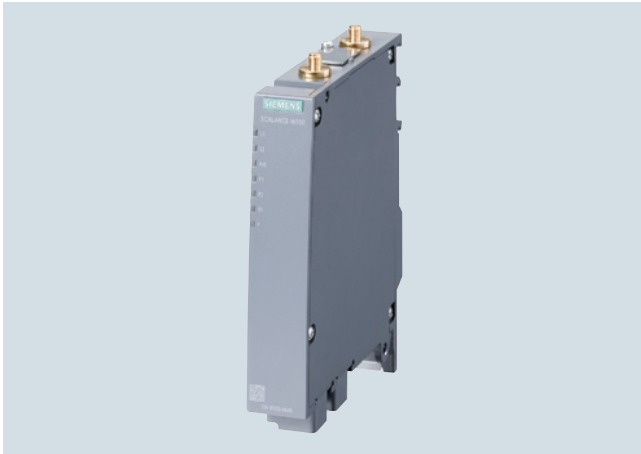
6XV1840-2AH10**IE FC stripping tool**

Preadjusted stripping tool for fast stripping of the Industrial Ethernet FC cables

6GK1901-1GA00*Antennas and miscellaneous IWLAN accessories*

See Catalog IK PI, Industrial Wireless LAN/ accessories

2) Please note national approvals under <http://www.siemens.com/wireless-approvals>

Overview

- Client modules in SIMATIC design suitable for applications where the device is to be mounted in the control cabinet



ET 200MP station with SCALANCE W734 RJ45

SCALANCE W734-1 RJ45

- A radio card is permanently installed; functional scope can be expanded by using a KEY-PLUG W740 iFeatures

Technical specifications

Article number	6GK5734-1FX00-0AA0 6GK5734-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W734-1 RJ45
Transmission rate	
Transfer rate	
• with WLAN maximum	300 Mbit/s
• 1 for Industrial Ethernet	10 Mbit/s
• 2 for Industrial Ethernet	100 Mbit/s
• for Industrial Ethernet	10 Mbit/s, 100 Mbit/s
Interfaces	
Number of electrical connections	
• for network components or terminal equipment	2
• for power supply	1
• for redundant voltage supply	1
Type of electrical connection	
• for network components or terminal equipment	RJ45 socket
• for power supply	4-pole screw terminal, PoE
design of the removable storage	
• C-PLUG	Yes
• KEY-PLUG	Yes
Interfaces wireless	
Number of radio cards permanently installed	1
Transmission mode for multiple input multiple output (MIMO)	2x2
Number of spatial streams	2
Number of electrical connections for external antenna(s)	2
Type of electrical connection for external antenna(s)	R-SMA (socket)
Product property external antenna can be mounted directly on device	Yes
Supply voltage, current consumption, power loss	
Type of voltage of the supply voltage	DC
Supply voltage 1	
• from terminal block	19.2 V
Supply voltage 2	
• from terminal block	28.8 V
Supply voltage	
• from Power-over-Ethernet acc. to IEEE802.3at for type 1 and IEEE802.3af	48 V
Consumed current	
• for DC at 24 V typical	0.25 A
• with Power-over-Ethernet according to IEEE802.3at for type 1 and IEEE802.3af typical	0.125 A
Active power loss	
• for DC at 24 V typical	6 W
• with Power-over-Ethernet according to IEEE802.3at for type 1 and IEEE802.3af typical	6 W

1) Wireless approval in the USA

SIMATIC S7-1500 advanced controller

I/O modules

Communication

SCALANCE W734 RJ45 for use in the control cabinet**Technical specifications (continued)**

Article number	6GK5734-1FX00-0AA0 6GK5734-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W734-1 RJ45
Permitted ambient conditions	
Ambient temperature	
• during operation	-20 ... +60 °C
• during storage	-40 ... +85 °C
• during transport	-40 ... +85 °C
Relative humidity at 25 °C without condensation during operation maximum	97 %
Ambient condition for operation	When used under hazardous conditions (Zone 2), the SCALANCE W774-1 RJ45 or W734-1 RJ45 product must be installed in an enclosure. To comply with EN 50021, this enclosure must meet the requirements of at least IP 54 in compliance with EN 60529.
Protection class IP	IP30
Design, dimensions and weight	
Width	26 mm
Height	156 mm
Depth	127 mm
Width of the enclosure without antenna	26 mm
Height of the enclosure without antenna	147 mm
Depth of the enclosure without antenna	127 mm
Net weight	0.52 kg
Mounting type	wall mounting only if flat mounted
• S7-300 rail mounting	Yes
• S7-1500 rail mounting	Yes
• wall mounting	Yes
Wireless frequencies	
Operating frequency	
• for WLAN in 2.4 GHz frequency band	2.41 ... 2.48 GHz
• for WLAN in 5 GHz frequency band	4.9 ... 5.8 GHz
Product properties, functions, components general	
Product function Access Point Mode	No
Product function Client Mode	Yes
Product function	
• Dual Client	No
• iPCF client	Yes; Only in combination with the 'KEY-PLUG W780 iFeatures' or 'KEY-PLUG W740 iFeatures'
• iPCF-MC Access Point	No
• iPCF-MC client	Yes; Only in combination with 'KEY-PLUG W780 iFeatures' or 'KEY-PLUG W740 iFeatures'
Number of iPCF-capable radio modules	1

Article number	6GK5734-1FX00-0AA0 6GK5734-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W734-1 RJ45
Product functions management, configuration	
Number of manageable IP addresses in client	8
Product function	
• CLI	Yes
• web-based management	Yes
• MIB support	Yes
• TRAPs via email	Yes
• Configuration with STEP 7	No
• configuration with STEP 7 in the TIA Portal	No
• forced roaming with IWLAN	No
• WDS	No
Protocol is supported	
• Address Resolution Protocol (ARP)	Yes
• ICMP	Yes
• Telnet	Yes
• HTTP	Yes
• HTTPS	Yes
• TFTP	Yes
• DCP	Yes
• LLDP	No
Identification & maintenance function	
• I&M0 - device-specific information	Yes
• I&M1 - higher-level designation/ location designation	Yes
Product functions Diagnosis	
Product function	
• PROFINET IO diagnosis	No
• Link Check	No
• connection monitoring IP-Alive	No
• localization via Aeroscout	No
• SysLog	Yes
Protocol is supported	
• SNMP v1	Yes
• SNMP v2	Yes
• SNMP v3	Yes
Product functions VLAN	
Product function	
• function VLAN with IWLAN	No
Product functions DHCP	
Product function	
• DHCP client	Yes
• in Client Mode DHCP server via LAN	No
Product functions Security	
Product function	
• ACL - MAC-based	No
• Management security, ACL-IP based	Yes
• IEEE 802.1x (radius)	Yes
• NAT/NAPT	No
• access protection according to IEEE802.11i	Yes
• WPA/WPA2	Yes
• TKIP/AES	Yes
Protocol is supported	
• SSH	Yes

1) Wireless approval in the USA

Technical specifications (continued)

Article number	6GK5734-1FX00-0AA0 6GK5734-1FX00-0AB0 ¹⁾
Product type designation	SCALANCE W734-1 RJ45
Product functions Time	
Protocol is supported	
• SNTP	Yes
• SIMATIC Time	Yes
Standards, specifications, approvals	
Standard	
• for FM	FM 3611: Class I, Division 2, Groups A,B,C,D, T4 / Class 1, Zone 2, Group IIC, T4
• for hazardous zone	EN 60079-15:2005, EN 60079-0:2006, II 3 G Ex nA II T4 KEMA 07 ATEX 0145X
• for safety from CSA and UL	UL 60950-1 CSA C22.2 No. 60950-1
• for hazardous zone from CSA and UL	ANSI/ISA 12.12.01-2013, CAN/CSA C22.2 No.213-M1987, CL. 1, Div. 2, GP. A,B,C,D, T4 / CL. 1, Zone 2, GP IIC
Certificate of suitability	
• EC declaration of conformity	Yes
• CE marking	Yes
• C-Tick	Yes
• CCC	No
• E1 approval	No
• Railway application in accordance with EN 50155	No
• Fire protection in accordance with EN 45545-2	No
• NEMA TS2	No
• IEC 61375	No
• IEC 61850-3	No
• NEMA4X	No
• Power-over-Ethernet according IEEE802.3at for type 1 and IEEE802.3af	Yes
• Power-over-Ethernet according to IEEE802.3at for type 2	Yes
Standard for wireless communication	
• IEEE 802.11a	Yes
• IEEE 802.11b	Yes
• IEEE 802.11e	Yes
• IEEE 802.11g	Yes
• IEEE 802.11h	Yes
• IEEE 802.11i	Yes
• IEEE 802.11n	Yes
Wireless approval	You will find the current list of countries at: www.siemens.com/wireless-approvals
Marine classification association	
• American Bureau of Shipping Europe Ltd. (ABS)	No
• Bureau Veritas (BV)	No
• Det Norske Veritas (DNV)	No
• Germanische Lloyd (GL)	No
• Lloyds Register of Shipping (LRS)	No
• Nippon Kaiji Kyokai (NK)	No
• Polski Rejestr Statkow (PRS)	No
Accessories	
accessories	24 V DC screw terminal included in scope of delivery

¹⁾ Wireless approval in the USA

Ordering data

Article No.

SCALANCE W734 Client Modules

IWLAN Ethernet client modules with built-in wireless interface; wireless networks IEEE 802.11a/b/g/h/n at 2.4/5 GHz up to 300 Mbit/s; WPA2/AES; integrated 2-port switch; Power over Ethernet (PoE), IP30 degree of protection (-20°C to +60°C); scope of delivery: Mounting hardware, 4-pin screw terminal for 24V DC; manual on CD-ROM; German/English

SCALANCE W734-1 RJ45

for managing the wireless connection of up to eight linked devices with Industrial Ethernet connection

- National approvals for operation outside the USA
- National approvals for operation within the USA ²⁾

6GK5734-1FX00-0AA0

6GK5734-1FX00-0AB0

Accessories

KEY-PLUG W740 iFeatures

Swap medium for enabling additional iFeatures, for simple device replacement if a fault occurs and for storage of configuration data; can be used in SCALANCE W client modules with PLUG compartment

6GK5907-4PA00

C-PLUG

Swap medium for simple replacement of devices if a fault occurs; for storing configuration data; can be used in SIMATIC NET products with PLUG compartment

6GK1900-0AB00

IE FC RJ45 Plug 180 2 x 2

RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation-displacement contacts for connecting Industrial Ethernet FC installation cables; with a 180° cable outlet; for network components and CPs/ CPUs with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1901-1BB10-2AA0

6GK1901-1BB10-2AB0

6GK1901-1BB10-2AE0

IE FC Standard Cable GP 2 x 2

4-core, shielded TP installation cable for connection to IE FC outlet RJ45 plug / IE FC RJ45 plug; PROFINET-compliant; with UL approval
Sold by the meter
max. quantity 1000 m
minimum order 20 m

6XV1840-2AH10

IE FC stripping tool

Preadjusted stripping tool for fast stripping of the Industrial Ethernet FC cables

6GK1901-1GA00

Antennas and miscellaneous IWLAN accessories

See Catalog IK PI, Industrial Wireless LAN/ accessories

²⁾ Please note national approvals under <http://www.siemens.com/wireless-approvals>

SIMATIC S7-1500 advanced controller

I/O modules

SIPLUS Communication

SIPLUS CM PTP**Overview**

- Modules for serial communication connections, scaled according to interface types, protocols, and performance
- 4 versions with different physical transmission characteristics:
 - RS 232C, max. 19.2 Kbit/s
 - RS 232C, max. 115.2 Kbit/s
 - RS 422/RS 485, max. 19.2 Kbit/s
 - RS 422/RS 485, max. 115.2 Kbit/s
- Protocols supported
 - Freepoint: User-parameterizable telegram format for universal communication
 - 3964(R) for improved transmission reliability
 - Modbus RTU Master
 - Modbus RTU Slave
 - USS, implemented through instructions

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Technical specifications

Article number	6AG1540-1AD00-7AA0	6AG1541-1AD00-7AB0	6AG1540-1AB00-7AA0	6AG1541-1AB00-7AB0
Based on	6ES7540-1AD00-0AA0 SIPLUS S7-1500 CM PTP RS 232 BA	6ES7541-1AD00-0AB0 SIPLUS S7-1500 CM PTP RS 232 HF	6ES7540-1AB00-0AA0 SIPLUS S7-1500 CM PTP RS 422/485 BA	6ES7541-1AB00-0AB0 SIPLUS S7-1500 CM PTP RS 422/485 HF
Ambient conditions				
Ambient temperature in operation				
• horizontal installation, min.	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C
• horizontal installation, max.	70 °C	70 °C	70 °C	70 °C
• vertical installation, min.	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C
• vertical installation, max.	40 °C	40 °C	40 °C	40 °C
Extended ambient conditions				
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity				
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance				
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data	Article No.	Accessories	Article No.
<p>SIPLUS CM PtP RS 232 BA communication modules</p> <p>(extended temperature range and medial exposure)</p> <p>Basic communication module with 1 interface RS 232, Freeport, 3964(R) and USS protocols, 9-pin sub D connector, max. 19.2 Kbit/s</p>	6AG1540-1AD00-7AA0	See SIMATIC S7-1500, CM PtP communication module, page 4/70	
<p>SIPLUS CM PtP RS 232 HF communication modules</p> <p>(extended temperature range and medial exposure)</p> <p>High Feature communication module with 1 interface RS 232, Freeport, 3964(R), USS and Modbus RTU protocols, 9-pin sub D connector, max. 115.2 Kbit/s</p>	6AG1541-1AD00-7AB0		
<p>SIPLUS CM PtP RS 422/485 BA communication modules</p> <p>(extended temperature range and medial exposure)</p> <p>Basic communication module with 1 interface RS 422/485, Freeport, 3964(R) and USS protocols, 15-pin sub D socket, max. 19.2 Kbit/s</p>	6AG1540-1AB00-7AA0		
<p>SIPLUS CM PtP RS 422/485 HF communication modules</p> <p>(extended temperature range and medial exposure)</p> <p>High Feature communication module with 1 interface RS 422/485, Freeport, 3964(R), USS and Modbus RTU protocols, 15-pin sub D socket, max. 115.2 Kbit/s</p>	6AG1541-1AB00-7AB0		

SIMATIC S7-1500 advanced controller

I/O modules

SIPLUS communication

SIPLUS CM 1542-5**Overview**

DP-M	DP-S	FMS	PG/OP	S7/S5	
●	●		●	●	●

The CM 1542-5 communication module expands the SIMATIC S7-1500 controller with an additional PROFIBUS connection for communication with lower-level PROFIBUS devices in bandwidths from 9.6 kbps to 12 Mbps. The module also allows the implementation of separate PROFIBUS lines; in other words, the control of multiple field devices via several PROFIBUS segments. The CM 1542-5 handles all communication tasks, thus reducing the CPU load.

Apart from classic PROFIBUS communication; the CM 1542-5 is also suitable for S7 communication. This makes it possible to establish communication between the S7-1500 controller and other devices, for example those from the SIMATIC S7-300/400 range.

- PROFIBUS DP master or DP slave with electrical interface for connecting the SIMATIC S7-1500 to PROFIBUS at up to 12 Mbit/s (including 45.45 Kbit/s)
- Communication services:
 - PROFIBUS DP
 - PG/OP communication
 - S7 communication
- Time synchronization
- Simple programming and configuration over PROFIBUS
- Cross-network PG communication using S7 routing
- Module replacement without a PG
- Data record routing (PROFIBUS DP)
- Adding or modifying distributed I/O during operation

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Ordering data**Article No.****SIPLUS CM 1542-5 communication modules**

(extended temperature range and medial exposure)

Communication module for electrical connection of SIMATIC S7-1500 to PROFIBUS as a DP master or DP slave

6AG1542-5DX00-7XE0**Accessories**

See SIMATIC S7-1500, CM 1542-5 communication module, page 4/72

Overview



- Uniform, 40-pin front connector, suitable for SIMATIC S7-1500 I/O modules
- Versions for 25 mm wide or 35 mm wide modules
- With screw-type or push-in terminals
- Connectable core cross-sections: 0.25 mm² to 1.5 mm² (AWG 24 to 16)
- Front connector for 35 mm modules to be ordered separately; front connector for 25 mm modules included in scope of supply of modules

Ordering data

Article No.

Front connectors

For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin

- Screw terminals
- Push-in

6ES7592-1AM00-0XB0

6ES7592-1BM00-0XB0

6ES7592-1BM00-0XA0

For 25 mm modules; including cable ties and individual labeling strips; push-in, 40-pin; Spare part

Potential bridges for front connectors

6ES7592-3AA00-0AA0

For 35 mm modules; 20 units; spare part

SIMATIC S7-1500 advanced controller

Connection system - SIMATIC TOP connect system cabling for SIMATIC S7-1500 and ET 200MP

Introduction

Overview



With two cabling systems, SIMATIC TOP connect ensures efficient wiring of the input and output module of the SIMATIC S7-1500: Fully modular connection for fast and clearly arranged connecting to sensors and actuators in the field, and flexible connection for simple wiring inside the control cabinet.

With the TIA Selection Tool, you can select suitable system cabling for the individual I/O modules with a simple mouse click. Suitable components for the respective I/O module are always offered. These can be transferred to the order list and then ordered in the Industry Mall.

Further information can be found on the Internet at <http://www.siemens.com/tia-selection-tool>

Design

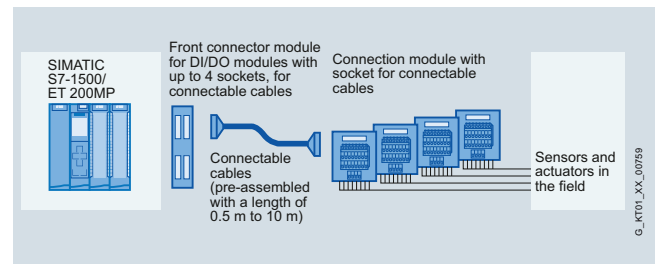
Two cabling variants are available for a wide range of control cabinet concepts:

Fully modular connection

The system consists of:

- Front connector module
- Connecting cable
- Terminal modules in the following versions: Basic module, signal module and function module

Connection errors are thus practically excluded and installation overhead is significantly reduced. Systematic connection of the SIMATIC system. The assembly overhead for the connecting cables is drastically reduced thanks to the use of pre-assembled or easily assembled cables sold by the meter.



SIMATIC TOP connect for S7-1500/ ET200 MP, fully modular connection

Flexible connection

Flexible connection with front connectors is available with 20 (Pin1 – 20) or 40 wired single cores.

These are available in lengths from 2.5 m to 10.0 m.

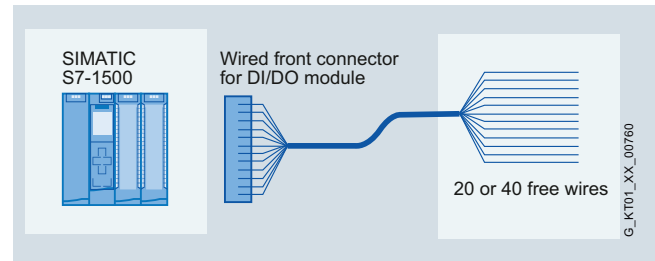
The single cores are available in different versions:

- Core type H05V-K is used for industrial applications
- The UL/CSA-approved core is available for export to North America
- The halogen-free version is used where low smoke gas density in the event of fire is required, e.g. in building automation

The blue wires are numbered sequentially and can be routed direct to each element in the control cabinet. The numbering of the single cores corresponds to the coding of the front connector contacts.

In comparison to conventional single wiring, there is a cost saving of 50 % for assembly, since the single cores that have already been checked on the connector are fixed.

Thus no complex pre-assembly of up to two times 20 single cores per module is necessary.



SIMATIC TOP connect for S7-1500/ ET200 MP, flexible connection

Overview

The fully modular connection for connecting to the digital I/O modules of the SIMATIC S7-1500 or ET 200MP consists of modified front connectors, called front connector modules, pre-assembled connecting cables of various lengths, and terminal modules. Suitable components can be selected for the application in question and joined by means of simple plug-in connections. The terminal modules are used instead of conventional terminal blocks and act as the interface to the sensors and actuators.

Benefits

- Easy plugging in of front connector module, connecting cable and terminal module
- Fast and low-cost wiring
- In the case of digital signals, the supply voltage can be connected to the front connector module or the terminal module
- Reduction in wiring errors, clear control cabinet wiring
- Byte-by-byte, or four-byte distribution of the signals in the case of digital signals
- Each component can be replaced individually
- Every cable length can be configured without cutting, or pre-assembled cables can be used

Design**Front connector module**

Modified front connectors, called front connector modules, are available for connecting to the I/O modules. These are plugged into the I/O module to be wired instead of the front connector. The front connector modules are available in many different versions for digital I/O modules, analog I/O modules and for the 24 V, 2-ampère module. The connecting cables are plugged into these front connector modules.

Connecting cable

The connecting cable is available in two different versions.

As a pre-assembled 16-pole or 50-pole round cable (shielded or unshielded) up to a length of 10 m, or as a 16-pole round-sheath ribbon cable (with or without shield), which can be easily assembled by the user; or as 2 x 16-pole round-sheath ribbon cables (without shield).

When assembled, there are one or two insulation displacement connectors (female ribbon connectors) at both ends of the cable.

The round-sheath ribbon cable is assembled by the user with the aid of pliers (can be ordered separately). The cable transmits 8 or 2 x 8 channels over a distance of up to 30 m.

The connecting cable connects the front connector module with the terminal module.

Connection module

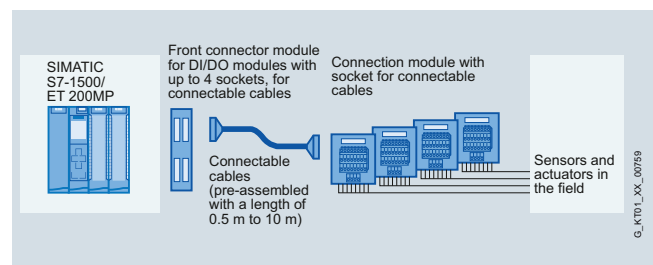
The system has digital and analog terminal modules for connecting the I/O signals. These are snapped onto the standard mounting rail. The terminal modules with basic or signal functionality are available in 1-byte or 4-byte versions.

Terminal modules are available for two different connection methods: with push-in or screw-type terminals. The potential can be fed in at the terminal module or at the front connector module.

If other voltage or power levels are required in the field, the terminal module for TPRo or TPOo output signals is used. For the TPRo terminal module, relays are used for the implementation. For the TPOo terminal module, optocouplers are used for the implementation. This converts the 24 V DC output signal simply and reliably to another voltage or power level. If 230 V AC or 110 V AC input signals have to be transmitted to the controller in the field, a connection module with relay TPRi is available that simply converts the 230/110 V AC signal to 24 V DC. This means that there is always the same voltage level on the module side.

Use with optocouplers for the TPRo relay modules

If higher switching frequencies of the relay terminal module are required for the output signals, the relay can simply be replaced with an optocoupler (note technical specifications) in order to increase the switching frequency here.



SIMATIC TOP connect for S7-1500/ ET200 MP, fully modular connection

SIMATIC S7-1500 advanced controller

Connection system - SIMATIC TOP connect system cabling for SIMATIC S7-1500 and ET 200MP

Fully modular connection

Technical specifications Front connector module

Rated operating voltage	24 V DC
Max. permissible operating voltage	60 V DC
Max. permissible continuous current • per connector pin	1 A
Max. permissible total current	2 A/byte
Permissible ambient temperature	0 to +60 °C
Test voltage	0.5 kV, 50 Hz, 60 sec.
Clearance and creepage distances	IEC 664 (1980), IEC 664 A (1981), in accordance with DIN VDE 0110 (01.89), overvoltage class II, pollution degree 2

Wiring rules for the front connector modules

SIMATIC TOP connect front connector module, connection for potential infeed

	Push-in	Screw terminals
	Modules up to 4 connections	
Connectable cable cross-sections		
• Solid conductors	No	
• Flexible cables with/without wire end ferrule	0.25 to 1.5 mm ²	
Number of cables per connection	1 or a combination of 2 wires up to 1.5 mm ² (total) in a common wire end ferrule	
Max. diameter of the cable insulation	3.1 mm	
Stripped length of the cables		
• Without insulating collar	6 mm	
• With insulating collar	-	
Wire end ferrules according to DIN 46228		
• Without insulating collar	Form A; 5 to 7 mm long	
• with insulating collar 0.25 to 1.0 mm ²	-	
• with insulating collar 1.5 mm ²	-	
Blade width of the screwdriver	3.5 mm (cylindrical design)	
Tightening torque for connecting the cables	-	0.4 Nm to 0.7 Nm

Technical specifications Connecting cable

Technical specifications of connecting cable from SIMATIC S7 to connection module

Operating voltage	60 V DC
Continuous current per signal conductor	1 A
Max. aggregate current	4 A/byte
Operating temperature	0 to +60 °C
Outer diameter of pre-assembled round cable in mm unshielded/shielded (16-pole)	Approx. 6.5/7.0
Outer diameter of pre-assembled round cable in mm unshielded/shielded (50-pole)	approx. 10.5/11.0
Outer diameter of round-sheath ribbon cable in mm 16-pole/2 x 16-pole	approx. 9.5/11.5

Ordering data

Article No.

Front connector modules

Front connector module for digital modules for the connection of 16-pin connecting cables

Power supply via
• Push-in
• Screw terminals

6ES7921-5AH20-0AA0
6ES7921-5AB20-0AA0

Front connector module for digital modules for the connection of 50-pin connecting cables

Power supply via
• Push-in
• Screw terminals

6ES7921-5CH20-0AA0
6ES7921-5CB20-0AA0

Front connector module for 2 A digital modules for the connection of 16-pin connecting cables

Power supply via
• Push-in
• Screw terminals

6ES7921-5AJ00-0AA0
6ES7921-5AD00-0AA0

Front connector module for analog modules for the connection of 16-pin connecting cables

6ES7921-5AK20-0AA0

Front connector module for analog modules for the connection of 50-pin connecting cables

6ES7921-5CK20-0AA0

Ordering data	Article No.	Article No.
Connecting cables		Terminal modules (for 16-pin connecting cables)
Pre-assembled round cable		Terminal module TP1
<u>16-pole, 0.14 mm²</u>		for 1-wire connection
unshielded		<ul style="list-style-type: none"> • Push-in terminals without LEDs • Screw-type terminals without LEDs
<ul style="list-style-type: none"> • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 2.5 m • 3.0 m • 4.0 m • 5.0 m • 6.5 m • 8.0 m • 10.0 m 	6ES7923-0BA50-0CB0 6ES7923-0BB00-0CB0 6ES7923-0BB50-0CB0 6ES7923-0BC00-0CB0 6ES7923-0BC50-0CB0 6ES7923-0BD00-0CB0 6ES7923-0BE00-0CB0 6ES7923-0BF00-0CB0 6ES7923-0BG50-0CB0 6ES7923-0BJ00-0CB0 6ES7923-0CB00-0CB0	6ES7924-0AA20-0AC0 6ES7924-0AA20-0AA0 6ES7924-0AA20-0BC0 6ES7924-0AA20-0BA0
shielded		Terminal module TP3
<ul style="list-style-type: none"> • 1.0 m • 2.0 m • 2.5 m • 3.0 m • 4.0 m • 5.0 m • 6.5 m • 8.0 m • 10.0 m 	6ES7923-0BB00-0DB0 6ES7923-0BC00-0DB0 6ES7923-0BC50-0DB0 6ES7923-0BD00-0DB0 6ES7923-0BE00-0DB0 6ES7923-0BF00-0DB0 6ES7923-0BG50-0DB0 6ES7923-0BJ00-0DB0 6ES7923-0CB00-0DB0	for 3-wire connection <ul style="list-style-type: none"> • Push-in terminals without LEDs • Screw-type terminals without LEDs • Push-in terminals with LEDs • Screw-type terminals with LEDs • Push-in terminals with LEDs and one isolating terminal per channel • Screw-type terminals with LEDs and one isolating terminal per channel • Push-in terminals with LED and fuse per channel • Push-in terminals with LED and fuse per channel
<u>50-pole, 0.14 mm²</u>		Terminal module TPRo
Unshielded		Relay module for 8 outputs, relay as normally open contact
<ul style="list-style-type: none"> • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 2.5 m • 3.0 m • 4.0 m • 5.0 m • 6.5 m • 8.0 m • 10.0 m 	6ES7923-5BA50-0CB0 6ES7923-5BB00-0CB0 6ES7923-5BB50-0CB0 6ES7923-5BC00-0CB0 6ES7923-5BC50-0CB0 6ES7923-5BD00-0CB0 6ES7923-5BE00-0CB0 6ES7923-5BF00-0CB0 6ES7923-5BG50-0CB0 6ES7923-5BJ00-0CB0 6ES7923-5CB00-0CB0	<ul style="list-style-type: none"> • Push-in terminals with LEDs • Screw-type terminals with LEDs
Shielded		Terminal module TPri
<ul style="list-style-type: none"> • 1.0 m • 2.0 m • 2.5 m • 3.0 m • 4.0 m • 5.0 m • 6.5 m • 8.0 m • 10.0 m 	6ES7923-5BB00-0DB0 6ES7923-5BC00-0DB0 6ES7923-5BC50-0DB0 6ES7923-5BD00-0DB0 6ES7923-5BE00-0DB0 6ES7923-5BF00-0DB0 6ES7923-5BG50-0DB0 6ES7923-5BJ00-0DB0 6ES7923-5CB00-0DB0	Relay module for 8 outputs (110 V AC), relay as normally open contact
Round-sheath ribbon cable		Terminal module TPri
<u>16-pole, 0.14 mm²</u>		Relay module for 8 outputs (230 V AC), relay as normally open contact
Unshielded		<ul style="list-style-type: none"> • Push-in terminals with LEDs • Screw-type terminals with LEDs
<ul style="list-style-type: none"> • 30 m • 60 m 	6ES7923-0CD00-0AA0 6ES7923-0CG00-0AA0	6ES7924-0BD20-0BC0 6ES7924-0BD20-0BA0
Shielded		Terminal module TPri
<ul style="list-style-type: none"> • 30 m • 60 m 	6ES7923-0CD00-0BA0 6ES7923-0CG00-0BA0	<ul style="list-style-type: none"> • Push-in terminals with LEDs • Screw-type terminals with LEDs
Round-sheath ribbon cable		Terminal module TPOo
<u>2 x 16-pole, 0.14 mm²</u>		Optocoupler module for 8 outputs (max. 24 V DC/4 A)
Unshielded		<ul style="list-style-type: none"> • Push-in terminals with LEDs • Screw-type terminals with LEDs
<ul style="list-style-type: none"> • 30 m • 60 m 	6ES7923-2CD00-0AA0 6ES7923-2CG00-0AA0	6ES7924-0BG20-0BC0 6ES7924-0BG20-0BA0
Connector (female ribbon connector)	6ES7921-3BE10-0AA0	Connection modules for digital output modules 2 A
16-pole, insulation displacement system, with strain relief devices; packing unit: 8 connectors and 8 cable grips		Terminal module TP2
Accessories		<ul style="list-style-type: none"> • Push-in terminals without LEDs • Screw-type terminals without LEDs
Manual pliers	6ES7928-0AA00-0AA0	Terminal module for analog modules (for S7-1500 only)
For preparing the connectors (female ribbon connector)		Terminal module TPA
		<ul style="list-style-type: none"> • Push-in terminals without LEDs • Screw-type terminals without LEDs
		Accessories
		ID labels for terminal modules in S7-1500 design
		ID labels, insertable, PU = 340 units
		3RT1900-1SB20
		Shield for analog terminal module
		PU = 4 units (for connection of 16-pin connecting cable)
		6ES7928-1AA20-4AA0
		Shield connection clamp
		for shield plate at SIMATIC end, PU = 10 units
		6ES7590-5BA00-0AA0
		for shield plate at field end, 2 x 2 ... 6 mm
		6ES7390-5AB00-0AA0
		for shield plate at field end, 3 ... 8 mm
		6ES7390-5BA00-0AA0
		for shield plate at field end, 4 ... 13 mm
		6ES7390-5CA00-0AA0

SIMATIC S7-1500 advanced controller

Connection system - SIMATIC TOP connect system cabling for SIMATIC S7-1500 and ET 200MP

Fully modular connection**Ordering data****Article No.****Article No.****Terminal modules (for 50-pin connecting cables)****Terminal module TP1**

for 1-wire connection

- Push-in terminals without LEDs
- Screw-type terminals without LEDs
- Push-in terminals with LEDs
- Screw-type terminals with LEDs

6ES7924-2AA20-0AC0**6ES7924-2AA20-0BA0****6ES7924-2AA20-0BC0****6ES7924-2AA20-0BA0****Terminal module TP3**

for 3-wire connection

- Push-in terminals without LEDs
- Screw-type terminals without LEDs
- Push-in terminals with LEDs
- Screw-type terminals with LEDs

6ES7924-2CA20-0AC0**6ES7924-2CA20-0AA0****6ES7924-2CA20-0BC0****6ES7924-2CA20-0BA0****Terminal module for analog modules (for S7-1500 only)**

Terminal module TPA

- Push-in terminals without LEDs
- Screw-type terminals without LEDs

6ES7924-2CC20-0AC0**6ES7924-2CC20-0AA0****Accessories****ID labels for terminal modules in S7-1500 design**ID labels, insertable
PU = 340 units**3RT1900-1SB20****Shield for analog terminal module**

PU = 4 units (for connection of 50-pin connecting cable)

6ES7928-1BA20-4AA0**Shield connection clamp**for shield plate at SIMATIC end,
PU = 10 units**6ES7590-5BA00-0AA0**for shield plate at field end,
2 x 2 ... 6 mm**6ES7390-5AB00-0AA0**for shield plate at field end,
3 ... 8 mm**6ES7390-5BA00-0AA0**for shield plate at field end,
4 ... 13 mm**6ES7390-5CA00-0AA0**

4

SIMATIC S7-1500 advanced controller

Connection system - SIMATIC TOP connect system cabling for S7-1500 and ET 200MP

Front connectors with single cores**Overview**

Can be used for SIMATIC S7-1500 and ET 200MP digital modules (24 V DC)

The front connectors with single cores replace the SIMATIC standard connectors

- 6ES7592-1AM00-0XB0

Technical specifications

Front connector with single cores for 16 channels (pins 1-20)	
Rated operating voltage	24 V DC
Permissible continuous current with simultaneous load of all cores, max.	1.5 A
Permissible ambient temperature	0 to 60 °C
Core type	H05V-K, UL 1007/1569; CSA TR64, or halogen-free
Number of single cores	20
Core cross-section	0.5 mm ² ; Cu
Bundle diameter in mm	approx. 15
Wire color	Blue, RAL 5010
Designation of cores	Numbered from 1 to 20 (front connector contact = core number)
Assembly	Screw contacts
Front connector with single cores for 32 channels (pins 1-40)	
Rated operating voltage	24 V DC
Permissible continuous current with simultaneous load of all cores, max.	1.5 A
Permissible ambient temperature	0 to 60 °C
Core type	H05V-K, UL 1007/1569; CSA TR64, or halogen-free
Number of single cores	40
Core cross-section	0.5 mm ² ; Cu
Bundle diameter in mm	approx. 17
Wire color	Blue, RAL 5010
Designation of cores	Numbered from 1 to 40 (front connector contact = core number)
Assembly	Screw contacts

Ordering data**Article No.**

Front connector with single cores for 32 channels (pins 1-40)	
Core type H05V-K (0.5 mm² with screwed connection)	
• 2.5 m	6ES7922-5BC50-0AC0
• 3.2 m	6ES7922-5BD20-0AC0
• 5.0 m	6ES7922-5BF00-0AC0
• 6.5 m	6ES7922-5BG50-0AC0
• 8.0 m	6ES7922-5BJ00-0AC0
• 10.0 m	6ES7922-5CB00-0AC0
Core type H05Z-K, halogen-free (0.5 mm² with screwed connection)	
• 2.5 m	6ES7922-5BC50-0HC0
• 3.2 m	6ES7922-5BD20-0HC0
• 5.0 m	6ES7922-5BF00-0HC0
• 6.5 m	6ES7922-5BG50-0HC0
• 8.0 m	6ES7922-5BJ00-0HC0
• 10.0 m	6ES7922-5CB00-0HC0
Core type UL/CSA-certified (0.5 mm² with screw connection)	
• 3.2 m	6ES7922-5BD20-0UC0
• 5.0 m	6ES7922-5BF00-0UC0
• 6.5 m	6ES7922-5BG50-0UC0
Front connector with single cores for 16 channels (pins 1-20)	
Core type H05V-K (0.5 mm² with screwed connection)	
• 2.5 m	6ES7922-5BC50-0AB0
• 3.2 m	6ES7922-5BD20-0AB0
• 5.0 m	6ES7922-5BF00-0AB0
• 6.5 m	6ES7922-5BG50-0AB0
• 8.0 m	6ES7922-5BJ00-0AB0
• 10.0 m	6ES7922-5CB00-0AB0
Core type H05Z-K, halogen-free (0.5 mm² with screwed connection)	
• 2.5 m	6ES7922-5BC50-0HB0
• 3.2 m	6ES7922-5BD20-0HB0
• 5.0 m	6ES7922-5BF00-0HB0
• 6.5 m	6ES7922-5BG50-0HB0
• 8.0 m	6ES7922-5BJ00-0HB0
• 10.0 m	6ES7922-5CB00-0HB0
Core type UL/CSA-certified (0.5 mm² with screw connection)	
• 3.2 m	6ES7922-5BD20-0UB0
• 5.0 m	6ES7922-5BF00-0UB0
• 6.5 m	6ES7922-5BG50-0UB0

SIMATIC S7-1500 advanced controller

Power supplies

1-phase, 24 V DC (for S7-1500 and ET 200MP)

Overview



The design and functionality of the SIMATIC PM 1507 single-phase load power supply (PM = power module) with automatic range selection of the input voltage makes it an optimal match to the SIMATIC S7-1500 PLC. It supplies the S7-1500 system components such as CPU, system power supply (PS), I/O circuits of the input and output modules and, if necessary, the sensors and actuators with 24 V DC.

4

Technical specifications

Article number	6EP1332-4BA00	6EP1333-4BA00
Product	S7-1500 PM1507	S7-1500 PM1507
Power supply, type	24 V/3 A	24 V/8 A
Input		
Input	1-phase AC	1-phase AC
Supply voltage		
• 1 with AC Rated value	120 V	120 V
• 2 with AC Rated value	230 V	230 V
• Note	Automatic range selection	Automatic range selection
Input voltage		
• 1 with AC	85 ... 132 V	85 ... 132 V
• 2 with AC	170 ... 264 V	170 ... 264 V
Wide-range input	No	No
Overvoltage resistance	$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$	$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$
Mains buffering at $I_{out \text{ rated}}, \text{ min.}$	20 ms; at $V_{in} = 93/187 \text{ V}$	20 ms; at $V_{in} = 93/187 \text{ V}$
Rated line frequency	50 ... 60 Hz	50 ... 60 Hz
Rated line range	45 ... 65 Hz	45 ... 65 Hz
Input current		
• at rated input voltage 120 V	1.4 A	3.7 A
• at rated input voltage 230 V	0.8 A	1.7 A
Switch-on current limiting (+25 °C), max.	23 A	62 A
Duration of inrush current limiting at 25 °C		
• maximum	3 ms	3 ms
$I^2t, \text{ max.}$	1.3 A ² ·s	12 A ² ·s
Built-in incoming fuse	T 3, 15 A/250 V (not accessible)	T 6.3 A/250 V (not accessible)
Protection in the mains power input (IEC 898)	Recommended miniature circuit breaker: 10 A characteristic B or 6 A characteristic C	Recommended miniature circuit breaker: 16 A characteristic B or 10 A characteristic C

Technical specifications (continued)

Article number	6EP1332-4BA00	6EP1333-4BA00
Product	S7-1500 PM1507	S7-1500 PM1507
Power supply, type	24 V/3 A	24 V/8 A
Output		
Output	Controlled, isolated DC voltage	Controlled, isolated DC voltage
Rated voltage V_{out} DC	24 V	24 V
Total tolerance, static \pm	1 %	1 %
Static mains compensation, approx.	0.1 %	0.1 %
Static load balancing, approx.	0.1 %	0.1 %
Residual ripple peak-peak, max.	50 mV	50 mV
Spikes peak-peak, max. (bandwidth: 20 MHz)	150 mV	150 mV
Product function	No	No
Output voltage adjustable		
Status display	LED green for 24 V OK; LED red for error; LED yellow for stand-by	LED green for 24 V OK; LED red for error; LED yellow for stand-by
On/off behavior	No overshoot of V_{out} (soft start)	No overshoot of V_{out} (soft start)
Startup delay, max.	1.5 s	1.5 s
Voltage rise, typ.	10 ms	10 ms
Rated current value I _{out} rated	3 A	8 A
Current range	0 ... 3 A	0 ... 8 A
Active power supplied typical	72 W	192 W
Short-term overload current		
• on short-circuiting during the start-up typical	12 A	35 A
• at short-circuit during operation typical	12 A	35 A
Duration of overloading capability for excess current		
• on short-circuiting during the start-up	70 ms	70 ms
• at short-circuit during operation	70 ms	70 ms
Parallel switching for enhanced performance	Yes; Parallel switching of 3 A and 8 A possible, devices must be switched on at the same time, max. 75% per device with I-load	Yes; Parallel switching of 3 A and 8 A possible, devices must be switched on at the same time, max. 75% per device with I-load
Numbers of parallel switchable units for enhanced performance	2	2
Efficiency		
Efficiency at V_{out} rated, I _{out} rated, approx.	87 %	90 %
Power loss at V_{out} rated, I _{out} rated, approx.	11 W	21 W
Closed-loop control		
Dynamic mains compensation (V_{in} rated \pm 15 %), max.	0.1 %	0.1 %
Dynamic load smoothing (I_{out} : 50/100/50 %), $U_{out} \pm$ typ.	1 %	2 %
Dynamic load smoothing (I_{out} : 10/90/10 %), $U_{out} \pm$ typ.	3 %	3 %
Load step setting time 10 to 90%, typ.	5 ms	5 ms
Load step setting time 90 to 10%, typ.	5 ms	5 ms
Setting time maximum	5 ms	5 ms
Protection and monitoring		
Output overvoltage protection	Additional control loop, limitation (closed loop control) at < 28.8 V	Additional control loop, limitation (closed loop control) at < 28.8 V
Current limitation	3.15 ... 3.6 A	8.4 ... 9.6 A
Current limitation, typ.	3.4 A	9 A
Property of the output Short-circuit proof	Yes	Yes
Short-circuit protection	Electronic shutdown, automatic restart	Electronic shutdown, automatic restart
Overload/short-circuit indicator	-	-

SIMATIC S7-1500 advanced controller

Power supplies

1-phase, 24 V DC (for S7-1500 and ET 200MP)**Technical specifications (continued)**

Article number	6EP1332-4BA00	6EP1333-4BA00
Product	S7-1500 PM1507	S7-1500 PM1507
Power supply, type	24 V/3 A	24 V/8 A
Safety		
Primary/secondary isolation	Yes	Yes
Galvanic isolation	Safety extra-low output voltage U _{out} acc. to EN 60950-1 and EN 50178 and EN 61131-2	Safety extra-low output voltage U _{out} acc. to EN 60950-1 and EN 50178 and EN 61131-2
Protection class	Class I	Class I
Leakage current		
• maximum	3.5 mA	3.5 mA
• typical	0.4 mA	1.3 mA
CE mark	Yes	Yes
UL/CSA approval	Yes	Yes
UL/cUL (CSA) approval	cULus-Listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-Listed (UL 508, CSA C22.2 No. 142), File E143289
Explosion protection	ATEX (EX) II 3G Ex nA nC IIC T4 Gc; cULus (ISA 12.12.01, CSA C22.2 No.213) Class I, Div. 2, Group ABCD, T4, File E330455	ATEX (EX) II 3G Ex nA nC IIC T3 Gc; cULus (ISA 12.12.01, CSA C22.2 No.213) Class I, Div. 2, Group ABCD, T3, File E330455
Certificate of suitability IECEx	No	No
Certificate of suitability NEC Class 2	No	No
FM approval	Class I, Div. 2, Group ABCD, T4	Class I, Div. 2, Group ABCD, T4
CB approval	Yes	Yes
Marine approval	GL, DNV	GL, DNV
Degree of protection (EN 60529)	IP20	IP20
EMC		
Emitted interference	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	EN 61000-3-2	EN 61000-3-2
Noise immunity	EN 61000-6-2	EN 61000-6-2
Operating data		
Ambient temperature		
• during operation	0 ... 60 °C	0 ... 60 °C
- Note	with natural convection	with natural convection
• during transport	-40 ... +85 °C	-40 ... +85 °C
• during storage	-40 ... +85 °C	-40 ... +85 °C
Humidity class according to EN 60721	Climate class 3K3, no condensation	Climate class 3K3, no condensation
Mechanics		
Connection technology	Screw-/spring clamp connection	Screw-/spring clamp connection
Connections		
• Supply input	L, N, PE: 1 screw terminal each for 0.5 ... 2.5 mm ²	L, N, PE: 1 screw terminal each for 0.5 ... 2.5 mm ²
• Output	L+, M: 2 spring-loaded terminals each for 0.5 to 2.5 mm ²	L+, M: 2 spring-loaded terminals each for 0.5 to 2.5 mm ²
Product function		
• removable terminal at input	Yes	Yes
• removable terminal at output	Yes	Yes
Width of the enclosure	50 mm	75 mm
Height of the enclosure	147 mm	147 mm
Depth of the enclosure	129 mm	129 mm
Weight, approx.	0.45 kg	0.74 kg
Product property of the enclosure housing for side-by-side mounting	Yes	Yes
Installation	Can be mounted onto S7-1500 rail	Can be mounted onto S7-1500 rail
Other information	Specifications at rated input voltage and ambient temperature +25 °C (unless otherwise specified)	Specifications at rated input voltage and ambient temperature +25 °C (unless otherwise specified)

Ordering data**Article No.****Article No.****SIMATIC PM 1507****6EP1332-4BA00****SIMATIC PM 1507****6EP1333-4BA00**

Stabilized power supply for SIMATIC S7-1500
Input 120/230 V AC,
output 24 V DC, 3 A

Stabilized power supply for SIMATIC S7-1500
Input 120/230 V AC,
output 24 V DC, 8 A

Overview



- Power supplies for the SIMATIC S7-1500
- For conversion of AC or DC line voltages to the operating voltages required for the internal electronics
- 25 or 60 W output power
- Can be used for S7-1500 or ET 200MP
- Configuration via STEP 7 V12 and higher

Technical specifications

Article number	6ES7505-0KA00-0AB0 PS 25W 24V DC	6ES7505-0RA00-0AB0 PS 60W 24/48/60V DC	6ES7507-0RA00-0AB0 PS 60W 120/230V AC/DC
Product type designation			
Engineering with			
• STEP 7 TIA Portal can be configured/integrated as of version	V12 / V12	V12 / V12	V12 / V12
• STEP 7 can be configured/integrated as of version	V5.5 SP3 or higher	V5.5 SP3 or higher	V5.5 SP3 or higher
FH technology			
Redundancy			
• Redundancy capability	Yes	Yes	Yes
- for increased power	Yes	Yes	Yes
Supply voltage			
Rated value (DC)	24 V; SELV	24 V / 48 V / 60 V	120 V / 230 V
permissible range, lower limit (DC)	Static 19.2 V, dynamic 18.5 V	Static 19.2 V, dynamic 18.5 V	88 V
permissible range, upper limit (DC)	Static 28.8 V, dynamic 30.2 V	Static 72 V, dynamic 75.5 V	300 V
Rated value (AC)			120 V / 230 V
permissible range, lower limit (AC)			85 V
permissible range, upper limit (AC)			264 V
Reverse polarity protection	Yes	Yes	
short-circuit protection	Yes	Yes	Yes
Line frequency			
• Rated value 50 Hz			Yes
• permissible frequency range, lower limit			47 Hz
• permissible frequency range, upper limit			63 Hz
Mains buffering			
• Mains/voltage failure stored energy time	20 ms	20 ms	20 ms
Input current			
Rated value at 48 V DC		1.5 A	
Rated value at 60 V DC		1.2 A	
Rated value at 120 V DC			0.6 A
Rated value at 230 V DC			0.3 A
Rated value at 120 V AC			0.6 A
Rated value at 230 V AC			0.34 A
Output current			
short-circuit protection	Yes	Yes	Yes

SIMATIC S7-1500 advanced controller

Power supplies

System power supplies

Technical specifications (continued)

Article number	6ES7505-0KA00-0AB0 PS 25W 24V DC	6ES7505-0RA00-0AB0 PS 60W 24/48/60V DC	6ES7507-0RA00-0AB0 PS 60W 120/230V AC/DC
Power			
Infeed power to the backplane bus	25 W	60 W	60 W
Power losses			
Power loss at nominal rating conditions	6.2 W	12 W	12 W
Interrupts/diagnostics/status information			
Status indicator	Yes	Yes	Yes
Galvanic isolation			
primary/secondary	Yes; Electrical isolation for max. 60 V AC/75 V DC (base isolation)	Yes; Electrical isolation for 230 V AC (reinforced isolation)	Yes
Isolation			
Isolation checked with	707 V DC (type test)	2500V DC 2s (routine test)	2500V DC 2s (routine test)
EMC			
Surge immunity			
• on the supply lines acc. to IEC 61000-4-5	Yes; +/- 1 kV (acc. to IEC 61000-4-5; 1995; surge symm.), +/- 2 kV (acc. to IEC 61000-4-5; 1995; surge asymm.), no external protective circuit required	Yes; +/- 1 kV (acc. to IEC 61000-4-5; 1995; surge symm.), +/- 2 kV (acc. to IEC 61000-4-5; 1995; surge asymm.), no external protective circuit required	Yes; +/- 1 kV (acc. to IEC 61000-4-5; 1995; surge symm.), +/- 2 kV (acc. to IEC 61000-4-5; 1995; surge asymm.), no external protective circuit required
Degree and class of protection			
Degree of protection to EN 60529	IP20	IP20	IP20
Protection class	3; with protective conductor	1; with protective conductor	1; with protective conductor
Dimensions			
Width	35 mm	70 mm	70 mm
Height	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm
Weights			
Weight, approx.	350 g	600 g	600 g

Ordering data

Power supplies

For supplying the backplane bus of the S7-1500

24 V DC input voltage, power 25 W

24/48/60 V DC input voltage, power 60 W

120/230 V AC input voltage, power 60 W

Article No.

6ES7505-0KA00-0AB0

6ES7505-0RA00-0AB0

6ES7507-0RA00-0AB0

Article No.

Accessories

SIMATIC S7-1500 mounting rails

Fixed lengths, with grounding elements

- 160 mm
- 245 mm
- 482 mm
- 530 mm
- 830 mm

For cutting to length by customer, without drill holes; grounding elements must be ordered separately

- 2000 mm

PE connection element for mounting rail 2000 mm

Spare part, 20 units

Power connector

With coding element for power supply module; spare part, 10 units

6ES7590-1AB60-0AA0

6ES7590-1AC40-0AA0

6ES7590-1AE80-0AA0

6ES7590-1AF30-0AA0

6ES7590-1AJ30-0AA0

6ES7590-1BC00-0AA0

6ES7590-5AA00-0AA0

6ES7590-8AA00-0AA0

SIMATIC S7-1500 advanced controller

SIPLUS power supplies

Single-phase, 24 V DC/3 A (SIPLUS PM 1507)

Application



The design and functionality of the SIMATIC PM 1507 single-phase load power supply (PM = power module) with automatic range selection of the input voltage are an optimal match to the SIMATIC S7-1500 PLC. It supplies the S7-1500 system components such as CPU, system power supply (PS), I/O circuits of the input and output modules and, if necessary, the sensors and actuators with 24 V DC.

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Ordering data

SIPLUS S7-1500 PM 1507

(extended temperature range and medial exposure)

Input 120/230 V AC,
output 24 V DC, 3 A

Article No.

6AG1332-4BA00-7AA0

SIMATIC S7-1500 advanced controller

SIPLUS power supplies

Single-phase, 24 V DC/8 A (SIPLUS PM 1507)

Application**Ordering data****SIPLUS S7-1500 PM 1507**

(extended temperature range and medial exposure)

Input 120/230 V AC,
output 24 V DC, 8 A**Article No.****6AG1333-4BA00-7AA0**

The design and functionality of the SIMATIC PM 1507 single-phase load power supply (PM = power module) with automatic range selection of the input voltage are an optimal match to the SIMATIC S7-1500 PLC. It supplies the S7-1500 system components such as CPU, system power supply (PS), I/O circuits of the input and output modules and, if necessary, the sensors and actuators with 24 V DC.

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Overview



- System power supplies for the SIMATIC S7-1500
- For conversion of AC or DC line voltages to the operating voltages required for the internal electronics
- 25 or 60 W output power
- Can be used for S7-1500 or ET 200MP
- Configuration via STEP 7 V12

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

Technical specifications

Article number	6AG1505-0KA00-7AB0	6AG1505-0RA00-7AB0	6AG1507-0RA00-7AB0
Based on	6ES7505-0KA00-0AB0	6ES7505-0RA00-0AB0	6ES7507-0RA00-0AB0
	SIPLUS S7-1500 PS 25W 24V DC	SIPLUS S7-1500 PS 60W 24/48/60V DC	SIPLUS S7-1500 PS 60W 120/230V AC/DC
Ambient conditions			
Ambient temperature in operation			
• Min.	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C	-40 °C; = Tmin; startup @ -25 °C
• max.	70 °C; = Tmax; for vertical mounting position Tmax = +40 °C	70 °C; = Tmax; > +60 °C max. power input 30 W; for vertical mounting position Tmax = +40 °C	70 °C; = Tmax; for vertical mounting position Tmax = +40 °C
Storage/transport temperature			
• Min.		-40 °C	
• max.		70 °C	
Extended ambient conditions			
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)
Relative humidity			
- With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance			
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

SIMATIC S7-1500 advanced controller

SIPLUS power supplies

SIPLUS system power supplies

Ordering data**Article No.****SIPLUS system power supplies**

(extended temperature range and
medial exposure)

For supplying the backplane bus
of the S7-1500

24 V DC input voltage, power 25 W

6AG1505-0KA00-7AB0

24/48/60 V DC input voltage,
power 60 W

6AG1505-0RA00-7AB0

120/230 V AC input voltage,
power 60 W

6AG1507-0RA00-7AB0

SIMATIC S7-1500 advanced controller

Operator control and monitoring

SIMATIC HMI Basic Panels and Comfort Panels

Overview SIMATIC HMI Basic Panels (2nd Generation)



SIMATIC HMI Basic Panels, 2nd generation

With their fully developed HMI basic functions, 2nd generation SIMATIC HMI Basic Panels are the ideal entry level series for simple HMI applications.

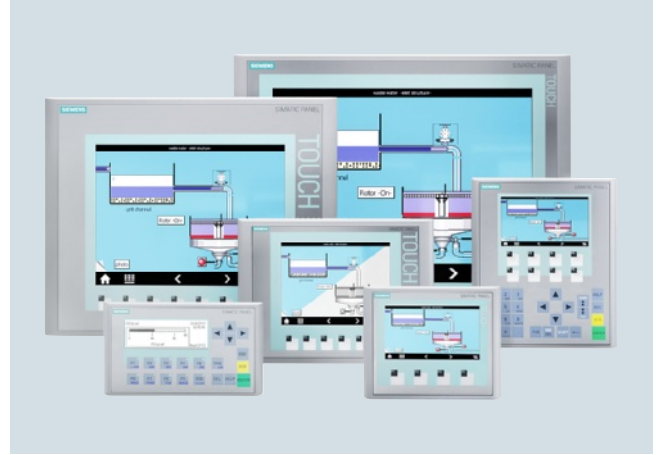
The device family offers panels with 4", 7", 9" and 12" widescreen displays, as well as combined key and touch operation.

The innovative high-resolution widescreen displays with 64 000 colors are also suitable for upright installation, and they can be dimmed down to 100 %. The innovative operator interface with improved usability opens up a diverse range of options thanks to new controls and graphics. The new USB interface enables the connection of keyboard, mouse or barcode scanner, and supports the simple archiving of data on a USB stick.

The integrated Ethernet or RS 485/422 interface (version-specific) enables simple connection to the controller.

For further information, see chapter 3, page 3/145.

Overview SIMATIC HMI Basic Panels (1st Generation)



- Ideal entry-level series from 3" to 15" for operating and monitoring compact machines and systems
- Clear process representation thanks to use of pixel-graphics displays
- Intuitive operation using Touch and tactile function keys
- Equipped with all the necessary basic functions such as alarm logging, recipe management, plots, vector graphics, and language switching
- Simple connection to the controller via integral Ethernet interface or separate version with RS 485/422
- Faster commissioning thanks to integrated diagnostics viewer and IP setting for SIMATIC S7-1200 and S7-1500 PLCs

For further information, see chapter 3, page 3/146.

SIMATIC S7-1500 advanced controller

Operator control and monitoring

SIMATIC HMI Basic Panels and Comfort Panels

Overview SIMATIC HMI Comfort Panels



SIMATIC HMI Comfort Panels

- Excellent HMI functionality for demanding applications
- Widescreen TFT displays with 4", 7", 9", 12", 15", 19" and 22" diagonals (all 16 million colors) with up to 40% more visualization area as compared to the predecessor devices
- Integrated high-end functionality with archives, scripts, PDF/Word/Excel viewer, Internet Explorer, Media Player and Web Server
- Dimmable displays from 0 to 100% via PROFIenergy, via the HMI project or via a controller

- Modern industrial design, cast aluminum fronts for 7" upwards
- Upright installation for all touch devices
- Optimal selection option: seven touch and five key versions are available
- Data security in the event of a power failure for the device and for the SIMATIC HMI Memory Card
- Innovative service and commissioning concept through second SD card (automatic backup)
- Maximum performance with short screen refresh times
- Suitable for extremely harsh industrial environments thanks to extended approvals such as ATEX 2/22 and marine approvals
- Wide range of communication options: PROFIBUS and PROFINET onboard; 2 x PROFINET with integrated switch for 7" models or larger; plus 1 x PROFINET with Gigabit support for 15" models or larger
- All versions can be used as an OPC UA client or as an OPC DA server
- Key-operated devices with LED in every function key and new text input mechanism, similar to the keypads of mobile phones
- All keys have a service life of 2 million operations
- Configuring with the WinCC engineering software of the TIA Portal

For further information, see chapter 3, page 3/151.

SIPLUS Basic Panels and Comfort Panels

Overview

SIPLUS extreme products are based on SIMATIC standard products.

For technical documentation on SIPLUS, see:
<http://www.siemens.com/siplus-extreme>

For further information, see chapter 3, page 3/152.

Overview



- Aluminum mounting rail for mounting the SIMATIC S7-1500 or ET 200MP
- With integrated DIN rail for snapping on a wide range of standard components
- Attachment of modules with a single screw
- Installation by screwing to the control cabinet wall
- Entire length of rail can be used

Ordering data

SIMATIC S7-1500 mounting rails

Fixed lengths, with grounding elements

- 160 mm
- 245 mm
- 482 mm
- 530 mm
- 830 mm

For cutting to length by customer, without drill holes; grounding elements must be ordered separately

PE connection element for mounting rail 2000 mm

20 units

Article No.

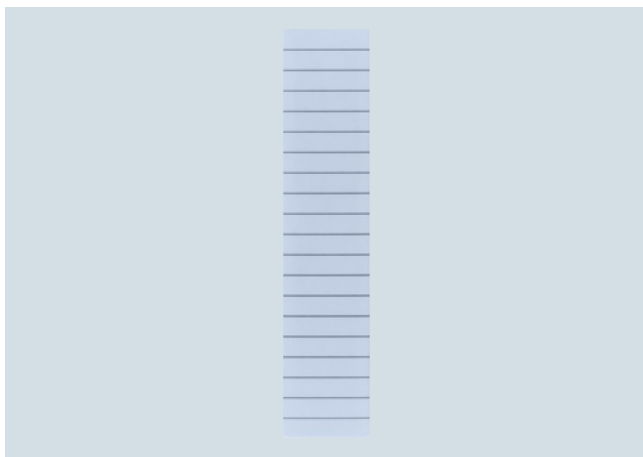
6ES7590-1AB60-0AA0
6ES7590-1AC40-0AA0
6ES7590-1AE80-0AA0
6ES7590-1AF30-0AA0
6ES7590-1AJ30-0AA0

6ES7590-1BC00-0AA0

6ES7590-5AA00-0AA0

Labeling sheets

Overview



- Film sheets for the application-specific, automatic labeling of I/O modules of the SIMATIC S7-1500 using standard laser printers
- Printing direct from the TIA Portal possible
 - No double entry of symbols and/or addresses
 - Saves time and avoids typing errors
- Plain color films, tear-resistant, dirt-repellent
- Simple handling:
 - Perforated labeling sheets in DIN A4 format for easy separation of the labeling strips
 - Detached strips can be inserted directly into the I/O modules
- Different colors to differentiate module types; yellow reserved for failsafe systems

Ordering data

DIN A4 labeling sheets

For 35 mm modules; 10 sheets with 10 labeling strips each for I/O modules; perforated, color Al grey

For 25 mm modules; 10 sheets with 10 labeling strips each for I/O modules; perforated, color Al grey

Article No.

6ES7592-2AX00-0AA0

6ES7592-1AX00-0AA0

SIMATIC S7-1500 advanced controller

Accessories

Spare parts

Overview

Front doors



- Versions:
 - Universal front doors for digital and analog I/O modules
 - Universal front doors for the interface module IM155-5 PN ST
- Included in the scope of delivery of the respective modules
Can be ordered as a spare part in a set consisting of five universal (unlabeled) front doors
- Front doors for I/O modules: Universal labeling sheets and cabling diagrams are included. Cabling diagrams can be detached from preperforated sheets and inserted inside the door

U connector



- To interconnect the modules (self-assembling backplane bus)
- Implementation of a rugged, interference-free station setup through
 - consistent separation of supply voltage of modules and data signals
 - fully shielded, gold-plated contacts for the data bus
- Included in the scope of delivery of each module. Available as spare part in sets of 5

Shielding



- Components for implementing the integrated shielding concept of the S7-1500:
 - 24 V DC infeed element for supplying the analog module: Strict separation of infeed and analog signals ensures high EMC stability
 - Shield clamp for insertion in the front connector: Allows a low-impedance connection and optimally dissipates interference
 - Universal shield terminal: Connects the cable shield with the shield clamp and is simultaneously used for mechanical fixing
- Included in the scope of delivery of the analog modules. Available as a spare part in two versions:
 - Shielding set, comprising infeed element, shield clamp, and shield terminal (pack of 5 units each)
 - Individual shield terminals (pack of 20)
- No tool required for assembly/disassembly

Ordering data

Article No.

Universal front door for IM 155-5 PN ST

6ES7528-0AA70-7AA0

5 front doors; spare part

Universal front door for I/O modules

5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part

• For module width 35 mm

6ES7528-0AA00-7AA0

• For module width 25 mm

6ES7528-0AA00-0AA0

U connector

6ES7590-0AA00-0AA0

5 units; spare part

Shielding set I/O

6ES7590-5CA00-0AA0

Infeed element, shield clamp, and shield terminal; 5 units, spare part

• For module width 35 mm

6ES7590-5CA00-0AA0

• For module width 25 mm

6ES7590-5CA10-0AA0

Shield terminal element

6ES7590-5BA00-0AA0

10 units; spare part