

SIMATIC S7-1500T, CPU 1515T-2 PN, Central processing unit with work memory 750 KB for program and 3 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface, Ethernet, 30 ns bit performance, SIMATIC Memory Card required



| General information                                       |   |
|---|---|
| Product type designation                                  | CPU 1515T-2 PN                          |
| HW functional status                                      | FS03                                    |
| Firmware version  | V2.6                                    |
| Product function  |   |
| • I&M data  | Yes; I&M0 to I&M3                       |
| Engineering with  |   |
| • STEP 7 TIA Portal configurable/integrated as of version | V15.1 (FW V2.6)/V14 (FW V2.0) or higher |
| Configuration control                                     |   |
| via dataset   | Yes                                     |
| Display   |   |
| Screen diagonal [cm]                                      | 6.1 cm                                  |
| Control elements  |   |
| Number of keys  | 6                                       |
| Mode selector switch                                      | 1                                       |
| Supply voltage  |   |

|  |   |
|--|---|
| Type of supply voltage   | 24 V DC   |
| permissible range, lower limit (DC)  | 19.2 V  |
| permissible range, upper limit (DC)  | 28.8 V  |
| Reverse polarity protection  | Yes   |
| <b>Mains buffering</b>   |   |
| <ul style="list-style-type: none"> <li>• Mains/voltage failure stored energy time</li> </ul> | 5 ms  |
| <ul style="list-style-type: none"> <li>• Repeat rate, min.</li> </ul>                        | 1/s   |
| <b>Input current</b>   |   |
| Current consumption (rated value)  | 0.8 A   |
| Inrush current, max.   | 2.4 A; Rated value  |
| $I^2t$   | 0.02 A <sup>2</sup> ·s  |
| <b>Power</b>   |   |
| Infeed power to the backplane bus  | 12 W  |
| Power consumption from the backplane bus (balanced)  | 6.2 W   |
| <b>Power loss</b>  |   |
| Power loss, typ.   | 6.3 W   |
| <b>Memory</b>  |   |
| Number of slots for SIMATIC memory card  | 1   |
| SIMATIC memory card required   | Yes   |
| <b>Work memory</b>   |   |
| <ul style="list-style-type: none"> <li>• integrated (for program)</li> </ul>                 | 750 kbyte   |
| <ul style="list-style-type: none"> <li>• integrated (for data)</li> </ul>                    | 3 Mbyte   |
| <b>Load memory</b>   |   |
| <ul style="list-style-type: none"> <li>• Plug-in (SIMATIC Memory Card), max.</li> </ul>      | 32 Gbyte  |
| <b>Backup</b>  |   |
| <ul style="list-style-type: none"> <li>• maintenance-free</li> </ul>                         | Yes   |
| <b>CPU processing times</b>  |   |
| for bit operations, typ.   | 30 ns   |
| for word operations, typ.  | 36 ns   |
| for fixed point arithmetic, typ.   | 48 ns   |
| for floating point arithmetic, typ.  | 192 ns  |
| <b>CPU-blocks</b>  |   |
| Number of elements (total)   | 6 000; Blocks (OB, FB, FC, DB) and UDTs   |
| <b>DB</b>  |   |
| <ul style="list-style-type: none"> <li>• Number range</li> </ul>                             | 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 |
| <ul style="list-style-type: none"> <li>• Size, max.</li> </ul>                               | 3 Mbyte; For DBs with absolute addressing, the max. size is 64 KB   |
| <b>FB</b>  |   |

|  |  |
|--|--|
| • Number range                               | 0 ... 65 535                           |
| • Size, max.                                 | 500 kbyte                              |
| <b>FC</b>                                    |  |
| • Number range                               | 0 ... 65 535                           |
| • Size, max.                                 | 500 kbyte                              |
| <b>OB</b>                                    |  |
| • Size, max.                                 | 500 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 500 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                                     |

### Counters, timers and their retentivity

|                    |                                       |
|--------------------|---------------------------------------|
| <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                                   |

### Data areas and their retentivity

|   |   |
|---|---|
| Retentive data area (incl. timers, counters, flags), max. | 512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB |
|---|---|



|  |   |
|--|---|
| Extended retentive data area (incl. timers, counters, flags), max. | 3 Mbyte; When using PS 6 0W 24/48/60 V DC HF  |
| <b>Flag</b>  |   |
| • Number, 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   | 8 192; 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  |
| <b>per integrated IO subsystem</b>                                 |   |
| — Inputs (volume)  | 8 kbyte   |
| — Outputs (volume)   | 8 kbyte   |
| <b>per CM/CP</b>   |   |
| — 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                                   | 64; 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   | 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total   |
| <b>Number of IO Controllers</b>                                    |   |
| • integrated   | 2   |
| • Via CM   | 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) 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>   |   |

| Clock                                    |  |
|--|--|
| • Type                                   | Hardware clock   |
| • Backup time                            | 6 wk; At 40 °C ambient temperature, typically  |
| • Deviation per day, max.                | 10 s; Typ.: 2 s  |
| Operating hours counter                  |  |
| • Number                                 | 16   |
| Clock synchronization                    |  |
| • supported                              | Yes  |
| • in AS, master                          | Yes  |
| • in AS, slave                           | Yes  |
| • on Ethernet via NTP                    | Yes  |
| Interfaces                               |  |
| Number of PROFINET interfaces            | 2  |
| 1. Interface                             |  |
| Interface types                          |  |
| • Number of ports                        | 2  |
| • integrated switch                      | Yes  |
| • RJ 45 (Ethernet)                       | Yes; X1  |
| Protocols                                |  |
| • IP protocol                            | Yes; IPv4  |
| • PROFINET IO Controller                 | Yes  |
| • PROFINET IO Device                     | Yes  |
| • SIMATIC communication                  | Yes  |
| • Open IE communication                  | Yes  |
| • Web server                             | Yes  |
| • Media redundancy                       | Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  |
| PROFINET IO Controller                   |  |
| Services                                 |  |
| — PG/OP communication                    | Yes  |
| — S7 routing                             | Yes  |
| — Isochronous mode                       | Yes  |
| — Open IE communication                  | Yes  |
| — IRT                                    | Yes  |
| — MRP                                    | Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50           |
| — MRPD                                   | Yes; Requirement: IRT  |
| — PROFlenergy                            | Yes  |
| — Prioritized startup                    | Yes; Max. 32 PROFINET devices  |
| — Number of connectable IO Devices, max. | 256; In total, up to 1 000 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.                               | 256  |
| — of which in line, max.  | 256  |
| — 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 |

#### Update time for IRT

|  |   |
|--|---|
| — 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)  |

#### Update time for RT

|                            |                  |
|----------------------------|------------------|
| — 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   |

#### PROFINET IO Device

##### Services

|   |  |
|---|--|
| — PG/OP communication                               | Yes  |
| — S7 routing  | Yes  |
| — Isochronous mode                                  | No   |
| — Open IE communication                             | Yes  |
| — IRT   | Yes  |
| — MRP   | Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 |
| — MRPD  | Yes; Requirement: IRT  |
| — PROFinergy  | Yes  |
| — Shared device                                     | Yes  |
| — Number of IO Controllers with shared device, max. | 4  |
| — Asset management record                           | Yes; Per user program  |

## 2. Interface

### Interface types

|                   |   |
|-------------------|---|
| • Number of ports | 1 |
|-------------------|---|

|   |  |
|---|--|
| • integrated switch   | No   |
| • RJ 45 (Ethernet)  | Yes; X2  |
| <b>Protocols</b>  |  |
| • IP protocol   | Yes; IPv4  |
| • PROFINET IO Controller  | Yes  |
| • PROFINET IO Device  | Yes  |
| • SIMATIC communication   | Yes  |
| • Open IE communication   | Yes  |
| • Web server  | Yes  |
| • Media redundancy  | No   |
| <b>PROFINET IO Controller</b>   |  |
| <b>Services</b>   |  |
| — PG/OP communication   | Yes  |
| — S7 routing  | Yes  |
| — Isochronous mode  | No   |
| — Open IE communication   | Yes  |
| — IRT   | No   |
| — MRP   | No   |
| — MRPD  | No   |
| — PROFIenergy   | Yes  |
| — Prioritized startup   | No   |
| — Number of connectable IO Devices, max.                                      | 32; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET  |
| — Number of connectable IO Devices for RT, max.                               | 32   |
| — of which in line, max.  | 32   |
| — 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 |
| <b>Update time for RT</b>   |  |
| — for send cycle of 1 ms  | 1 ms to 512 ms   |
| <b>PROFINET IO Device</b>   |  |
| <b>Services</b>   |  |
| — PG/OP communication   | Yes  |
| — S7 routing  | Yes  |
| — Isochronous mode  | No   |
| — Open IE communication   | Yes  |
| — IRT   | No   |
| — MRP   | No   |

|   |                       |
|---|-----------------------|
| — MRPD  | No                    |
| — PROFinergy  | Yes                   |
| — Prioritized startup                               | No                    |
| — Shared device                                     | Yes                   |
| — Number of IO Controllers with shared device, max. | 4                     |
| — Asset management record                           | Yes; Per user program |

## Interface types

|                                  |     |
|----------------------------------|-----|
| <b>RJ 45 (Ethernet)</b>          |     |
| • 100 Mbps                       | Yes |
| • Autonegotiation                | Yes |
| • Autocrossing                   | Yes |
| • Industrial Ethernet status LED | Yes |

## Protocols

|   |   |
|---|---|
| <b>Number of connections</b>                      |   |
| • Number of connections, max.                     | 192; 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 | 108   |
| • Number of S7 routing paths                      | 16  |

|                        |     |
|------------------------|-----|
| <b>Redundancy mode</b> |     |
| • H-Sync forwarding    | Yes |

|                               |  |
|-------------------------------|--|
| <b>SIMATIC communication</b>  |  |
| • S7 communication, as server | Yes  |
| • S7 communication, as client | Yes  |
| • User data per job, max.     | See online help (S7 communication, user data size) |

|   |  |
|---|--|
| <b>Open IE communication</b>                      |  |
| • 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. 5 multicast circuits         |
| • DHCP  | No                                     |
| • SNMP  | Yes                                    |
| • DCP   | Yes                                    |
| • LLDP  | Yes                                    |



| Web server   |   |
|--|---|
| • HTTP   | Yes; Standard and user pages  |
| • HTTPS  | Yes; Standard and user pages  |
| OPC UA   |   |
| • Runtime license required   | Yes   |
| • OPC UA client  | Yes   |
| — Application authentication   | Yes   |
| — Security policies  | Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 |
| — User authentication  | "anonymous" or by user name & password  |
| — Number of connections, max.  | 10  |
| — Number of nodes of the client interfaces, max.   | 2 000   |
| — 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 per connection (except OPC-UA-ReadList, OPC-UA-WriteList, OPC-UA-MethodCall), max. | 1   |
| — Number of simultaneous calls of the client instructions<br>OPC-UA-ReadList, OPC-UA-WriteList and OPC-UA-MethodCall, max.                   | 5   |
| — Number of registerable nodes, max.   | 5 000   |
| — Number of registerable method calls of OPC-UA-MethodCall, max.   | 100   |
| — Number of inputs/outputs when calling OPC-UA-MethodCall, max.  | 20  |
| • OPC UA server  | Yes; Data access (read, write, subscribe), method call, custom address space    |
| — Application authentication   | Yes   |
| — Security policies  | Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 |
| — User authentication  | "anonymous" or by user name & password  |
| — Number of sessions, max.   | 48  |
| — Number of accessible variables, max.   | 100 000   |
| — Number of registerable nodes, max.   | 20 000  |
| — Number of subscriptions per session, max.  | 20  |
| — Sampling time, min.  | 100 ms  |

|   |   |
|---|---|
| — Send time, min.   | 200 ms  |
| — Number of server methods, max.                                | 50  |
| — Number of inputs/outputs per server method, max.              | 20  |
| — Number of monitored items, max.                               | 2 000; For 1 s sampling interval and 1 s send interval  |
| — Number of server interfaces, max.                             | 10  |
| — Number of nodes for user-defined server interfaces, max.      | 5 000   |
| <b>Further protocols</b>  |   |
| • MODBUS  | Yes; MODBUS TCP   |
| <b>Media redundancy</b>   |   |
| • Switchover time on line break, typ.                           | 200 ms; For MRP, bumpless for MRPD  |
| • Number of stations in the ring, max.                          | 50  |
| <b>Isochronous mode</b>   |   |
| Isochronous operation (application synchronized up to terminal) | Yes; Distributed and central; with minimum OB 6x cycle of 500 µs (distributed) and 1 ms (central) |
| Equidistance  | Yes   |
| <b>S7 message functions</b>                                     |   |
| Number of login stations for message functions, max.            | 32  |
| Program alarms  | Yes   |
| Number of configurable program messages, max.                   | 10 000; 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                       | 200   |
| • 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 8 engineering systems                              |
| Status block  | Yes; Up to 8 simultaneously (in total across all ES clients)                                      |
| Single step   | No  |
| Number of breakpoints   | 8   |
| <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  |

| Forcing  |  |
|--|--|
| • Forcing, variables   | Peripheral inputs/outputs  |
| • Number of variables, max.  | 200  |
| Diagnostic buffer  |  |
| • present  | Yes  |
| • Number of entries, max.  | 3 200  |
| — of which powerfail-proof   | 500  |
| Traces   |  |
| • Number of configurable Traces  | 4; Up to 512 KB of data per trace are possible   |
| Interrupts/diagnostics/status information  |  |
| Diagnostics indication LED   |  |
| • RUN/STOP LED   | Yes  |
| • ERROR LED  | Yes  |
| • MAINT 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 or SIZER |
| • Number of available Motion Control resources for technology objects (except cam disks) | 2 400  |
| • 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   |
| • Number of available Extended Motion Control resources for technology objects           | 120  |
| • Required Extended Motion Control resources   |  |
| — for each cam   | 2  |
| — for each set of kinematics   | 30   |
| • Positioning axis   |  |
| — Number of positioning axes at motion control cycle of 4 ms (typical value)             | 7  |
| — 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.                   | 0 °C   |
| • horizontal installation, max.                   | 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off |
| • vertical installation, min.                     | 0 °C   |
| • 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  |

### Configuration

|   |                               |
|---|-------------------------------|
| Programming                                   |                               |
| Programming language                          |                               |
| — LAD   | Yes                           |
| — FBD   | Yes                           |
| — STL   | Yes                           |
| — SCL   | Yes                           |
| — GRAPH                                       | Yes                           |
| Know-how protection                           |                               |
| • User program protection/password protection | Yes                           |
| • Copy protection                             | Yes                           |
| • Block protection                            | Yes                           |
| Access protection                             |                               |
| • Password for display                        | Yes                           |
| • Protection level: Write protection          | Yes                           |
| • Protection level: Read/write protection     | Yes                           |
| • Protection level: Complete protection       | Yes                           |
| Cycle time monitoring                         |                               |
| • lower limit                                 | adjustable minimum cycle time |
| • upper limit                                 | adjustable maximum cycle time |

### Dimensions

|        |        |
|--------|--------|
| Width  | 70 mm  |
| Height | 147 mm |
| Depth  | 129 mm |

### Weights

|                 |       |
|-----------------|-------|
| Weight, approx. | 830 g |
|-----------------|-------|

last modified:

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