



\*\*\* spare part \*\*\* SIMATIC S7-1500F, CPU 1515F-2 PN, central processing unit with work memory 750 KB for program and 3 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 30 ns bit performance, SIMATIC Memory Card required

| General information                                      |                                                                                                            |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Product type designation                                 | CPU 1515F-2 PN                                                                                             |
| HW functional status                                     | FS01                                                                                                       |
| Firmware version                                         | V2.9                                                                                                       |
| Product function                                         |                                                                                                            |
| • I&M data                                               | Yes; I&M0 to I&M3                                                                                          |
| • Isochronous mode                                       | Yes; Distributed and central; with minimum OB 6x cycle of 500 µs (distributed) and 1 ms (central)          |
| Engineering with                                         |                                                                                                            |
| • STEP 7 TIA Portal configurable/integrated from version | V17 (FW V2.9) / V16 (FW V2.8) or higher; with older TIA Portal versions configurable as 6ES7515-2FM01-0AB0 |
| Configuration control                                    |                                                                                                            |
| via dataset                                              | Yes                                                                                                        |
| Display                                                  |                                                                                                            |
| Screen diagonal [cm]                                     | 6.1 cm                                                                                                     |
| Control elements                                         |                                                                                                            |
| Number of keys                                           | 8                                                                                                          |
| Mode buttons                                             | 2                                                                                                          |
| Supply voltage                                           |                                                                                                            |
| Rated value (DC)                                         | 24 V                                                                                                       |
| permissible range, lower limit (DC)                      | 19.2 V                                                                                                     |
| permissible range, upper limit (DC)                      | 28.8 V                                                                                                     |
| Reverse polarity protection                              | Yes                                                                                                        |
| Mains buffering                                          |                                                                                                            |
| • Mains/voltage failure stored energy time               | 5 ms                                                                                                       |
| • Repeat rate, min.                                      | 1/s                                                                                                        |
| Input current                                            |                                                                                                            |
| Current consumption (rated value)                        | 0.8 A                                                                                                      |
| Current consumption, max.                                | 1.1 A                                                                                                      |
| Inrush current, max.                                     | 2.4 A; Rated value                                                                                         |
| $I^2t$                                                   | 0.02 A <sup>2</sup> ·s                                                                                     |
| Power                                                    |                                                                                                            |
| Infeed power to the backplane bus                        | 12 W                                                                                                       |
| Power consumption from the backplane bus (balanced)      | 6.2 W                                                                                                      |
| Power loss                                               |                                                                                                            |
| Power loss, typ.                                         | 6.3 W                                                                                                      |
| Storage                                                  |                                                                                                            |
| Number of slots for SIMATIC memory card                  | 1                                                                                                          |
| SIMATIC memory card required                             | Yes                                                                                                        |

|                                                           |                                                                                                                                                       |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Work memory                                               |                                                                                                                                                       |
| • integrated (for program)                                | 750 kbyte                                                                                                                                             |
| • integrated (for data)                                   | 3 Mbyte                                                                                                                                               |
| Load memory                                               |                                                                                                                                                       |
| • Plug-in (SIMATIC Memory Card), max.                     | 32 Gbyte                                                                                                                                              |
| Backup                                                    |                                                                                                                                                       |
| • maintenance-free                                        | Yes                                                                                                                                                   |
| CPU processing times                                      |                                                                                                                                                       |
| for bit operations, typ.                                  | 30 ns                                                                                                                                                 |
| for word operations, typ.                                 | 36 ns                                                                                                                                                 |
| for fixed point arithmetic, typ.                          | 48 ns                                                                                                                                                 |
| for floating point arithmetic, typ.                       | 192 ns                                                                                                                                                |
| CPU-blocks                                                |                                                                                                                                                       |
| Number of elements (total)                                | 8 000; Blocks (OB, FB, FC, DB) and UDTs                                                                                                               |
| DB                                                        |                                                                                                                                                       |
| • 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.                                              | 3 Mbyte; For DBs with absolute addressing, the max. size is 64 KB                                                                                     |
| FB                                                        |                                                                                                                                                       |
| • Number range                                            | 0 ... 65 535                                                                                                                                          |
| • Size, max.                                              | 500 kbyte                                                                                                                                             |
| FC                                                        |                                                                                                                                                       |
| • Number range                                            | 0 ... 65 535                                                                                                                                          |
| • Size, max.                                              | 500 kbyte                                                                                                                                             |
| OB                                                        |                                                                                                                                                       |
| • Size, max.                                              | 500 kbyte                                                                                                                                             |
| • Number of free cycle OBs                                | 100                                                                                                                                                   |
| • Number of time alarm OBs                                | 20                                                                                                                                                    |
| • Number of delay alarm OBs                               | 20                                                                                                                                                    |
| • Number of cyclic interrupt OBs                          | 20; With minimum OB 3x cycle of 500 µs                                                                                                                |
| • Number of process alarm OBs                             | 50                                                                                                                                                    |
| • Number of DPV1 alarm OBs                                | 3                                                                                                                                                     |
| • Number of isochronous mode OBs                          | 2                                                                                                                                                     |
| • Number of technology synchronous alarm OBs              | 2                                                                                                                                                     |
| • Number of startup OBs                                   | 100                                                                                                                                                   |
| • Number of asynchronous error OBs                        | 4                                                                                                                                                     |
| • Number of synchronous error OBs                         | 2                                                                                                                                                     |
| • Number of diagnostic alarm OBs                          | 1                                                                                                                                                     |
| Nesting depth                                             |                                                                                                                                                       |
| • per priority class                                      | 24; Up to 8 possible for F-blocks                                                                                                                     |
| Counters, timers and their retentivity                    |                                                                                                                                                       |
| S7 counter                                                |                                                                                                                                                       |
| • Number                                                  | 2 048                                                                                                                                                 |
| Retentivity                                               |                                                                                                                                                       |
| — adjustable                                              | Yes                                                                                                                                                   |
| IEC counter                                               |                                                                                                                                                       |
| • Number                                                  | Any (only limited by the main memory)                                                                                                                 |
| Retentivity                                               |                                                                                                                                                       |
| — adjustable                                              | Yes                                                                                                                                                   |
| S7 timer                                                  |                                                                                                                                                       |
| • Number                                                  | 2 048                                                                                                                                                 |
| Retentivity                                               |                                                                                                                                                       |
| — adjustable                                              | Yes                                                                                                                                                   |
| IEC timer                                                 |                                                                                                                                                       |
| • Number                                                  | Any (only limited by the main memory)                                                                                                                 |
| Retentivity                                               |                                                                                                                                                       |
| — can be set                                              | Yes                                                                                                                                                   |
| Data areas and their retentivity                          |                                                                                                                                                       |
| Retentive data area (incl. timers, counters, flags), max. | 512 kbyte; In total; available retentive memory for bit memories, timers,                                                                             |

|                                                                    |                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                    | counters, DBs, and technology data (axes): 472 KB                                                                                                                                                                                 |
| Extended retentive data area (incl. timers, counters, flags), max. | 3 Mbyte; When using PS 6 0W 24/48/60 V DC HF                                                                                                                                                                                      |
| <b>Flag</b>                                                        |                                                                                                                                                                                                                                   |
| • Size, max.                                                       | 16 kbyte                                                                                                                                                                                                                          |
| • Number of clock memories                                         | 8; 8 clock memory bit, grouped into one clock memory byte                                                                                                                                                                         |
| <b>Data blocks</b>                                                 |                                                                                                                                                                                                                                   |
| • Retentivity adjustable                                           | Yes                                                                                                                                                                                                                               |
| • Retentivity preset                                               | No                                                                                                                                                                                                                                |
| <b>Local data</b>                                                  |                                                                                                                                                                                                                                   |
| • per priority class, max.                                         | 64 kbyte; max. 16 KB per block                                                                                                                                                                                                    |
| <b>Address area</b>                                                |                                                                                                                                                                                                                                   |
| Number of IO modules                                               | 8 192; max. number of modules / submodules                                                                                                                                                                                        |
| <b>I/O address area</b>                                            |                                                                                                                                                                                                                                   |
| • Inputs                                                           | 32 kbyte; All inputs are in the process image                                                                                                                                                                                     |
| • Outputs                                                          | 32 kbyte; All outputs are in the process image                                                                                                                                                                                    |
| <b>per integrated IO subsystem</b>                                 |                                                                                                                                                                                                                                   |
| — Inputs (volume)                                                  | 8 kbyte                                                                                                                                                                                                                           |
| — Outputs (volume)                                                 | 8 kbyte                                                                                                                                                                                                                           |
| <b>per CM/CP</b>                                                   |                                                                                                                                                                                                                                   |
| — Inputs (volume)                                                  | 8 kbyte                                                                                                                                                                                                                           |
| — Outputs (volume)                                                 | 8 kbyte                                                                                                                                                                                                                           |
| <b>Subprocess images</b>                                           |                                                                                                                                                                                                                                   |
| • Number of subprocess images, max.                                | 32                                                                                                                                                                                                                                |
| <b>Hardware configuration</b>                                      |                                                                                                                                                                                                                                   |
| Number of distributed IO systems                                   | 64; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link) |
| <b>Number of DP masters</b>                                        |                                                                                                                                                                                                                                   |
| • Via CM                                                           | 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total                                                                                                                                                 |
| <b>Number of IO Controllers</b>                                    |                                                                                                                                                                                                                                   |
| • Integrated                                                       | 2                                                                                                                                                                                                                                 |
| • via CM                                                           | 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total                                                                                                                                                 |
| <b>Rack</b>                                                        |                                                                                                                                                                                                                                   |
| • Modules per rack, max.                                           | 32; CPU + 31 modules                                                                                                                                                                                                              |
| • Number of lines, max.                                            | 1                                                                                                                                                                                                                                 |
| <b>PtP CM</b>                                                      |                                                                                                                                                                                                                                   |
| • Number of PtP CMs                                                | the number of connectable PtP CMs is only limited by the number of available slots                                                                                                                                                |
| <b>Time of day</b>                                                 |                                                                                                                                                                                                                                   |
| <b>Clock</b>                                                       |                                                                                                                                                                                                                                   |
| • Type                                                             | Hardware clock                                                                                                                                                                                                                    |
| • Backup time                                                      | 6 wk; At 40 °C ambient temperature, typically                                                                                                                                                                                     |
| • Deviation per day, max.                                          | 10 s; Typ.: 2 s                                                                                                                                                                                                                   |
| <b>Operating hours counter</b>                                     |                                                                                                                                                                                                                                   |
| • Number                                                           | 16                                                                                                                                                                                                                                |
| <b>Clock synchronization</b>                                       |                                                                                                                                                                                                                                   |
| • supported                                                        | Yes                                                                                                                                                                                                                               |
| • in AS, master                                                    | Yes                                                                                                                                                                                                                               |
| • in AS, device                                                    | Yes                                                                                                                                                                                                                               |
| • on Ethernet via NTP                                              | Yes                                                                                                                                                                                                                               |
| <b>Interfaces</b>                                                  |                                                                                                                                                                                                                                   |
| Number of PROFINET interfaces                                      | 2                                                                                                                                                                                                                                 |
| <b>1. Interface</b>                                                |                                                                                                                                                                                                                                   |
| <b>Interface types</b>                                             |                                                                                                                                                                                                                                   |
| • RJ 45 (Ethernet)                                                 | Yes; X1                                                                                                                                                                                                                           |
| • Number of ports                                                  | 2                                                                                                                                                                                                                                 |
| • integrated switch                                                | Yes                                                                                                                                                                                                                               |
| <b>Protocols</b>                                                   |                                                                                                                                                                                                                                   |

|                                                                                                                                                                                                                                                     |                                                                                                                                                                        |
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| <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> | <p>Yes; IPv4</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optionally also encrypted</p> <p>Yes</p> <p>Yes; MRP Automanager according to IEC 62439-2 Edition 2.0</p>    |
| <b>PROFINET IO Controller</b>                                                                                                                                                                                                                       |                                                                                                                                                                        |
| <b>Services</b>                                                                                                                                                                                                                                     |                                                                                                                                                                        |
| — PG/OP communication                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — Isochronous mode                                                                                                                                                                                                                                  | Yes                                                                                                                                                                    |
| — Direct data exchange                                                                                                                                                                                                                              | Yes; Requirement: IRT and isochronous mode (MRPD optional)                                                                                                             |
| — IRT                                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — PROFINergy                                                                                                                                                                                                                                        | Yes; per user program                                                                                                                                                  |
| — Prioritized startup                                                                                                                                                                                                                               | Yes; Max. 32 PROFINET devices                                                                                                                                          |
| — Number of connectable IO Devices, max.                                                                                                                                                                                                            | 256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET                                                                     |
| — Of which IO devices with IRT, max.                                                                                                                                                                                                                | 64                                                                                                                                                                     |
| — Number of connectable IO Devices for RT, max.                                                                                                                                                                                                     | 256                                                                                                                                                                    |
| — of which in line, max.                                                                                                                                                                                                                            | 256                                                                                                                                                                    |
| — Number of IO Devices that can be simultaneously activated/deactivated, max.                                                                                                                                                                       | 8; in total across all interfaces                                                                                                                                      |
| — Number of IO Devices per tool, max.                                                                                                                                                                                                               | 8                                                                                                                                                                      |
| — Updating times                                                                                                                                                                                                                                    | The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data |
| <b>Update time for IRT</b>                                                                                                                                                                                                                          |                                                                                                                                                                        |
| — for send cycle of 250 µs                                                                                                                                                                                                                          | 250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive                                    |
| — for send cycle of 500 µs                                                                                                                                                                                                                          | 500 µs to 8 ms                                                                                                                                                         |
| — for send cycle of 1 ms                                                                                                                                                                                                                            | 1 ms to 16 ms                                                                                                                                                          |
| — for send cycle of 2 ms                                                                                                                                                                                                                            | 2 ms to 32 ms                                                                                                                                                          |
| — for send cycle of 4 ms                                                                                                                                                                                                                            | 4 ms to 64 ms                                                                                                                                                          |
| — With IRT and parameterization of "odd" send cycles                                                                                                                                                                                                | Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)                                                                               |
| <b>Update time for RT</b>                                                                                                                                                                                                                           |                                                                                                                                                                        |
| — for send cycle of 250 µs                                                                                                                                                                                                                          | 250 µs to 128 ms                                                                                                                                                       |
| — for send cycle of 500 µs                                                                                                                                                                                                                          | 500 µs to 256 ms                                                                                                                                                       |
| — for send cycle of 1 ms                                                                                                                                                                                                                            | 1 ms to 512 ms                                                                                                                                                         |
| — for send cycle of 2 ms                                                                                                                                                                                                                            | 2 ms to 512 ms                                                                                                                                                         |
| — for send cycle of 4 ms                                                                                                                                                                                                                            | 4 ms to 512 ms                                                                                                                                                         |
| <b>PROFINET IO Device</b>                                                                                                                                                                                                                           |                                                                                                                                                                        |
| <b>Services</b>                                                                                                                                                                                                                                     |                                                                                                                                                                        |
| — PG/OP communication                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — Isochronous mode                                                                                                                                                                                                                                  | No                                                                                                                                                                     |
| — IRT                                                                                                                                                                                                                                               | Yes                                                                                                                                                                    |
| — PROFINergy                                                                                                                                                                                                                                        | Yes; per user program                                                                                                                                                  |
| — Shared device                                                                                                                                                                                                                                     | Yes                                                                                                                                                                    |
| — Number of IO Controllers with shared device, max.                                                                                                                                                                                                 | 4                                                                                                                                                                      |
| — activation/deactivation of I-devices                                                                                                                                                                                                              | Yes; per user program                                                                                                                                                  |
| — Asset management record                                                                                                                                                                                                                           | Yes; per user program                                                                                                                                                  |
| <b>2. Interface</b>                                                                                                                                                                                                                                 |                                                                                                                                                                        |
| <b>Interface types</b>                                                                                                                                                                                                                              |                                                                                                                                                                        |
| • RJ 45 (Ethernet)                                                                                                                                                                                                                                  | Yes; X2                                                                                                                                                                |
| • 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                                                                                                                                                                    |

|                                                                               |                                                                                                                                                                        |
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| • Open IE communication                                                       | Yes; Optionally also encrypted                                                                                                                                         |
| • Web server                                                                  | Yes                                                                                                                                                                    |
| • Media redundancy                                                            | No                                                                                                                                                                     |
| <b>PROFINET IO Controller</b>                                                 |                                                                                                                                                                        |
| <b>Services</b>                                                               |                                                                                                                                                                        |
| — PG/OP communication                                                         | Yes                                                                                                                                                                    |
| — Isochronous mode                                                            | No                                                                                                                                                                     |
| — Direct data exchange                                                        | No                                                                                                                                                                     |
| — IRT                                                                         | No                                                                                                                                                                     |
| — PROFINergy                                                                  | Yes; per user program                                                                                                                                                  |
| — Prioritized startup                                                         | No                                                                                                                                                                     |
| — Number of connectable IO Devices, max.                                      | 32; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET                                                                      |
| — Number of connectable IO Devices for RT, max.                               | 32                                                                                                                                                                     |
| — of which in line, max.                                                      | 32                                                                                                                                                                     |
| — Number of IO Devices that can be simultaneously activated/deactivated, max. | 8; in total across all interfaces                                                                                                                                      |
| — Number of IO Devices per tool, max.                                         | 8                                                                                                                                                                      |
| — Updating times                                                              | The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data |
| <b>Update time for RT</b>                                                     |                                                                                                                                                                        |
| — for send cycle of 1 ms                                                      | 1 ms to 512 ms                                                                                                                                                         |
| <b>PROFINET IO Device</b>                                                     |                                                                                                                                                                        |
| <b>Services</b>                                                               |                                                                                                                                                                        |
| — PG/OP communication                                                         | Yes                                                                                                                                                                    |
| — Isochronous mode                                                            | No                                                                                                                                                                     |
| — IRT                                                                         | No                                                                                                                                                                     |
| — PROFINergy                                                                  | Yes; per user program                                                                                                                                                  |
| — Prioritized startup                                                         | No                                                                                                                                                                     |
| — Shared device                                                               | Yes                                                                                                                                                                    |
| — Number of IO Controllers with shared device, max.                           | 4                                                                                                                                                                      |
| — activation/deactivation of I-devices                                        | Yes; per user program                                                                                                                                                  |
| — Asset management record                                                     | Yes; per user program                                                                                                                                                  |
| <b>Interface types</b>                                                        |                                                                                                                                                                        |
| <b>RJ 45 (Ethernet)</b>                                                       |                                                                                                                                                                        |
| • 100 Mbps                                                                    | Yes                                                                                                                                                                    |
| • Autonegotiation                                                             | Yes                                                                                                                                                                    |
| • Autocrossing                                                                | Yes                                                                                                                                                                    |
| • Industrial Ethernet status LED                                              | Yes                                                                                                                                                                    |
| <b>Protocols</b>                                                              |                                                                                                                                                                        |
| PROFIsafe                                                                     | Yes; V2.4 / V2.6                                                                                                                                                       |
| <b>Number of connections</b>                                                  |                                                                                                                                                                        |
| • Number of connections, max.                                                 | 192; via integrated interfaces of the CPU and connected CPs / CMs                                                                                                      |
| • Number of connections reserved for ES/HMI/web                               | 10                                                                                                                                                                     |
| • Number of connections via integrated interfaces                             | 108                                                                                                                                                                    |
| • Number of S7 routing paths                                                  | 16                                                                                                                                                                     |
| <b>Redundancy mode</b>                                                        |                                                                                                                                                                        |
| • H-Sync forwarding                                                           | Yes                                                                                                                                                                    |
| <b>Media redundancy</b>                                                       |                                                                                                                                                                        |
| — Media redundancy                                                            | only via 1st interface (X1)                                                                                                                                            |
| — MRP                                                                         | Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client                                                                                     |
| — MRP interconnection, supported                                              | Yes; as MRP ring node according to IEC 62439-2 Edition 3.0                                                                                                             |
| — MRPD                                                                        | Yes; Requirement: IRT                                                                                                                                                  |
| — Switchover time on line break, typ.                                         | 200 ms; For MRP, bumpless for MRPD                                                                                                                                     |
| — Number of stations in the ring, max.                                        | 50                                                                                                                                                                     |
| <b>SIMATIC communication</b>                                                  |                                                                                                                                                                        |
| • S7 routing                                                                  | Yes                                                                                                                                                                    |
| • S7 communication, as server                                                 | Yes                                                                                                                                                                    |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <ul style="list-style-type: none"> <li>• S7 communication, as client</li> <li>• User data per job, max.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>Yes</p> <p>See online help (S7 communication, user data size)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Open IE communication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>• TCP/IP <ul style="list-style-type: none"> <li>— Data length, max.</li> <li>— several passive connections per port, supported</li> </ul> </li> <li>• ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> <li>— Data length, max.</li> </ul> </li> <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>64 kbyte</p> <p>Yes</p> <p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>2 kbyte; 1 472 bytes for UDP broadcast</p> <p>Yes; Max. 5 multicast circuits</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optional</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Web server                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>Yes; Standard and user pages</p> <p>Yes; Standard and user pages</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| OPC UA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <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>— 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> </ul> </li> </ul> | <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>"anonymous" or by user name &amp; password</p> <p>10</p> <p>2 000</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, custom address space</p> <p>Yes</p> <p>Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>"anonymous" or by user name &amp; password</p> <p>48</p> <p>100 000</p> <p>20 000</p> <p>20</p> <p>100 ms</p> <p>200 ms</p> <p>50</p> <p>20</p> <p>2 000; 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> |

|                                                                       |                                                                                                                                   |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| — Number of nodes for user-defined server interfaces, max.            | 5 000                                                                                                                             |
| <b>Further protocols</b>                                              |                                                                                                                                   |
| • MODBUS                                                              | Yes; MODBUS TCP                                                                                                                   |
| <b>Isochronous mode</b>                                               |                                                                                                                                   |
| Equidistance                                                          | Yes                                                                                                                               |
| <b>S7 message functions</b>                                           |                                                                                                                                   |
| Number of login stations for message functions, max.                  | 64                                                                                                                                |
| Program alarms                                                        | Yes                                                                                                                               |
| Number of configurable program messages, max.                         | 10 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH                                             |
| Number of loadable program messages in RUN, max.                      | 5 000                                                                                                                             |
| Number of simultaneously active program alarms                        |                                                                                                                                   |
| • Number of program alarms                                            | 800                                                                                                                               |
| • Number of alarms for system diagnostics                             | 200                                                                                                                               |
| • Number of alarms for motion technology objects                      | 160                                                                                                                               |
| <b>Test commissioning functions</b>                                   |                                                                                                                                   |
| Joint commission (Team Engineering)                                   | Yes; Parallel online access possible for up to 8 engineering systems                                                              |
| Status block                                                          | Yes; Up to 8 simultaneously (in total across all ES clients)                                                                      |
| Single step                                                           | No                                                                                                                                |
| Number of breakpoints                                                 | 8                                                                                                                                 |
| <b>Status/control</b>                                                 |                                                                                                                                   |
| • Status/control variable                                             | Yes; 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                                            | 500                                                                                                                               |
| <b>Traces</b>                                                         |                                                                                                                                   |
| • Number of configurable Traces                                       | 4; Up to 512 KB of data per trace are possible                                                                                    |
| <b>Interrupts/diagnostics/status information</b>                      |                                                                                                                                   |
| <b>Diagnostics indication LED</b>                                     |                                                                                                                                   |
| • RUN/STOP LED                                                        | Yes                                                                                                                               |
| • ERROR LED                                                           | Yes                                                                                                                               |
| • MAINT LED                                                           | Yes                                                                                                                               |
| • STOP ACTIVE LED                                                     | Yes                                                                                                                               |
| • Connection display LINK TX/RX                                       | Yes                                                                                                                               |
| <b>Supported technology objects</b>                                   |                                                                                                                                   |
| Motion Control                                                        | Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool |
| • Number of available Motion Control resources for technology objects | 2 400                                                                                                                             |
| • Required Motion Control resources                                   |                                                                                                                                   |
| — per speed-controlled axis                                           | 40                                                                                                                                |
| — per positioning axis                                                | 80                                                                                                                                |
| — per synchronous axis                                                | 160                                                                                                                               |
| — per external encoder                                                | 80                                                                                                                                |
| — per output cam                                                      | 20                                                                                                                                |
| — per cam track                                                       | 160                                                                                                                               |
| — per probe                                                           | 40                                                                                                                                |
| • Positioning axis                                                    |                                                                                                                                   |
| — Number of positioning axes at motion control cycle                  | 7                                                                                                                                 |

|                                                                                                                                                                                                                                                                                 |  |                                                                                                                                                                                                                                                                |                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| of 4 ms (typical value)<br>— Number of positioning axes at motion control cycle of 8 ms (typical value)                                                                                                                                                                         |  | 14                                                                                                                                                                                                                                                             |                |
| Controller <ul style="list-style-type: none"><li>• PID_Compact</li><li>• PID_3Step</li><li>• PID-Temp</li></ul>                                                                                                                                                                 |  | Yes; Universal PID controller with integrated optimization<br>Yes; PID controller with integrated optimization for valves<br>Yes; PID controller with integrated optimization for temperature                                                                  |                |
| Counting and measuring <ul style="list-style-type: none"><li>• High-speed counter</li></ul>                                                                                                                                                                                     |  | Yes                                                                                                                                                                                                                                                            |                |
| Standards, approvals, certificates                                                                                                                                                                                                                                              |  |                                                                                                                                                                                                                                                                |                |
| 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>                                                                                                                                                    |  | PLe<br>SIL 3                                                                                                                                                                                                                                                   |                |
| Probability of failure (for service life of 20 years and repair time of 100 hours)                                                                                                                                                                                              |  |                                                                                                                                                                                                                                                                |                |
| — Low demand mode: PFDavg in accordance with SIL3                                                                                                                                                                                                                               |  | < 2.00E-05                                                                                                                                                                                                                                                     |                |
| — High demand/continuous mode: PFH in accordance with SIL3                                                                                                                                                                                                                      |  | < 1.00E-09                                                                                                                                                                                                                                                     |                |
| Ambient conditions                                                                                                                                                                                                                                                              |  |                                                                                                                                                                                                                                                                |                |
| Ambient temperature during operation                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                |                |
| <ul style="list-style-type: none"><li>• horizontal installation, min.</li><li>• horizontal installation, max.</li><li>• vertical installation, min.</li><li>• vertical installation, max.</li></ul>                                                                             |  | -25 °C; No condensation<br>60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off<br>-25 °C; No condensation<br>40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off |                |
| Ambient temperature during storage/transportation                                                                                                                                                                                                                               |  |                                                                                                                                                                                                                                                                |                |
| <ul style="list-style-type: none"><li>• min.</li><li>• max.</li></ul>                                                                                                                                                                                                           |  | -40 °C<br>70 °C                                                                                                                                                                                                                                                |                |
| Altitude during operation relating to sea level                                                                                                                                                                                                                                 |  |                                                                                                                                                                                                                                                                |                |
| <ul style="list-style-type: none"><li>• Installation altitude above sea level, max.</li></ul>                                                                                                                                                                                   |  | 5 000 m; Restrictions for installation altitudes > 2 000 m, see manual                                                                                                                                                                                         |                |
| Configuration                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                |                |
| Programming                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                |                |
| Programming language                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                |                |
| — LAD                                                                                                                                                                                                                                                                           |  | Yes; incl. failsafe                                                                                                                                                                                                                                            |                |
| — FBD                                                                                                                                                                                                                                                                           |  | Yes; incl. failsafe                                                                                                                                                                                                                                            |                |
| — STL                                                                                                                                                                                                                                                                           |  | Yes                                                                                                                                                                                                                                                            |                |
| — SCL                                                                                                                                                                                                                                                                           |  | Yes                                                                                                                                                                                                                                                            |                |
| — GRAPH                                                                                                                                                                                                                                                                         |  | Yes                                                                                                                                                                                                                                                            |                |
| Know-how protection                                                                                                                                                                                                                                                             |  |                                                                                                                                                                                                                                                                |                |
| <ul style="list-style-type: none"><li>• User program protection/password protection</li><li>• Copy protection</li><li>• Block protection</li></ul>                                                                                                                              |  | Yes<br>Yes<br>Yes                                                                                                                                                                                                                                              |                |
| Access protection                                                                                                                                                                                                                                                               |  |                                                                                                                                                                                                                                                                |                |
| <ul style="list-style-type: none"><li>• Password for display</li><li>• Protection level: Write protection</li><li>• Protection level: Read/write protection</li><li>• Protection level: Write protection for Failsafe</li><li>• Protection level: Complete protection</li></ul> |  | Yes<br>Yes; Specific write protection both for Standard and for Failsafe<br>Yes<br>Yes<br>Yes                                                                                                                                                                  |                |
| Cycle time monitoring                                                                                                                                                                                                                                                           |  |                                                                                                                                                                                                                                                                |                |
| <ul style="list-style-type: none"><li>• lower limit</li><li>• upper limit</li></ul>                                                                                                                                                                                             |  | adjustable minimum cycle time<br>adjustable maximum cycle time                                                                                                                                                                                                 |                |
| Dimensions                                                                                                                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                |                |
| Width                                                                                                                                                                                                                                                                           |  | 70 mm                                                                                                                                                                                                                                                          |                |
| Height                                                                                                                                                                                                                                                                          |  | 147 mm                                                                                                                                                                                                                                                         |                |
| Depth                                                                                                                                                                                                                                                                           |  | 129 mm                                                                                                                                                                                                                                                         |                |
| Weights                                                                                                                                                                                                                                                                         |  |                                                                                                                                                                                                                                                                |                |
| Weight, approx.                                                                                                                                                                                                                                                                 |  | 830 g                                                                                                                                                                                                                                                          |                |
| Classifications                                                                                                                                                                                                                                                                 |  |                                                                                                                                                                                                                                                                |                |
|                                                                                                                                                                                                                                                                                 |  | Version                                                                                                                                                                                                                                                        | Classification |

|        |     |             |
|--------|-----|-------------|
| eClass | 16  | 27-24-22-07 |
| eClass | 14  | 27-24-22-07 |
| eClass | 12  | 27-24-22-07 |
| eClass | 9.1 | 27-24-22-07 |
| eClass | 9   | 27-24-22-07 |
| eClass | 8   | 27-24-22-07 |
| eClass | 7.1 | 27-24-22-07 |
| eClass | 6   | 27-24-22-07 |
| ETIM   | 10  | EC000236    |
| ETIM   | 9   | EC000236    |
| ETIM   | 8   | EC000236    |
| ETIM   | 7   | EC000236    |
| IDEA   | 4   | 3565        |
| UNSPSC | 15  | 32-15-17-05 |

## Approvals / Certificates

### General Product Approval

[Miscellaneous](#)

[Manufacturer Declaration](#)



[Miscellaneous](#)

### General Product Approval

### EMV

### For use in hazardous locations



[China RoHS](#)

[Manufacturer Declaration](#)



### For use in hazardous locations

[FM](#)

[CCC-Ex](#)



[Type Examination Certificate](#)

[Miscellaneous](#)

### For use in hazardous locations

### Functional Safety

### Maritime application

[CCC-Ex](#)

[Type Examination Certificate](#)

[TUEV](#)

[Type Examination Certificate](#)

[TUEV](#)



### Maritime application



[NK / Nippon Kaiji Kyokai](#)



[CCS \(China Classification Society\)](#)

### Maritime application

### other

### Industrial Communication

[KR \(Korean Register of Shipping\)](#)

[PROFINET](#)

[PROFINET](#)

