



SIMATIC S7-1500, CPU 1513-1 PN, central processing unit with work memory 600 KB for program and 2.5 MB for data, 1st interface: PROFINET IRT with 2-port switch, 25 ns bit performance, SIMATIC Memory Card required - - approvals and certificates according to entry 109815653 at support.industry.siemens.com to be considered! - -

| General information                                      |  |
|--|--|
| Product type designation                                 | CPU 1513-1 PN  |
| HW functional status                                     | FS03   |
| Firmware version   | V3.1   |
| • FW update possible                                     | Yes  |
| Product function   |  |
| • I&M data   | Yes; I&M0 to I&M3  |
| • Isochronous mode                                       | Yes; Distributed and central; with minimum OB 6x cycle of 500 µs (distributed) and 1 ms (central)          |
| • SysLog   | Yes  |
| Engineering with   |  |
| • STEP 7 TIA Portal configurable/integrated from version | V19 (FW V3.1) / V18 (FW V3.0) or higher; with older TIA Portal versions configurable as 6ES7513-1AL02-0AB0 |
| Configuration control                                    |  |
| via dataset  | Yes  |
| Display  |  |
| Screen diagonal [cm]                                     | 3.45 cm  |
| Control elements   |  |
| Number of keys   | 8  |
| Mode buttons   | 2  |
| Supply voltage   |  |
| 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  |
| Mains buffering  |  |
| • Mains/voltage failure stored energy time               | 5 ms   |
| • Repeat rate, min.                                      | 1/s  |
| Input current  |  |
| Current consumption (rated value)                        | 0.56 A   |
| Current consumption, max.                                | 0.9 A  |
| Inrush current, max.                                     | 1.15 A; Rated value  |
| I <sup>2</sup> t   | 0.6 A <sup>2</sup> ·s  |
| Power  |  |
| Infeed power to the backplane bus                        | 10 W   |
| Power consumption from the backplane bus (balanced)      | 5.5 W  |
| Power loss   |  |
| Power loss, typ.   | 3.4 W  |
| Memory   |  |
| Number of slots for SIMATIC memory card                  | 1  |

|   |   |
|---|---|
| SIMATIC memory card required                              | Yes   |
| <b>Work memory</b>  |   |
| • integrated (for program)                                | 600 kbyte   |
| • integrated (for data)                                   | 2.5 Mbyte   |
| <b>Load memory</b>  |   |
| • Plug-in (SIMATIC Memory Card), max.                     | 32 Gbyte  |
| <b>Backup</b>   |   |
| • maintenance-free  | Yes   |
| <b>CPU processing times</b>                               |   |
| for bit operations, typ.                                  | 25 ns   |
| for word operations, typ.                                 | 32 ns   |
| for fixed point arithmetic, typ.                          | 42 ns   |
| for floating point arithmetic, typ.                       | 170 ns  |
| <b>CPU-blocks</b>   |   |
| Number of elements (total)                                | 4 000; Blocks (OB, FB, FC, DB) and UDTs   |
| <b>DB</b>   |   |
| • Number range  | 1 ... 60 999; subdivided into: number range that can be used by the user: 1 ... 59 999, and number range of DBs created via SFC 86: 60 000 ... 60 999 |
| • Size, max.  | 2.5 Mbyte; For DBs with absolute addressing, the max. size is 64 KB   |
| <b>FB</b>   |   |
| • Number range  | 0 ... 65 535  |
| • Size, max.  | 600 kbyte   |
| <b>FC</b>   |   |
| • Number range  | 0 ... 65 535  |
| • Size, max.  | 600 kbyte   |
| <b>OB</b>   |   |
| • Size, max.  | 600 kbyte   |
| • Number of free cycle OBs                                | 100   |
| • Number of time alarm OBs                                | 20  |
| • Number of delay alarm OBs                               | 20  |
| • Number of cyclic interrupt OBs                          | 20; With minimum OB 3x cycle of 250 µs  |
| • Number of process alarm OBs                             | 50  |
| • Number of DPV1 alarm OBs                                | 3   |
| • Number of isochronous mode OBs                          | 2   |
| • Number of technology synchronous alarm OBs              | 2   |
| • Number of startup OBs                                   | 100   |
| • Number of asynchronous error OBs                        | 4   |
| • Number of synchronous error OBs                         | 2   |
| • Number of diagnostic alarm OBs                          | 1   |
| <b>Nesting depth</b>                                      |   |
| • per priority class                                      | 24  |
| <b>Counters, timers and their retentivity</b>             |   |
| <b>S7 counter</b>   |   |
| • Number  | 2 048   |
| <b>Retentivity</b>  |   |
| — adjustable  | Yes   |
| <b>IEC counter</b>  |   |
| • Number  | Any (only limited by the main memory)   |
| <b>Retentivity</b>  |   |
| — adjustable  | Yes   |
| <b>S7 times</b>   |   |
| • Number  | 2 048   |
| <b>Retentivity</b>  |   |
| — adjustable  | Yes   |
| <b>IEC timer</b>  |   |
| • Number  | Any (only limited by the main memory)   |
| <b>Retentivity</b>  |   |
| — adjustable  | Yes   |
| <b>Data areas and their retentivity</b>                   |   |
| Retentive data area (incl. timers, counters, flags), max. | 256 kbyte; in total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 216 KB                           |


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| Extended retentive data area (incl. timers, counters, flags), max. | 2.5 Mbyte; When using PS 6 0W 24/48/60 V DC HF  |
| <b>Flag</b>  |   |
| • Size, max.   | 16 kbyte  |
| • Number of clock memories   | 8; 8 clock memory bit, grouped into one clock memory byte   |
| <b>Data blocks</b>   |   |
| • Retentivity adjustable   | Yes   |
| • Retentivity preset   | No  |
| <b>Local data</b>  |   |
| • per priority class, max.   | 64 kbyte; max. 16 KB per block  |
| <b>Address area</b>  |   |
| Number of IO modules   | 2 048; max. number of modules / submodules  |
| <b>I/O address area</b>  |   |
| • Inputs   | 32 kbyte; All inputs are in the process image   |
| • Outputs  | 32 kbyte; All outputs are in the process image  |
| per integrated IO subsystem  |   |
| — Inputs (volume)  | 8 kbyte   |
| — Outputs (volume)   | 8 kbyte   |
| per CM/CP  |   |
| — Inputs (volume)  | 8 kbyte   |
| — Outputs (volume)   | 8 kbyte   |
| <b>Subprocess images</b>   |   |
| • Number of subprocess images, max.                                | 32  |
| <b>Hardware configuration</b>                                      |   |
| Number of distributed IO systems                                   | 32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link) |
| <b>Number of DP masters</b>  |   |
| • Via CM   | 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total  |
| <b>Number of IO Controllers</b>                                    |   |
| • integrated   | 1   |
| • Via CM   | 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total  |
| <b>Rack</b>  |   |
| • Modules per rack, max.   | 32; CPU + 31 modules  |
| • Number of lines, max.  | 1   |
| <b>PtP CM</b>  |   |
| • Number of PtP CMs  | the number of connectable PtP CMs is only limited by the number of available slots  |
| <b>Time of day</b>   |   |
| <b>Clock</b>   |   |
| • Type   | Hardware clock  |
| • Backup time  | 6 wk; At 40 °C ambient temperature, typically   |
| • Deviation per day, max.  | 10 s; Typ.: 2 s   |
| <b>Operating hours counter</b>                                     |   |
| • Number   | 16  |
| <b>Clock synchronization</b>                                       |   |
| • supported  | Yes   |
| • to DP, master  | Yes; via PROFIBUS CM / CP   |
| • on DP, device  | Yes; via PROFIBUS CM / CP   |
| • in AS, master  | Yes   |
| • in AS, device  | Yes   |
| • on Ethernet via NTP  | Yes   |
| <b>Interfaces</b>  |   |
| Number of PROFINET interfaces                                      | 1   |
| <b>1. Interface</b>  |   |
| <b>Interface types</b>   |   |
| • RJ 45 (Ethernet)   | Yes; X1   |
| • Number of ports  | 2   |
| • integrated switch  | Yes   |
| <b>Protocols</b>   |   |
| • IP protocol  | Yes; IPv4   |
| • PROFINET IO Controller   | Yes   |

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| <ul style="list-style-type: none"> <li>• PROFINET IO Device</li> <li>• SIMATIC communication</li> <li>• Open IE communication</li> <li>• Web server</li> <li>• Media redundancy</li> </ul> | <p>Yes</p> <p>Yes</p> <p>Yes; Optionally also encrypted</p> <p>Yes</p> <p>Yes</p>  |
| <b>PROFINET IO Controller</b>  |  |
| <b>Services</b>  |  |
| — Isochronous mode   | Yes  |
| — Direct data exchange   | Yes; Requirement: IRT and isochronous mode (MRPD optional)   |
| — IRT  | Yes  |
| — PROFINergy   | Yes; per user program  |
| — Prioritized startup  | Yes; Max. 32 PROFINET devices  |
| — Number of connectable IO Devices, max.   | 128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET   |
| — Of which IO devices with IRT, max.   | 64   |
| — Number of connectable IO Devices for RT, max.  | 128  |
| — of which in line, max.   | 128  |
| — Number of IO Devices that can be simultaneously activated/deactivated, max.  | 8; in total across all interfaces  |
| — Number of IO Devices per tool, max.  | 8  |
| — Updating times   | The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data |
| — PROFINET Security Class  | 1  |
| <b>Update time for IRT</b>   |  |
| — for send cycle of 250 µs   | 250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive                                    |
| — for send cycle of 500 µs   | 500 µs to 8 ms   |
| — for send cycle of 1 ms   | 1 ms to 16 ms  |
| — for send cycle of 2 ms   | 2 ms to 32 ms  |
| — for send cycle of 4 ms   | 4 ms to 64 ms  |
| — With IRT and parameterization of "odd" send cycles   | Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)   |
| <b>Update time for RT</b>  |  |
| — for send cycle of 250 µs   | 250 µs to 128 ms   |
| — for send cycle of 500 µs   | 500 µs to 256 ms   |
| — for send cycle of 1 ms   | 1 ms to 512 ms   |
| — for send cycle of 2 ms   | 2 ms to 512 ms   |
| — for send cycle of 4 ms   | 4 ms to 512 ms   |
| <b>PROFINET IO Device</b>  |  |
| <b>Services</b>  |  |
| — Isochronous mode   | No   |
| — IRT  | Yes  |
| — PROFINergy   | Yes; per user program  |
| — Shared device  | Yes  |
| — Number of IO Controllers with shared device, max.  | 4  |
| — activation/deactivation of I-devices   | Yes; per user program  |
| — Asset management record  | Yes; per user program  |
| — PROFINET Security Class  | SNMP Configuration and DCP Read Only   |
| <b>Interface types</b>   |  |
| <b>RJ 45 (Ethernet)</b>  |  |
| • 100 Mbps   | Yes  |
| • Autonegotiation  | Yes  |
| • Autocrossing   | Yes  |
| • Industrial Ethernet status LED   | Yes  |
| <b>Protocols</b>   |  |
| PROFIsafe  | No   |
| <b>Number of connections</b>   |  |
| • Number of connections, max.  | 128; via integrated interfaces of the CPU and connected CPs / CMs  |
| • Number of connections reserved for ES/HMI/web  | 10   |
| • Number of connections via integrated interfaces  | 88   |
| • Number of S7 routing paths   | 16   |

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| Redundancy mode  |  |
| • H-Sync forwarding  | Yes  |
| Media redundancy   |  |
| — Media redundancy   | only via 1st interface (X1)  |
| — MRP  | Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client |
| — MRP interconnection, supported   | Yes; as MRP ring node according to IEC 62439-2 Edition 3.0                         |
| — MRPD   | Yes; Requirement: IRT  |
| — Switchover time on line break, typ.  | 200 ms; For MRP, bumpless for MRPD   |
| — Number of stations in the ring, max.   | 50   |
| SIMATIC communication  |  |
| • PG/OP communication  | Yes; encryption with TLS V1.3 pre-selected   |
| • S7 routing   | Yes  |
| • Data record routing  | Yes  |
| • S7 communication, as server  | Yes  |
| • S7 communication, as client  | Yes  |
| • User data per job, max.  | See online help (S7 communication, user data size)                                 |
| Open IE communication  |  |
| • TCP/IP   | Yes  |
| — Data length, max.  | 64 kbyte   |
| — several passive connections per port, supported  | Yes  |
| • ISO-on-TCP (RFC1006)   | Yes  |
| — Data length, max.  | 64 kbyte   |
| • UDP  | Yes  |
| — Data length, max.  | 2 kbyte; 1 472 bytes for UDP broadcast   |
| — UDP multicast  | Yes; max. 78 multicast circuits  |
| • DHCP   | Yes  |
| • DNS  | Yes  |
| • SNMP   | Yes  |
| • DCP  | Yes  |
| • LLDP   | Yes  |
| • Encryption   | Yes; Optional  |
| Web server   |  |
| • HTTP   | Yes; Standard and user pages   |
| • HTTPS  | Yes; Standard and user pages   |
| • web API  |  |
| — Number of sessions, max.   | 50   |
| — number of simultaneous HTTP calls, max.  | 4  |
| — HTTP request body, max.  | 131 072 byte   |
| OPC UA   |  |
| • Runtime license required   | Yes; "Small" license required  |
| • OPC UA Client  | Yes; Data Access (registered Read/Write), Method Call                              |
| — Application authentication   | Yes  |
| — Security policies  | Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256    |
| — User authentication  | "anonymous" or by user name & password   |
| — Number of connections, max.  | 4  |
| — Number of nodes of the client interfaces, recommended max.   | 1 000  |
| — Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/OPC-UA_WriteList, max.   | 300  |
| — Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max.                                | 20   |
| — Number of elements for one call of OPC-UA_MethodGetHandleList, max.                                  | 100  |
| — Number of simultaneous calls of the client instructions for session management, per connection, max. | 1  |
| — Number of simultaneous calls of the client instructions for data access, per connection, max.        | 5  |
| — Number of registerable nodes, max.   | 5 000  |
| — Number of registerable method calls of OPC-UA_MethodCall, max.                                       | 100  |

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|---|--|
| — Number of inputs/outputs when calling OPC-UA_MethodCall, max. | 20   |
| • OPC UA Server   | Yes; Data Access (Read, Write, Subscribe), Method Call, Alarms & Condition (A&C), Custom Address Space                   |
| — Application authentication                                    | Yes  |
| — Security policies   | available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss |
| — User authentication   | "anonymous" or by user name & password   |
| — GDS support (certificate management)                          | Yes  |
| — Number of sessions, max.                                      | 32   |
| — Number of accessible variables, max.                          | 50 000   |
| — Number of registerable nodes, max.                            | 10 000   |
| — Number of subscriptions per session, max.                     | 50   |
| — Sampling interval, min.                                       | 100 ms   |
| — Publishing interval, min.                                     | 200 ms   |
| — Number of server methods, max.                                | 20   |
| — Number of inputs/outputs per server method, max.              | 20   |
| — Number of monitored items, recommended max.                   | 4 000; for 1 s sampling interval and 1 s send interval   |
| — Number of server interfaces, max.                             | 10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"                 |
| — Number of nodes for user-defined server interfaces, max.      | 15 000   |
| • Alarms and Conditions   | Yes  |
| — Number of program alarms                                      | 100  |
| — Number of alarms for system diagnostics                       | 50   |
| Further protocols   |  |
| • MODBUS  | Yes; MODBUS TCP  |
| <b>S7 message functions</b>                                     |  |
| Number of login stations for message functions, max.            | 32   |
| number of subscriptions, max.                                   | 250  |
| number of tags/attributes for subscriptions, max.               | 2 000  |
| Program alarms  | Yes  |
| Number of configurable program messages, max.                   | 5 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH                                     |
| Number of loadable program messages in RUN, max.                | 5 000  |
| Number of simultaneously active program alarms                  |  |
| • Number of program alarms                                      | 600  |
| • Number of alarms for system diagnostics                       | 100  |
| • Number of alarms for motion technology objects                | 160  |
| <b>Test commissioning functions</b>                             |  |
| Joint commission (Team Engineering)                             | Yes; Parallel online access possible for up to 5 engineering systems   |
| Status block  | Yes; Up to 8 simultaneously (in total across all ES clients)   |
| Single step   | No   |
| Number of breakpoints   | 8  |
| Profiling   | Yes  |
| <b>Status/control</b>   |  |
| • Status/control variable                                       | Yes  |
| • Variables   | Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters   |
| • Number of variables, max.                                     |  |
| — of which status variables, max.                               | 200; per job   |
| — of which control variables, max.                              | 200; per job   |
| <b>Forcing</b>  |  |
| • Forcing   | Yes  |
| • Forcing, variables  | Peripheral inputs/outputs  |
| • Number of variables, max.                                     | 200  |
| <b>Diagnostic buffer</b>  |  |
| • present   | Yes  |
| • Number of entries, max.                                       | 1 000  |
| — of which powerfail-proof                                      | 500  |
| <b>Traces</b>   |  |
| • Number of configurable Traces                                 | 4  |
| • Memory size per trace, max.                                   | 512 kbyte  |

| Interrupts/diagnostics/status information                                    |   |
|--|---|
| Diagnostics indication LED   |   |
| • RUN/STOP LED   | Yes   |
| • ERROR LED  | Yes   |
| • MAINT LED  | Yes   |
| • STOP ACTIVE LED  | Yes   |
| • Connection display LINK TX/RX  | Yes   |
| Supported technology objects   |   |
| Motion Control   | Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool |
| • Number of available Motion Control resources for technology objects        | 1 120   |
| • Required Motion Control resources  |   |
| — per speed-controlled axis  | 40  |
| — per positioning axis   | 80  |
| — per synchronous axis   | 160   |
| — per external encoder   | 80  |
| — per output cam   | 20  |
| — per cam track  | 160   |
| — per probe  | 40  |
| • Positioning axis   |   |
| — Number of positioning axes at motion control cycle of 4 ms (typical value) | 11  |
| — Number of positioning axes at motion control cycle of 8 ms (typical value) | 14  |
| Controller   |   |
| • PID_Compact  | Yes; Universal PID controller with integrated optimization  |
| • PID_3Step  | Yes; PID controller with integrated optimization for valves   |
| • PID-Temp   | Yes; PID controller with integrated optimization for temperature  |
| Counting and measuring   |   |
| • High-speed counter   | Yes   |
| Ambient conditions   |   |
| Ambient temperature during operation   |   |
| • horizontal installation, min.  | -30 °C; No condensation   |
| • horizontal installation, max.  | 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off                                |
| • vertical installation, min.  | -30 °C; No condensation   |
| • vertical installation, max.  | 40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off                                |
| Ambient temperature during storage/transportation                            |   |
| • min.   | -40 °C  |
| • max.   | 70 °C   |
| Altitude during operation relating to sea level                              |   |
| • Installation altitude above sea level, max.                                | 5 000 m; Restrictions for installation altitudes > 2 000 m, see manual  |
| configuration / header   |   |
| configuration / programming / header   |   |
| Programming language   |   |
| — LAD  | Yes   |
| — FBD  | Yes   |
| — STL  | Yes   |
| — SCL  | Yes   |
| — CFC  | Yes   |
| — GRAPH  | Yes   |
| Know-how protection  |   |
| • User program protection/password protection                                | Yes   |
| • Copy protection  | Yes   |
| • Block protection   | Yes   |
| Access protection  |   |
| • protection of confidential configuration data                              | Yes   |
| • Password for display   | Yes   |
| • Protection level: Write protection   | Yes   |
| • Protection level: Read/write protection                                    | Yes   |

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|---|---|
| <ul style="list-style-type: none"> <li>• Protection level: Write protection for Failsafe</li> </ul> | No  |
| <ul style="list-style-type: none"> <li>• Protection level: Complete protection</li> </ul>           | Yes   |
| <ul style="list-style-type: none"> <li>• User administration</li> </ul>                             | Yes; device-wide  |
| programming / cycle time monitoring / header  |   |
| <ul style="list-style-type: none"> <li>• lower limit</li> </ul>                                     | adjustable minimum cycle time   |
| <ul style="list-style-type: none"> <li>• upper limit</li> </ul>                                     | adjustable maximum cycle time   |
| Dimensions  |   |
| Width   | 35 mm   |
| Height  | 147 mm  |
| Depth   | 129 mm  |
| Weights   |   |
| Weight, approx.   | 336 g   |
| last modified:  | 7/13/2024  |