



Figure similar

SIMATIC S7-1500, Drive Controller CPU 1504D TF With SINAMICS S120 Integrated; Interfaces: 12 DI, 16 DI/DQ, 4 DRIVE-CLiQ, 3 PROFINET: 3+1+1 ports, 1 PROFIBUS, SIMATIC memory card required

| General information                                                                                      |                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product type designation                                                                                 | CPU 1504D TF                                                                                                                                                                                       |
| HW functional status                                                                                     | FS13                                                                                                                                                                                               |
| Firmware version                                                                                         | PLC: V3.1 / SINAMICS Integrated: V5.2 SP3                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>FW update possible</li> </ul>                                     | Yes                                                                                                                                                                                                |
| Product function                                                                                         |                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>I&amp;M data</li> </ul>                                           | Yes; I&M0 to I&M3                                                                                                                                                                                  |
| <ul style="list-style-type: none"> <li>Isochronous mode</li> </ul>                                       | Yes; With minimum OB 6x cycle of 500 µs                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>SysLog</li> </ul>                                                 | Yes                                                                                                                                                                                                |
| Engineering with                                                                                         |                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul> | V19 (FW V3.1) / V16 (FW V2.8) or higher                                                                                                                                                            |
| Integrated drive control                                                                                 |                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>Number of axes for servo control, max.</li> </ul>                 | 6                                                                                                                                                                                                  |
| <ul style="list-style-type: none"> <li>Number of axes for vector control, max.</li> </ul>                | 6                                                                                                                                                                                                  |
| <ul style="list-style-type: none"> <li>Number of axes for V/f control, max.</li> </ul>                   | 12                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>Remark</li> </ul>                                                 | alternative control modes; drive control based on SINAMICS S120 CU320-2 (firmware version V5.x); functional subset compared to CU320-2: no free function blocks, ... ; for details, see the manual |
| Configuration control                                                                                    |                                                                                                                                                                                                    |
| via dataset                                                                                              | Yes                                                                                                                                                                                                |
| Control elements                                                                                         |                                                                                                                                                                                                    |
| Number of keys                                                                                           | 1; FUNCT button                                                                                                                                                                                    |
| Mode selector switch                                                                                     | 1                                                                                                                                                                                                  |
| Supply voltage                                                                                           |                                                                                                                                                                                                    |
| Rated value (DC)                                                                                         | 24 V                                                                                                                                                                                               |
| permissible range, lower limit (DC)                                                                      | 20.4 V                                                                                                                                                                                             |
| permissible range, upper limit (DC)                                                                      | 28.8 V                                                                                                                                                                                             |
| Reverse polarity protection                                                                              | Yes                                                                                                                                                                                                |
| Mains buffering                                                                                          |                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>Mains/voltage failure stored energy time</li> </ul>               | 3 ms; Refers to the power supply on the CPU section                                                                                                                                                |
| <ul style="list-style-type: none"> <li>Repeat rate, min.</li> </ul>                                      | 1 event every 10 s                                                                                                                                                                                 |
| Input current                                                                                            |                                                                                                                                                                                                    |
| Current consumption (rated value)                                                                        | 0.65 A; Without load on inputs/outputs, without supply via DRIVE-CLiQ/USB interface                                                                                                                |
| Current consumption, max.                                                                                | 13.1 A; With load                                                                                                                                                                                  |
| Inrush current, max.                                                                                     | 6 A; Rated value                                                                                                                                                                                   |
| I <sup>2</sup> t                                                                                         | 0.62 A <sup>2</sup> ·s                                                                                                                                                                             |
| Power loss                                                                                               |                                                                                                                                                                                                    |
| Power loss, typ.                                                                                         | 17 W                                                                                                                                                                                               |
| Memory                                                                                                   |                                                                                                                                                                                                    |

|                                                           |                                                                                                                                                       |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of slots for SIMATIC memory card                   | 1                                                                                                                                                     |
| SIMATIC memory card required                              | Yes                                                                                                                                                   |
| <b>Work memory</b>                                        |                                                                                                                                                       |
| • integrated (for program)                                | 4 Mbyte                                                                                                                                               |
| • integrated (for data)                                   | 6 Mbyte                                                                                                                                               |
| <b>Load memory</b>                                        |                                                                                                                                                       |
| • Plug-in (SIMATIC Memory Card), required                 | 12 Mbyte; Recommended at least when integrated drive is used                                                                                          |
| • Plug-in (SIMATIC Memory Card), max.                     | 32 Gbyte                                                                                                                                              |
| <b>Backup</b>                                             |                                                                                                                                                       |
| • maintenance-free                                        | Yes                                                                                                                                                   |
| <b>CPU-blocks</b>                                         |                                                                                                                                                       |
| Number of elements (total)                                | 20 000; 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.                                              | 6 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 100 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; Up to 8 possible for F-blocks                                                                                                                     |
| <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. | 768 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 700 KB                           |
| <b>Flag</b>                                               |                                                                                                                                                       |
| • Size, max.                                              | 16 kbyte                                                                                                                                              |
| • Number of clock memories                                | 8; 8 clock memory bit, grouped into one clock memory byte                                                                                             |

|                                                                 |                                                                                                                                                                                                             |
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| <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                                            | 16 384; max. number of modules / submodules                                                                                                                                                                 |
| <b>I/O address area</b>                                         |                                                                                                                                                                                                             |
| • Inputs                                                        | 32 kbyte; All inputs are in the process image                                                                                                                                                               |
| • Outputs                                                       | 32 kbyte; All outputs are in the process image                                                                                                                                                              |
| per integrated IO subsystem                                     |                                                                                                                                                                                                             |
| — Inputs (volume)                                               | 32 kbyte; Max. 32 KB via X150; max. 8 KB via X160 or X126                                                                                                                                                   |
| — Outputs (volume)                                              | 32 kbyte; Max. 32 KB via X150; max. 8 KB via X160 or X126                                                                                                                                                   |
| <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, 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                                                        | Expansion via CMs / CPs (PROFIBUS, PROFINET, Ethernet) not possible; these CMs / CPs can only be operated in a central rack                                                                                 |
| <b>Number of IO Controllers</b>                                 |                                                                                                                                                                                                             |
| • integrated                                                    | 2                                                                                                                                                                                                           |
| • Via CM                                                        | Expansion via CMs / CPs (PROFIBUS, PROFINET, Ethernet) not possible; these CMs / CPs can only be operated in a central rack                                                                                 |
| <b>PtP CM</b>                                                   |                                                                                                                                                                                                             |
| • Number of PtP CMs                                             | The number of connectable PtP CMs (distributed) 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.: 2.4 s                                                                                                                                                                                           |
| <b>Operating hours counter</b>                                  |                                                                                                                                                                                                             |
| • Number                                                        | 16                                                                                                                                                                                                          |
| <b>Clock synchronization</b>                                    |                                                                                                                                                                                                             |
| • supported                                                     | Yes                                                                                                                                                                                                         |
| • to DP, master                                                 | Yes                                                                                                                                                                                                         |
| • on DP, device                                                 | Yes                                                                                                                                                                                                         |
| • in AS, master                                                 | Yes                                                                                                                                                                                                         |
| • in AS, device                                                 | Yes                                                                                                                                                                                                         |
| • on Ethernet via NTP                                           | Yes                                                                                                                                                                                                         |
| <b>Digital inputs</b>                                           |                                                                                                                                                                                                             |
| integrated channels (DI)                                        | 28; max. depending on parameterization                                                                                                                                                                      |
| Digital inputs, parameterizable                                 | Yes; 12 DI, 8 DI/DQ (X122/X132, SINAMICS Integrated) + 8 DI/DQ (X142, PLC)                                                                                                                                  |
| Source/sink input                                               | P-reading                                                                                                                                                                                                   |
| Input characteristic curve in accordance with IEC 61131, type 3 | Yes                                                                                                                                                                                                         |
| <b>Digital input functions, parameterizable</b>                 |                                                                                                                                                                                                             |
| • Freely usable digital input                                   | Yes; Max. 20 (X122/X132) + max. 8 (X142)                                                                                                                                                                    |
| • Probe                                                         | Yes; Max. 8 (X122/X132) + max. 8 (X142)                                                                                                                                                                     |
| • Digital input with time stamp                                 | Yes; Max. 8 (X142); e.g. for probes                                                                                                                                                                         |
| • Counter                                                       | Yes; Max. 8 (X142); event/cycle duration measurement                                                                                                                                                        |
| • Digital input with oversampling                               | Yes; Max. 8 (X142); 32-fold oversampling                                                                                                                                                                    |
| <b>Input voltage</b>                                            |                                                                                                                                                                                                             |
| • Type of input voltage                                         | DC                                                                                                                                                                                                          |
| • Rated value (DC)                                              | 24 V                                                                                                                                                                                                        |
| • for signal "0"                                                | -3 to +5V                                                                                                                                                                                                   |
| • for signal "1"                                                | +15 to +30 V                                                                                                                                                                                                |
| • permissible voltage at input, min.                            | -30 V                                                                                                                                                                                                       |

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| • permissible voltage at input, max.           | 30 V                                                                                                     |
| Input current                                  |                                                                                                          |
| • for signal "1", typ.                         | 4 mA                                                                                                     |
| Input delay (for rated value of input voltage) |                                                                                                          |
| • Minimum pulse width for program reactions    | 5 µs for X122/X132/X142 (DI/DQ as DI; for X142 with filter setting 1 µs)                                 |
| for standard inputs                            |                                                                                                          |
| — parameterizable                              | No; For X122/X132                                                                                        |
| — with "0" to "1", typ.                        | For X122/X132: 10 µs (DI) / 5 µs (DI/DQ as DI)                                                           |
| — with "1" to "0", typ.                        | For X122/X132: 30 µs (DI) / 5 µs (DI/DQ as DI)                                                           |
| for interrupt inputs                           |                                                                                                          |
| — parameterizable                              | Yes; identical to those for technological functions                                                      |
| for technological functions                    |                                                                                                          |
| — parameterizable                              | Yes; For X142, additionally adjustable input filter: 1 µs / 125 µs                                       |
| — with "0" to "1", typ.                        | 5 µs; For X142; HW delay                                                                                 |
| — with "1" to "0", typ.                        | 5 µs; For X142; HW delay                                                                                 |
| Cable length                                   |                                                                                                          |
| • shielded, max.                               | 30 m; For technological functions: Shielding of the DI recommended depending on the requirements         |
| • unshielded, max.                             | 30 m                                                                                                     |
| <b>Digital outputs</b>                         |                                                                                                          |
| Type of digital output                         | Transistor                                                                                               |
| integrated channels (DO)                       | 16; max. depending on parameterization                                                                   |
| Current-sinking                                | Yes; With High Speed output                                                                              |
| Current-sourcing                               | Yes; Optionally as a P-switch or high-speed push-pull switch (high-speed output)                         |
| Digital outputs, parameterizable               | Yes; 8 DI/DQ (X122/X132, SINAMICS Integrated) + 8 DI/DQ (X142, PLC)                                      |
| Short-circuit protection                       | Yes; electronic/thermal                                                                                  |
| • Response threshold, typ.                     | X122/X132: 1.4 A / X142: 0.9 A (high-speed output: 0.7 A)                                                |
| Limitation of inductive shutdown voltage to    | X122/X132: max. -60 V / X142: max. -64.5 V                                                               |
| Controlling a digital input                    | Yes                                                                                                      |
| minimum pulse duration                         | 2 µs; For high-speed output, single pulse                                                                |
| Digital output functions, parameterizable      |                                                                                                          |
| • Freely usable digital output                 | Yes; Max. 8 (X122/X132) + max. 8 (X142)                                                                  |
| • Digital output with time stamp               | Yes; Max. 8 (X142); e.g. for output cams                                                                 |
| • PWM output                                   | Yes; Max. 8 (X142)                                                                                       |
| — Cycle duration, parameterizable              | Yes; Base frequency 1 / 2 / 4 / 8 / 16 kHz; specification of interpulse period ratio over 32-bit pattern |
| — ON period, min.                              | 0 %                                                                                                      |
| — ON period, max.                              | 100 %                                                                                                    |
| — Resolution of the duty cycle                 | 3.125 %                                                                                                  |
| • Digital output with oversampling             | Yes; Max. 8 (X142)                                                                                       |
| Switching capacity of the outputs              |                                                                                                          |
| • with resistive load, max.                    | 0.5 A; 0.4 A for high-speed output                                                                       |
| • on lamp load, max.                           | 5 W                                                                                                      |
| Load resistance range                          |                                                                                                          |
| • lower limit                                  | 48 Ω; with 24 V DC supply                                                                                |
| Output voltage                                 |                                                                                                          |
| • Type of output voltage                       | DC                                                                                                       |
| • Rated value (DC)                             | 24 V                                                                                                     |
| • for signal "0", max.                         | 28.8 V                                                                                                   |
| • for signal "1", min.                         | 20.4 V                                                                                                   |
| Output current                                 |                                                                                                          |
| • for signal "1" rated value                   | 0.5 A; 0.4 A for high-speed output                                                                       |
| • for signal "1" permissible range, min.       | 2 mA                                                                                                     |
| • for signal "1" permissible range, max.       | 0.6 A; 0.48 A for high-speed output                                                                      |
| Output delay with resistive load               |                                                                                                          |
| • "0" to "1", typ.                             | 100 µs; For X122/X132; at 48 ohm load                                                                    |
| • "1" to "0", typ.                             | 150 µs; For X122/X132; at 48 ohm load                                                                    |
| for technological functions                    |                                                                                                          |
| — "0" to "1", typ.                             | 1 µs; For X142                                                                                           |
| — "1" to "0", typ.                             | 1 µs; For X142 as a high-speed output; 150 µs for standard output                                        |
| <b>Parallel switching of two outputs</b>       |                                                                                                          |

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| <ul style="list-style-type: none"> <li>• for logic links</li> <li>• for uprating</li> <li>• for redundant control of a load</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Yes; For technological functions and high-speed outputs: No<br>No<br>Yes; For technological functions and high-speed outputs: No                                                                                                                                                                                                                                                                                                                                                                |
| <b>Switching frequency</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• with resistive load, max.</li> <li>• with inductive load, max.</li> <li>• on lamp load, max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 35 kHz; With High Speed output, 1 kHz with standard output<br>2 Hz; Max. 1 J per channel<br>11 Hz                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Total current of the outputs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• Current per module, max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Cable length</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• shielded, max.</li> <li>• unshielded, max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 30 m<br>30 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Interfaces</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Number of PROFINET interfaces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Number of PROFIBUS interfaces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Number of USB interfaces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2; USB 3.0 (without function, no connection permissible)                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Number of DRIVE-CLiQ interfaces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4; DRIVE-CLiQ interfaces (24 V / 450 mA per interface for connecting encoders/measuring systems)                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>1. 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; X150<br>3<br>Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <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>Yes                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>PROFINET IO Controller</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Services</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>— Isochronous mode</li> <li>— Direct data exchange</li> <li>— shortest clock pulse</li> <li>— IRT</li> <li>— PROFIenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>— Number of IO Devices per tool, max.</li> <li>— Updating times</li> <li>— PROFINET Security Class</li> </ul> | Yes<br>Yes; Requirement: IRT and isochronous mode (MRPD optional)<br>500 µs<br>Yes<br>Yes; per user program<br>Yes; Max. 32 PROFINET devices<br>256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET<br>64<br>256<br>256<br>8; in total across all interfaces<br>8<br>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<br>1 |
| <b>Update time for IRT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>— for send cycle of 500 µs</li> <li>— for send cycle of 1 ms</li> <li>— for send cycle of 2 ms</li> <li>— for send cycle of 4 ms</li> <li>— With IRT and parameterization of "odd" send cycles</li> </ul>                                                                                                                                                                                                                                                                                                                                                        | 500 µs to 8 ms<br>1 ms to 16 ms<br>2 ms to 32 ms<br>4 ms to 64 ms<br>Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)                                                                                                                                                                                                                                                                                                                                   |
| <b>Update time for RT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>— for send cycle of 500 µs</li> <li>— for send cycle of 1 ms</li> <li>— for send cycle of 2 ms</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 500 µs to 256 ms<br>1 ms to 512 ms<br>2 ms to 512 ms                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                                                                               |                                                                                                                                                                        |
|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| — for send cycle of 4 ms                                                      | 4 ms to 512 ms                                                                                                                                                         |
| <b>PROFINET IO Device</b>                                                     |                                                                                                                                                                        |
| <b>Services</b>                                                               |                                                                                                                                                                        |
| — Isochronous mode                                                            | No                                                                                                                                                                     |
| — shortest clock pulse                                                        | 500 µs                                                                                                                                                                 |
| — IRT                                                                         | Yes                                                                                                                                                                    |
| — PROFINergy                                                                  | Yes; per user program                                                                                                                                                  |
| — Shared device                                                               | Yes                                                                                                                                                                    |
| — Number of IO Controllers with shared device, max.                           | 4                                                                                                                                                                      |
| — activation/deactivation of I-devices                                        | Yes; per user program                                                                                                                                                  |
| — Asset management record                                                     | Yes; per user program                                                                                                                                                  |
| — PROFINET Security Class                                                     | SNMP Configuration and DCP Read Only                                                                                                                                   |
| <b>2. Interface</b>                                                           |                                                                                                                                                                        |
| <b>Interface types</b>                                                        |                                                                                                                                                                        |
| • RJ 45 (Ethernet)                                                            | Yes; X160                                                                                                                                                              |
| • Number of ports                                                             | 1                                                                                                                                                                      |
| • integrated switch                                                           | No                                                                                                                                                                     |
| <b>Protocols</b>                                                              |                                                                                                                                                                        |
| • IP protocol                                                                 | Yes; IPv4                                                                                                                                                              |
| • PROFINET IO Controller                                                      | Yes                                                                                                                                                                    |
| • PROFINET IO Device                                                          | Yes                                                                                                                                                                    |
| • SIMATIC communication                                                       | Yes                                                                                                                                                                    |
| • Open IE communication                                                       | Yes; Optionally also encrypted                                                                                                                                         |
| • Web server                                                                  | Yes                                                                                                                                                                    |
| • Media redundancy                                                            | No                                                                                                                                                                     |
| <b>PROFINET IO Controller</b>                                                 |                                                                                                                                                                        |
| <b>Services</b>                                                               |                                                                                                                                                                        |
| — Isochronous mode                                                            | No                                                                                                                                                                     |
| — Direct data exchange                                                        | No                                                                                                                                                                     |
| — IRT                                                                         | No                                                                                                                                                                     |
| — PROFINergy                                                                  | Yes; per user program                                                                                                                                                  |
| — Prioritized startup                                                         | No                                                                                                                                                                     |
| — Number of connectable IO Devices, max.                                      | 128; 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.                               | 128                                                                                                                                                                    |
| — of which in line, max.                                                      | 128                                                                                                                                                                    |
| — Number of IO Devices that can be simultaneously activated/deactivated, max. | 8; in total across all interfaces                                                                                                                                      |
| — Number of IO Devices per tool, max.                                         | 8                                                                                                                                                                      |
| — Updating times                                                              | The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data |
| — PROFINET Security Class                                                     | 1                                                                                                                                                                      |
| <b>Update time for RT</b>                                                     |                                                                                                                                                                        |
| — for send cycle of 1 ms                                                      | 1 ms to 512 ms                                                                                                                                                         |
| <b>PROFINET IO Device</b>                                                     |                                                                                                                                                                        |
| <b>Services</b>                                                               |                                                                                                                                                                        |
| — 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                                                                                                                                                  |
| — PROFINET Security Class                                                     | SNMP Configuration and DCP Read Only                                                                                                                                   |
| <b>3. Interface</b>                                                           |                                                                                                                                                                        |
| <b>Interface types</b>                                                        |                                                                                                                                                                        |
| • RJ 45 (Ethernet)                                                            | Yes; X130                                                                                                                                                              |
| • Number of ports                                                             | 1                                                                                                                                                                      |
| • integrated switch                                                           | No                                                                                                                                                                     |
| <b>Protocols</b>                                                              |                                                                                                                                                                        |

|                          |                                |
|--------------------------|--------------------------------|
| • IP protocol            | Yes; IPv4                      |
| • PROFINET IO Controller | No                             |
| • PROFINET IO Device     | No                             |
| • SIMATIC communication  | Yes                            |
| • Open IE communication  | Yes; Optionally also encrypted |
| • Web server             | Yes                            |

#### 4. Interface

|                                                   |                                                                                                    |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Interface types                                   |                                                                                                    |
| • RS 485                                          | Yes; X126                                                                                          |
| • Number of ports                                 | 1                                                                                                  |
| Protocols                                         |                                                                                                    |
| • PROFIBUS DP master                              | Yes                                                                                                |
| • PROFIBUS DP device                              | No                                                                                                 |
| • SIMATIC communication                           | Yes                                                                                                |
| PROFIBUS DP master                                |                                                                                                    |
| • Number of connections, max.                     | 48; for the integrated PROFIBUS DP interface                                                       |
| • max. number of DP devices                       | 125; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET |
| Services                                          |                                                                                                    |
| — Equidistance                                    | Yes                                                                                                |
| — Isochronous mode                                | Yes                                                                                                |
| — activation/deactivation of DP devices           | Yes                                                                                                |
| Interface types                                   |                                                                                                    |
| RJ 45 (Ethernet)                                  |                                                                                                    |
| • 100 Mbps                                        | Yes                                                                                                |
| • 1000 Mbps                                       | Yes; Only at the X130 interface                                                                    |
| • Autonegotiation                                 | Yes                                                                                                |
| • Autocrossing                                    | Yes                                                                                                |
| • Industrial Ethernet status LED                  | Yes; LINK and ACTIVITY                                                                             |
| RS 485                                            |                                                                                                    |
| • Transmission rate, max.                         | 12 Mbit/s                                                                                          |
| Protocols                                         |                                                                                                    |
| PROFIsafe                                         | Yes; V2.4 / V2.6                                                                                   |
| Number of connections                             |                                                                                                    |
| • Number of connections, max.                     | 384; Via integrated interfaces of the CPU                                                          |
| • Number of connections reserved for ES/HMI/web   | 10                                                                                                 |
| • Number of connections via integrated interfaces | 320                                                                                                |
| • Number of S7 routing paths                      | 64; in total, only 16 S7-Routing connections are supported via PROFIBUS                            |
| Redundancy mode                                   |                                                                                                    |
| • H-Sync forwarding                               | Yes                                                                                                |
| Media redundancy                                  |                                                                                                    |
| — Media redundancy                                | only via interface X150                                                                            |
| — MRP                                             | Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client                 |
| — MRP interconnection, supported                  | Yes; as MRP ring node according to IEC 62439-2 Edition 3.0                                         |
| — MRPD                                            | Yes; Requirement: IRT                                                                              |
| — Switchover time on line break, typ.             | 200 ms; For MRP, bumpless for MRPD                                                                 |
| — Number of stations in the ring, max.            | 50                                                                                                 |
| SIMATIC communication                             |                                                                                                    |
| • PG/OP communication                             | Yes; encryption with TLS V1.3 pre-selected                                                         |
| • S7 routing                                      | Yes                                                                                                |
| • Data record routing                             | Yes                                                                                                |
| • S7 communication, as server                     | Yes                                                                                                |
| • S7 communication, as client                     | Yes                                                                                                |
| • User data per job, max.                         | See online help (S7 communication, user data size)                                                 |
| Open IE communication                             |                                                                                                    |
| • TCP/IP                                          | Yes                                                                                                |
| — Data length, max.                               | 64 kbyte                                                                                           |
| — several passive connections per port, supported | Yes                                                                                                |
| • ISO-on-TCP (RFC1006)                            | Yes                                                                                                |
| — Data length, max.                               | 64 kbyte                                                                                           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• UDP <ul style="list-style-type: none"> <li>— Data length, max.</li> <li>— UDP multicast</li> </ul> </li> <li>• DHCP</li> <li>• DNS</li> <li>• SNMP</li> <li>• DCP</li> <li>• LLDP</li> <li>• Encryption</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>Yes</p> <p>2 kbyte; 1 472 bytes for UDP broadcast</p> <p>Yes; 128 multicast circuits (of which max. 5 via X150)</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optional</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Web server</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> <li>• web API <ul style="list-style-type: none"> <li>— Number of sessions, max.</li> <li>— number of simultaneous HTTP calls, max.</li> <li>— HTTP request body, max.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>Yes; Standard and user pages</p> <p>Yes; Standard and user pages</p> <p>200</p> <p>4</p> <p>131 072 byte</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>OPC UA</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>• Runtime license required</li> <li>• OPC UA Client <ul style="list-style-type: none"> <li>— Application authentication</li> <li>— Security policies</li> <li>— User authentication</li> <li>— Number of connections, max.</li> <li>— Number of nodes of the client interfaces, recommended max.</li> <li>— Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/OPC-UA_WriteList, max.</li> <li>— Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max.</li> <li>— Number of elements for one call of OPC-UA_MethodGetHandleList, max.</li> <li>— Number of simultaneous calls of the client instructions for session management, per connection, max.</li> <li>— Number of simultaneous calls of the client instructions for data access, per connection, max.</li> <li>— Number of registerable nodes, max.</li> <li>— Number of registerable method calls of OPC-UA_MethodCall, max.</li> <li>— Number of inputs/outputs when calling OPC-UA_MethodCall, max.</li> </ul> </li> <li>• OPC UA Server <ul style="list-style-type: none"> <li>— Application authentication</li> <li>— Security policies</li> <li>— User authentication</li> <li>— GDS support (certificate management)</li> <li>— Number of sessions, max.</li> <li>— Number of accessible variables, max.</li> <li>— Number of registerable nodes, max.</li> <li>— Number of subscriptions per session, max.</li> <li>— Sampling interval, min.</li> <li>— Publishing interval, min.</li> <li>— Number of server methods, max.</li> <li>— Number of inputs/outputs per server method, max.</li> <li>— Number of monitored items, recommended max.</li> <li>— Number of server interfaces, max.</li> <li>— Number of nodes for user-defined server interfaces, max.</li> </ul> </li> <li>• Alarms and Conditions <ul style="list-style-type: none"> <li>— Number of program alarms</li> </ul> </li> </ul> | <p>Yes; "Small" license required</p> <p>Yes; Data Access (registered Read/Write), Method Call</p> <p>Yes</p> <p>Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>"anonymous" or by user name &amp; password</p> <p>40</p> <p>5 000</p> <p>300</p> <p>20</p> <p>100</p> <p>1</p> <p>5</p> <p>5 000</p> <p>100</p> <p>20</p> <p>Yes; Data Access (Read, Write, Subscribe), Method Call, Alarms &amp; Condition (A&amp;C), Custom Address Space</p> <p>Yes</p> <p>available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss</p> <p>"anonymous" or by user name &amp; password</p> <p>Yes</p> <p>64</p> <p>200 000</p> <p>50 000</p> <p>50</p> <p>10 ms</p> <p>10 ms</p> <p>100</p> <p>20</p> <p>10 000; for 1 s sampling interval and 1 s send interval</p> <p>10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"</p> <p>50 000</p> <p>Yes</p> <p>400</p> |

|                                                                       |                                                                                                                                   |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| — Number of alarms for system diagnostics                             | 200                                                                                                                               |
| <b>Further protocols</b>                                              |                                                                                                                                   |
| • MODBUS                                                              | Yes; MODBUS TCP                                                                                                                   |
| <b>Isochronous mode</b>                                               |                                                                                                                                   |
| Equidistance                                                          | Yes                                                                                                                               |
| Jitter, max.                                                          | 1 µs                                                                                                                              |
| <b>S7 message functions</b>                                           |                                                                                                                                   |
| Number of login stations for message functions, max.                  | 64                                                                                                                                |
| number of subscriptions, max.                                         | 750                                                                                                                               |
| number of tags/attributes for subscriptions, max.                     | 50 000                                                                                                                            |
| 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.                      | 10 000                                                                                                                            |
| Number of simultaneously active program alarms                        |                                                                                                                                   |
| • Number of program alarms                                            | 4 000                                                                                                                             |
| • Number of alarms for system diagnostics                             | 1 000                                                                                                                             |
| • Number of alarms for motion technology objects                      | 480                                                                                                                               |
| <b>Test commissioning functions</b>                                   |                                                                                                                                   |
| Joint commission (Team Engineering)                                   | Yes; Parallel online access possible for up to 10 engineering systems                                                             |
| Status block                                                          | Yes; Up to 16 simultaneously (in total across all ES clients)                                                                     |
| Single step                                                           | No                                                                                                                                |
| Number of breakpoints                                                 | 20                                                                                                                                |
| Profiling                                                             | No                                                                                                                                |
| <b>Status/control</b>                                                 |                                                                                                                                   |
| • Status/control variable                                             | Yes; without fail-safe                                                                                                            |
| • Variables                                                           | inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, 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; without fail-safe                                                                                                            |
| • Forcing, variables                                                  | peripheral inputs/outputs (without fail-safe)                                                                                     |
| • Number of variables, max.                                           | 200                                                                                                                               |
| <b>Diagnostic buffer</b>                                              |                                                                                                                                   |
| • present                                                             | Yes                                                                                                                               |
| • Number of entries, max.                                             | 3 200                                                                                                                             |
| — of which powerfail-proof                                            | 1 000                                                                                                                             |
| <b>Traces</b>                                                         |                                                                                                                                   |
| • Number of configurable Traces                                       | 8                                                                                                                                 |
| • Memory size per trace, max.                                         | 512 kbyte                                                                                                                         |
| <b>Interrupts/diagnostics/status information</b>                      |                                                                                                                                   |
| <b>Diagnostics indication LED</b>                                     |                                                                                                                                   |
| • RUN/STOP LED                                                        | Yes                                                                                                                               |
| • ERROR LED                                                           | Yes                                                                                                                               |
| • MAINT LED                                                           | Yes                                                                                                                               |
| • ACT LED                                                             | Yes; For memory card access                                                                                                       |
| • RDY LED                                                             | Yes                                                                                                                               |
| • COM 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 |
| • Number of available Motion Control resources for technology objects | 3 200                                                                                                                             |
| • Required Motion Control resources                                   |                                                                                                                                   |
| — per speed-controlled axis                                           | 40                                                                                                                                |
| — per positioning axis                                                | 80                                                                                                                                |
| — per synchronous axis                                                | 160                                                                                                                               |
| — per external encoder                                                | 80                                                                                                                                |
| — per output cam                                                      | 20                                                                                                                                |

|                                                                                |                                                                  |
|--------------------------------------------------------------------------------|------------------------------------------------------------------|
| — per cam track                                                                | 160                                                              |
| — per probe                                                                    | 40                                                               |
| • Number of available Extended Motion Control resources for technology objects | 160                                                              |
| • Required Extended Motion Control resources                                   |                                                                  |
| — per cam (1 000 points and 50 segments)                                       | 2                                                                |
| — per cam (10 000 points and 50 segments)                                      | 20                                                               |
| — for each set of kinematics                                                   | 30                                                               |
| — per Interpreter                                                              | 60                                                               |
| — Per leading axis proxy                                                       | 3                                                                |
| • kinematics functions                                                         |                                                                  |
| — kinematics with up to 4 interpolating axes                                   | Yes; max. 3D + orientation                                       |
| — kinematics with 5 or more interpolating axes                                 | No                                                               |
| — user-defined kinematics                                                      | Yes                                                              |
| — SIMATIC Safe Kinematics                                                      | No                                                               |
| • Positioning axis                                                             |                                                                  |
| — Number of positioning axes at motion control cycle of 4 ms (typical value)   | 12                                                               |
| — Number of positioning axes at motion control cycle of 8 ms (typical value)   | 24                                                               |
| Controller                                                                     |                                                                  |
| • PID_Compact                                                                  | Yes; Universal PID controller with integrated optimization       |
| • PID_3Step                                                                    | Yes; PID controller with integrated optimization for valves      |
| • PID-Temp                                                                     | Yes; PID controller with integrated optimization for temperature |
| Counting and measuring                                                         |                                                                  |
| • High-speed counter                                                           | Yes                                                              |
| <b>Integrated Functions</b>                                                    |                                                                  |
| Counter                                                                        |                                                                  |
| • Number of counters                                                           | 8; Event/cycle duration measurement                              |
| • Counting frequency, max.                                                     | 32 kHz                                                           |
| Counting functions                                                             |                                                                  |
| • Continuous counting                                                          | Yes                                                              |
| Measuring functions                                                            |                                                                  |
| Measuring range                                                                |                                                                  |
| — Cycle duration measurement, min.                                             | 10 µs; 5 µs minimum pulse width                                  |
| — Cycle duration measurement, max.                                             | 178 s                                                            |
| Accuracy                                                                       |                                                                  |
| — Cycle duration measurement                                                   | Sampling of the time period with 41.67 ns increments             |
| <b>Potential separation</b>                                                    |                                                                  |
| Potential separation digital inputs                                            |                                                                  |
| • between the channels                                                         | Yes; 12 DI (X122/X132), in 2 groups of 6 DI each                 |
| Potential separation digital outputs                                           |                                                                  |
| • between the channels                                                         | No; 8 DI/DQ (X122/X132) and 8 DI/DQ (X142)                       |
| <b>Degree and class of protection</b>                                          |                                                                  |
| IP degree of protection                                                        | IP20 control cabinet installation / open type                    |
| <b>Standards, approvals, certificates</b>                                      |                                                                  |
| CE mark                                                                        | Yes                                                              |
| UKCA mark                                                                      | Yes                                                              |
| cULus                                                                          | Yes                                                              |
| RCM (formerly C-TICK)                                                          | Yes                                                              |
| KC approval                                                                    | Yes                                                              |
| EAC (formerly Gost-R)                                                          | Yes                                                              |
| Ecological footprint                                                           |                                                                  |
| • environmental product declaration                                            | Yes                                                              |
| Global warming potential                                                       |                                                                  |
| — global warming potential, (total) [CO2 eq]                                   | 403 kg                                                           |
| — global warming potential, (during production) [CO2 eq]                       | 107 kg                                                           |
| — global warming potential, (during operation) [CO2 eq]                        | 306 kg                                                           |
| — global warming potential, (after end of life cycle) [CO2 eq]                 | -10.7 kg                                                         |

|                                                                                                                                 |                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Highest safety class achievable in safety mode                                                                                  |                                                                                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"> <li>• Performance level according to ISO 13849-1</li> <li>• SIL acc. to IEC 61508</li> </ul> | PLd (PLe if exclusively F-CPU is used)<br>SIL 2 (SIL 3 if exclusively F-CPU is used)                                                                                                                                                                                                          |
| Probability of failure (for service life of 20 years and repair time of 100 hours)                                              |                                                                                                                                                                                                                                                                                               |
| — Low demand mode: PFDavg in accordance with SIL2                                                                               | < 14.00E-04                                                                                                                                                                                                                                                                                   |
| — Low demand mode: PFDavg in accordance with SIL3                                                                               | < 2.00E-05 PLd (if exclusively F-CPU is used)                                                                                                                                                                                                                                                 |
| — High demand/continuous mode: PFH in accordance with SIL2                                                                      | < 14.00E-09                                                                                                                                                                                                                                                                                   |
| — High demand/continuous mode: PFH in accordance with SIL3                                                                      | if exclusively F-CPU is used: < 1.00E-09 (at a site altitude of up to 3000 m); < 2.00E-09 (at a site altitude of more than 3000 m and up to 4000 m)                                                                                                                                           |
| Ambient conditions                                                                                                              |                                                                                                                                                                                                                                                                                               |
| Ambient temperature during operation                                                                                            |                                                                                                                                                                                                                                                                                               |
| • min.                                                                                                                          | 0 °C                                                                                                                                                                                                                                                                                          |
| • max.                                                                                                                          | 55 °C                                                                                                                                                                                                                                                                                         |
| Ambient temperature during storage/transportation                                                                               |                                                                                                                                                                                                                                                                                               |
| • min.                                                                                                                          | -40 °C; Long-term storage: -25 °C                                                                                                                                                                                                                                                             |
| • max.                                                                                                                          | 70 °C; Long-term storage: +55 °C                                                                                                                                                                                                                                                              |
| Altitude during operation relating to sea level                                                                                 |                                                                                                                                                                                                                                                                                               |
| • Installation altitude above sea level, max.                                                                                   | 4 000 m; as of an altitude of 2000 m, the maximum ambient air temperature is reduced by 7 °C per 1000 m; see SINAMICS documentation for SINAMICS S120 drive components                                                                                                                        |
| • Ambient air temperature-barometric pressure-altitude                                                                          | Permissible air pressure: 620 hPa ... 1 060 hPa                                                                                                                                                                                                                                               |
| configuration / header                                                                                                          |                                                                                                                                                                                                                                                                                               |
| configuration / programming / header                                                                                            |                                                                                                                                                                                                                                                                                               |
| Programming language                                                                                                            |                                                                                                                                                                                                                                                                                               |
| — LAD                                                                                                                           | Yes; incl. failsafe                                                                                                                                                                                                                                                                           |
| — FBD                                                                                                                           | Yes; incl. failsafe                                                                                                                                                                                                                                                                           |
| — STL                                                                                                                           | Yes                                                                                                                                                                                                                                                                                           |
| — SCL                                                                                                                           | Yes                                                                                                                                                                                                                                                                                           |
| — CFC                                                                                                                           | No                                                                                                                                                                                                                                                                                            |
| — GRAPH                                                                                                                         | Yes                                                                                                                                                                                                                                                                                           |
| Know-how protection                                                                                                             |                                                                                                                                                                                                                                                                                               |
| • User program protection/password protection                                                                                   | Yes                                                                                                                                                                                                                                                                                           |
| • Copy protection                                                                                                               | Yes                                                                                                                                                                                                                                                                                           |
| • Block protection                                                                                                              | Yes                                                                                                                                                                                                                                                                                           |
| Access protection                                                                                                               |                                                                                                                                                                                                                                                                                               |
| • protection of confidential configuration data                                                                                 | Yes                                                                                                                                                                                                                                                                                           |
| • Protection level: Write protection                                                                                            | Yes                                                                                                                                                                                                                                                                                           |
| • Protection level: Read/write protection                                                                                       | Yes                                                                                                                                                                                                                                                                                           |
| • Protection level: Write protection for Failsafe                                                                               | Yes                                                                                                                                                                                                                                                                                           |
| • Protection level: Complete protection                                                                                         | Yes                                                                                                                                                                                                                                                                                           |
| • User administration                                                                                                           | Yes                                                                                                                                                                                                                                                                                           |
| programming / cycle time monitoring / header                                                                                    |                                                                                                                                                                                                                                                                                               |
| • lower limit                                                                                                                   | adjustable minimum cycle time                                                                                                                                                                                                                                                                 |
| • upper limit                                                                                                                   | adjustable maximum cycle time                                                                                                                                                                                                                                                                 |
| Dimensions                                                                                                                      |                                                                                                                                                                                                                                                                                               |
| Width                                                                                                                           | 50 mm                                                                                                                                                                                                                                                                                         |
| Height                                                                                                                          | 300 mm                                                                                                                                                                                                                                                                                        |
| Depth                                                                                                                           | 226 mm; 270 mm with spacer (included in scope of supply)                                                                                                                                                                                                                                      |
| Weights                                                                                                                         |                                                                                                                                                                                                                                                                                               |
| Weight, approx.                                                                                                                 | 2 400 g                                                                                                                                                                                                                                                                                       |
| Other                                                                                                                           |                                                                                                                                                                                                                                                                                               |
| Note:                                                                                                                           | The SIMATIC Drive Controller deviates from the usual SIMATIC S7-1500 ambient conditions and specifications as well as the available approvals and certificates because of the drive design. For details, see the SIMATIC Drive Controller device and system manual. Operation is without fan. |

last modified:

10/9/2024 