



SIMATIC S7-1500, CPU 1516-3 PN/DP, central processing unit with 1 MB work memory for program and 5 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 3rd interface: PROFIBUS, 10 ns bit performance, SIMATIC Memory Card required

| General information                                      |                                                                                                            |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Product type designation                                 | CPU 1516-3 PN/DP                                                                                           |
| HW functional status                                     | FS01                                                                                                       |
| Firmware version                                         | V2.9                                                                                                       |
| Product function                                         |                                                                                                            |
| • I&M data                                               | Yes; I&M0 to I&M3                                                                                          |
| • Isochronous mode                                       | Yes; Distributed and central; with minimum OB 6x cycle of 375 µs (distributed) and 1 ms (central)          |
| Engineering with                                         |                                                                                                            |
| • STEP 7 TIA Portal configurable/integrated from version | V17 (FW V2.9) / V16 (FW V2.8) or higher; with older TIA Portal versions configurable as 6ES7516-3AN01-0AB0 |
| Configuration control                                    |                                                                                                            |
| via dataset                                              | Yes                                                                                                        |
| Display                                                  |                                                                                                            |
| Screen diagonal [cm]                                     | 6.1 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)                        | 0.85 A                                                                                                     |
| Current consumption, max.                                | 1.1 A                                                                                                      |
| Inrush current, max.                                     | 2.4 A; Rated value                                                                                         |
| I <sup>2</sup> t                                         | 0.02 A <sup>2</sup> ·s                                                                                     |
| Power                                                    |                                                                                                            |
| Infeed power to the backplane bus                        | 12 W                                                                                                       |
| Power consumption from the backplane bus (balanced)      | 6.7 W                                                                                                      |
| Power loss                                               |                                                                                                            |
| Power loss, typ.                                         | 7 W                                                                                                        |
| Memory                                                   |                                                                                                            |
| Number of slots for SIMATIC memory card                  | 1                                                                                                          |
| SIMATIC memory card required                             | Yes                                                                                                        |
| Work memory                                              |                                                                                                            |

|                                                                    |                                                                                                                                                       |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| • integrated (for program)                                         | 1 Mbyte                                                                                                                                               |
| • integrated (for data)                                            | 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.                                           | 10 ns                                                                                                                                                 |
| for word operations, typ.                                          | 12 ns                                                                                                                                                 |
| for fixed point arithmetic, typ.                                   | 16 ns                                                                                                                                                 |
| for floating point arithmetic, typ.                                | 64 ns                                                                                                                                                 |
| <b>CPU-blocks</b>                                                  |                                                                                                                                                       |
| Number of elements (total)                                         | 8 000; 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.                                                       | 5 Mbyte; For DBs with absolute addressing, the max. size is 64 KB                                                                                     |
| <b>FB</b>                                                          |                                                                                                                                                       |
| • Number range                                                     | 0 ... 65 535                                                                                                                                          |
| • Size, max.                                                       | 1 Mbyte                                                                                                                                               |
| <b>FC</b>                                                          |                                                                                                                                                       |
| • Number range                                                     | 0 ... 65 535                                                                                                                                          |
| • Size, max.                                                       | 1 Mbyte                                                                                                                                               |
| <b>OB</b>                                                          |                                                                                                                                                       |
| • Size, max.                                                       | 1 Mbyte                                                                                                                                               |
| • 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                                   | 3                                                                                                                                                     |
| • 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.          | 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. | 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                | 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>         |                                                                                                                                                                                                                                   |
| • integrated                        | 1                                                                                                                                                                                                                                 |
| • 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>                  |                                                                                                                                                                                                                                   |
| <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                                                                                                                                                                                                                               |
| • in AS, master                     | Yes                                                                                                                                                                                                                               |
| • in AS, slave                      | Yes                                                                                                                                                                                                                               |
| • on Ethernet via NTP               | Yes                                                                                                                                                                                                                               |
| <b>Interfaces</b>                   |                                                                                                                                                                                                                                   |
| Number of PROFINET interfaces       | 2                                                                                                                                                                                                                                 |
| Number of PROFIBUS 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                                                                                                                                                                                                                               |
| • PROFINET IO Device                | Yes                                                                                                                                                                                                                               |
| • SIMATIC communication             | Yes                                                                                                                                                                                                                               |

|                                                                                                                                                                                                                                                     |                                                                                                                                                                        |
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| <ul style="list-style-type: none"> <li>• Open IE communication</li> <li>• Web server</li> <li>• Media redundancy</li> </ul>                                                                                                                         | Yes; Optionally also encrypted<br>Yes<br>Yes                                                                                                                           |
| <b>PROFINET IO Controller</b>                                                                                                                                                                                                                       |                                                                                                                                                                        |
| <b>Services</b>                                                                                                                                                                                                                                     |                                                                                                                                                                        |
| — PG/OP communication                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — Isochronous mode                                                                                                                                                                                                                                  | Yes                                                                                                                                                                    |
| — Direct data exchange                                                                                                                                                                                                                              | Yes; Requirement: IRT and isochronous mode (MRPD optional)                                                                                                             |
| — IRT                                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — PROFlenergy                                                                                                                                                                                                                                       | Yes; per user program                                                                                                                                                  |
| — 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 |
| <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 375 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>                                                                                                                                                                                                                                     |                                                                                                                                                                        |
| — PG/OP communication                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — Isochronous mode                                                                                                                                                                                                                                  | No                                                                                                                                                                     |
| — IRT                                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — PROFlenergy                                                                                                                                                                                                                                       | 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                                                                                                                                                  |
| <b>2. Interface</b>                                                                                                                                                                                                                                 |                                                                                                                                                                        |
| <b>Interface types</b>                                                                                                                                                                                                                              |                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>• RJ 45 (Ethernet)</li> <li>• Number of ports</li> <li>• integrated switch</li> </ul>                                                                                                                        | Yes; X2<br>1<br>No                                                                                                                                                     |
| <b>Protocols</b>                                                                                                                                                                                                                                    |                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>• IP protocol</li> <li>• PROFINET IO Controller</li> <li>• PROFINET IO Device</li> <li>• SIMATIC communication</li> <li>• Open IE communication</li> <li>• Web server</li> <li>• Media redundancy</li> </ul> | Yes; IPv4<br>Yes<br>Yes<br>Yes<br>Yes; Optionally also encrypted<br>Yes<br>No                                                                                          |
| <b>PROFINET IO Controller</b>                                                                                                                                                                                                                       |                                                                                                                                                                        |
| <b>Services</b>                                                                                                                                                                                                                                     |                                                                                                                                                                        |
| — PG/OP communication                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |

|                                                                               |                                                                                                                                                                        |
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| — Isochronous mode                                                            | No                                                                                                                                                                     |
| — Direct data exchange                                                        | No                                                                                                                                                                     |
| — IRT                                                                         | No                                                                                                                                                                     |
| — PROFINergy                                                                  | Yes; per user program                                                                                                                                                  |
| — 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                                                                                                                                                                    |
| — Isochronous mode                                                            | No                                                                                                                                                                     |
| — IRT                                                                         | No                                                                                                                                                                     |
| — PROFINergy                                                                  | Yes; per user program                                                                                                                                                  |
| — Prioritized startup                                                         | No                                                                                                                                                                     |
| — 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                                                                                                                                                  |
| <b>3. Interface</b>                                                           |                                                                                                                                                                        |
| <b>Interface types</b>                                                        |                                                                                                                                                                        |
| • RS 485                                                                      | Yes; X3                                                                                                                                                                |
| • Number of ports                                                             | 1                                                                                                                                                                      |
| <b>Protocols</b>                                                              |                                                                                                                                                                        |
| • PROFIBUS DP master                                                          | Yes                                                                                                                                                                    |
| • PROFIBUS DP slave                                                           | No                                                                                                                                                                     |
| • SIMATIC communication                                                       | Yes                                                                                                                                                                    |
| <b>PROFIBUS DP master</b>                                                     |                                                                                                                                                                        |
| • Number of connections, max.                                                 | 48; for the integrated PROFIBUS DP interface                                                                                                                           |
| • Number of DP slaves, max.                                                   | 125; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET                                                                     |
| <b>Services</b>                                                               |                                                                                                                                                                        |
| — PG/OP communication                                                         | Yes                                                                                                                                                                    |
| — Equidistance                                                                | Yes                                                                                                                                                                    |
| — Isochronous mode                                                            | Yes                                                                                                                                                                    |
| — Activation/deactivation of DP slaves                                        | Yes                                                                                                                                                                    |
| <b>Interface types</b>                                                        |                                                                                                                                                                        |
| <b>RJ 45 (Ethernet)</b>                                                       |                                                                                                                                                                        |
| • 100 Mbps                                                                    | Yes                                                                                                                                                                    |
| • Autonegotiation                                                             | Yes                                                                                                                                                                    |
| • Autocrossing                                                                | Yes                                                                                                                                                                    |
| • Industrial Ethernet status LED                                              | Yes                                                                                                                                                                    |
| <b>RS 485</b>                                                                 |                                                                                                                                                                        |
| • Transmission rate, max.                                                     | 12 Mbit/s                                                                                                                                                              |
| <b>Protocols</b>                                                              |                                                                                                                                                                        |
| PROFIsafe                                                                     | No                                                                                                                                                                     |
| <b>Number of connections</b>                                                  |                                                                                                                                                                        |
| • Number of connections, max.                                                 | 256; 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                             | 128                                                                                                                                                                    |
| • Number of S7 routing paths                                                  | 16                                                                                                                                                                     |
| <b>Redundancy mode</b>                                                        |                                                                                                                                                                        |
| • H-Sync forwarding                                                           | Yes                                                                                                                                                                    |

|                                                                                                        |                                                                                    |
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| <b>Media redundancy</b>                                                                                |                                                                                    |
| — 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                                                                                 |
| <b>SIMATIC communication</b>                                                                           |                                                                                    |
| • 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)                                 |
| <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                                                                                                 | Yes                                                                                |
| • DNS                                                                                                  | Yes                                                                                |
| • SNMP                                                                                                 | Yes                                                                                |
| • DCP                                                                                                  | Yes                                                                                |
| • LLDP                                                                                                 | Yes                                                                                |
| • Encryption                                                                                           | Yes; Optional                                                                      |
| <b>Web server</b>                                                                                      |                                                                                    |
| • HTTP                                                                                                 | Yes; Standard and user pages                                                       |
| • HTTPS                                                                                                | Yes; Standard and user pages                                                       |
| <b>OPC UA</b>                                                                                          |                                                                                    |
| • Runtime license required                                                                             | Yes; "Medium" license required                                                     |
| • 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, recommended max.                                           | 2 000                                                                              |
| — Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/C 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                                                                                |
| — 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                                             |

|                                                            |                                                                                                                                   |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| — GDS support (certificate management)                     | Yes                                                                                                                               |
| — 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 interval, min.                                  | 100 ms                                                                                                                            |
| — Publishing interval, min.                                | 200 ms                                                                                                                            |
| — Number of server methods, max.                           | 50                                                                                                                                |
| — Number of inputs/outputs per server method, max.         | 20                                                                                                                                |
| — number of monitored items, recommended max.              | 2 000; 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. | 5 000                                                                                                                             |
| • Alarms and Conditions                                    | Yes                                                                                                                               |
| — Number of program alarms                                 | 200                                                                                                                               |
| — Number of alarms for system diagnostics                  | 100                                                                                                                               |
| <b>Further protocols</b>                                   |                                                                                                                                   |
| • MODBUS                                                   | Yes; MODBUS TCP                                                                                                                   |
| <b>Isochronous mode</b>                                    |                                                                                                                                   |
| Equidistance                                               | Yes                                                                                                                               |
| <b>S7 message functions</b>                                |                                                                                                                                   |
| Number of login stations for message functions, max.       | 64                                                                                                                                |
| 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                                 | 1 000                                                                                                                             |
| • 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                                                                                                                      |
| <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.                                  | 3 200                                                                                                                             |
| — of which powerfail-proof                                 | 500                                                                                                                               |
| <b>Traces</b>                                              |                                                                                                                                   |
| • Number of configurable Traces                            | 4; Up to 512 KB of data per trace are possible                                                                                    |
| <b>Interrupts/diagnostics/status information</b>           |                                                                                                                                   |
| <b>Diagnostics indication LED</b>                          |                                                                                                                                   |
| • RUN/STOP LED                                             | Yes                                                                                                                               |
| • ERROR LED                                                | Yes                                                                                                                               |
| • MAINT LED                                                | Yes                                                                                                                               |
| • STOP ACTIVE LED                                          | Yes                                                                                                                               |
| • Connection display LINK TX/RX                            | Yes                                                                                                                               |
| <b>Supported technology objects</b>                        |                                                                                                                                   |
| Motion Control                                             | Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Number of available Motion Control resources for technology objects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2 400                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>• Required Motion Control resources <ul style="list-style-type: none"> <li>— per speed-controlled axis</li> <li>— per positioning axis</li> <li>— per synchronous axis</li> <li>— per external encoder</li> <li>— per output cam</li> <li>— per cam track</li> <li>— per probe</li> </ul> </li> <li>• Positioning axis <ul style="list-style-type: none"> <li>— Number of positioning axes at motion control cycle of 4 ms (typical value)</li> <li>— Number of positioning axes at motion control cycle of 8 ms (typical value)</li> </ul> </li> </ul> | 40<br>80<br>160<br>80<br>20<br>160<br>40<br><br>7<br>14                                                                                                                                                                                                        |
| Controller                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• PID_Compact</li> <li>• PID_3Step</li> <li>• PID-Temp</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes; Universal PID controller with integrated optimization<br>Yes; PID controller with integrated optimization for valves<br>Yes; PID controller with integrated optimization for temperature                                                                  |
| Counting and measuring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• High-speed counter</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Yes                                                                                                                                                                                                                                                            |
| <b>Ambient conditions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                |
| Ambient temperature during operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• horizontal installation, min.</li> <li>• horizontal installation, max.</li> <li>• vertical installation, min.</li> <li>• vertical installation, max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       | -25 °C; No condensation<br>60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off<br>-25 °C; No condensation<br>40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off |
| Ambient temperature during storage/transportation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• min.</li> <li>• max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -40 °C<br>70 °C                                                                                                                                                                                                                                                |
| Altitude during operation relating to sea level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• Installation altitude above sea level, max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5 000 m; Restrictions for installation altitudes > 2 000 m, see manual                                                                                                                                                                                         |
| <b>configuration / header</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                |
| configuration / programming / header                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                |
| Programming language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>— LAD</li> <li>— FBD</li> <li>— STL</li> <li>— SCL</li> <li>— GRAPH</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Yes<br>Yes<br>Yes<br>Yes<br>Yes                                                                                                                                                                                                                                |
| Know-how protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• User program protection/password protection</li> <li>• Copy protection</li> <li>• Block protection</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         | Yes<br>Yes<br>Yes                                                                                                                                                                                                                                              |
| Access protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• protection of confidential configuration data</li> <li>• Password for display</li> <li>• Protection level: Write protection</li> <li>• Protection level: Read/write protection</li> <li>• Protection level: Complete protection</li> </ul>                                                                                                                                                                                                                                                                                                            | Yes<br>Yes<br>Yes<br>Yes<br>Yes                                                                                                                                                                                                                                |
| programming / cycle time monitoring / header                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• lower limit</li> <li>• upper limit</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | adjustable minimum cycle time<br>adjustable maximum cycle time                                                                                                                                                                                                 |
| <b>Dimensions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                |
| Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 70 mm                                                                                                                                                                                                                                                          |
| Height                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 147 mm                                                                                                                                                                                                                                                         |
| Depth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 129 mm                                                                                                                                                                                                                                                         |
| <b>Weights</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                |
| Weight, approx.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 845 g                                                                                                                                                                                                                                                          |

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