## SIEMENS

## Data sheet

## 6AG1515-2FM02-2AB0



SIPLUS S7-1500 CPU 1515F-2 PN based on 6ES7515-2FM02-0AB0 with conformal coating, -40...+60 °C, 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

| F | ig | ur | e | si | m | il | ar |  |
|---|----|----|---|----|---|----|----|--|
|   |    |    |   |    |   |    |    |  |

| General information  |  |
|--|--|
| Product type designation   | CPU 1515F-2 PN   |
| based on   | 6ES7515-2FM02-0AB0   |
| Product function   |  |
| • I&M data   | Yes; I&M0 to I&M3  |
| Isochronous mode   | Yes; Distributed and central; with minimum OB 6x cycle of 500 $\mu s$ (distributed) and 1 ms (central) |
| Engineering with   |  |
| <ul> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul> | see entry ID: 109746275  |
| 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  |  |
| <ul> <li>Mains/voltage failure stored energy time</li> </ul>               | 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   |
| l²t  | 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  |
| Memory   |  |
| Number of slots for SIMATIC memory card                                    | 1  |
| SIMATIC memory card required   | Yes  |
| Work memory  |  |
| <ul> <li>integrated (for program)</li> </ul>                               | 750 kbyte  |

| <ul> <li>integrated (for data)</li> </ul>                          | 3 Mbyte  |
|--|--|
| Load memory  |  |
| Plug-in (SIMATIC Memory Card), max.                                | 32 Gbyte   |
| Backup   | 02 00510   |
| maintenance-free   | Yes  |
| CPU processing times   | 1 65   |
|  | 20   |
| 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)   | 6 000; 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<br>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  |
| <ul> <li>Number of free cycle OBs</li> </ul>                       | 100  |
| Number of time alarm OBs   | 20   |
| <ul> <li>Number of delay alarm OBs</li> </ul>                      | 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  |
|  | 100  |
| Number of startup OBs  |  |
| 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 times   |  |
| Number   | 2 048  |
| Retentivity  |  |
| — adjustable   | Yes  |
| IEC timer  |  |
| Number   | Any (only limited by the main memory)  |
| Retentivity  |  |
| — adjustable   | Yes  |
| Data areas and their retentivity                                   |  |
|  | 512 khute: In total: available rotantive memory for hit memories, timera   |
| 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   |
| Flag   |  |
| • Size, max.   | 16 kbyte   |
|  |  |

| Number of clock memories                              | 8; 8 clock memory bit, grouped into one clock memory byte   |
|---|---|
| Data blocks   |   |
| <ul> <li>Retentivity adjustable</li> </ul>            | Yes   |
| Retentivity preset                                    | No  |
| Local data  |   |
| <ul> <li>per priority class, max.</li> </ul>          | 64 kbyte; max. 16 KB per block  |
| Address area  |   |
| Number of IO modules                                  | 8 192; max. number of modules / submodules  |
| I/O address area                                      |   |
| Inputs  | 32 kbyte; All inputs are in the process image   |
| Outputs   | 32 kbyte; All outputs are in the process image  |
| per integrated IO subsystem                           |   |
| — Inputs (volume)                                     | 8 kbyte   |
| — Outputs (volume)                                    | 8 kbyte   |
| per CM/CP   |   |
| — Inputs (volume)                                     | 8 kbyte   |
| — Outputs (volume)                                    | 8 kbyte   |
| Subprocess images                                     |   |
| <ul> <li>Number of subprocess images, max.</li> </ul> | 32  |
| Hardware configuration                                |   |
| 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) |
| Number of DP masters                                  |   |
| ● Via CM  | 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total   |
| Number of IO Controllers                              |   |
| <ul> <li>integrated</li> </ul>                        | 2   |
| • Via CM  | 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total   |
| Rack  |   |
| <ul> <li>Modules per rack, max.</li> </ul>            | 32; CPU + 31 modules  |
| <ul> <li>Number of lines, max.</li> </ul>             | 1   |
| PtP CM  |   |
| Number of PtP CMs                                     | the number of connectable PtP CMs is only limited by the number of available slots  |
| Time of day   |   |
| Clock   |   |
| • Туре  | Hardware clock  |
| Backup time   | 6 wk; At 40 °C ambient temperature, typically   |
| <ul> <li>Deviation per day, max.</li> </ul>           | 10 s; Typ.: 2 s   |
| Operating hours counter                               |   |
| Number  | 16  |
| Clock synchronization                                 |   |
| supported   | Yes   |
| • in AS, master                                       | Yes   |
| • in AS, device                                       | Yes   |
| • on Ethernet via NTP                                 | Yes   |
| Interfaces  |   |
| Number of PROFINET interfaces                         | 2   |
| 1. Interface  | -   |
|   |   |
| Interface types                                       | Voc: V1   |
| RJ 45 (Ethernet)                                      | Yes; X1   |
| Number of ports                                       | 2   |
| integrated switch                                     | Yes   |
| Protocols   |   |
| IP protocol   | Yes; IPv4   |
| PROFINET IO Controller                                | Yes   |
| PROFINET IO Device                                    | Yes   |
| <ul> <li>SIMATIC communication</li> </ul>             | Yes   |
| Open IE communication                                 | Yes; Optionally also encrypted  |
| Web server  | Yes   |

Yes; MRP Automanager according to IEC 62439-2 Edition 2.0

| <ul> <li>Media redundancy</li> </ul> |
|--------------------------------------|
| PROFINET IO Controller               |

| Implementation         Yes           Impleme  | PROFINET IO Controller   |  |
|--|--|--|
| → Isochronus mode         Yes           → IPCOT lankargy         Yes           → PROTE atomy         Yes           → PROTE atomy         Yes           → PROTE atomy         Yes           → PROTE atomy         Yes           → Protote atomy         Yes           → Protote atomy         Yes           → Protote atomy         Yes           → Number of connectable ID Devises (RT RT, RAX         B           → Number of connectable ID Devises (RT RT, RAX         B           → Number of DoDevises perton, max.         B           → Number of ID Devises perton, max.         B           → Number of ID Devises perton, max.         B           → Number of ID Devises perton, max.         B           → Protote ID Devises perton, max.         B           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs         Devise ID Perton           → For send opele of 200 µs   | Services   |  |
| - Decid data exchange     Yes: Requirement: IRT and isochronous mode (MRPD optional)       - IRT     Yes       - PROFIneringy     Yes       - Profinited startup     Yes: Max. 32 PROFINET devices       - Number of connectable IO Devices, max.     256       - Of which IO devices with IRT, max.     266       - of which In Ime, max.     256       - Number of Dovices that can be simultaneously activited IO Devices part tool. max.     3       - Number of Dovices part tool. max.     3       - Number of Dovices part tool. max.     3       - for send cycle of 250 µs     250 µs horts: horts: mumber of IO devices, and on the quantity of control contro control control contr   | - PG/OP communication  | Yes  |
| Instrain of the second se      | — Isochronous mode   | Yes  |
| - PROFinergy     Yes       - Priorized stampine     Yes       - Number of connectable I/O Devices, max.     256       - Of which I/O devices with IRT, max.     64       - Of which I/O devices with IRT, max.     64       - Of which I/O devices with IRT, max.     64       - of which I/O devices with IRT, max.     64       - of which I/O devices with IRT, max.     64       - Or which I/O devices with IRT, max.     64       - Number of I/O Devices that can be simultaneously activated/declativate, max.     8       - Number of D/O Devices that can be simultaneously activated/declativate, max.     8       - Or send cycle of 20 µs     250 µs to 4 ms. Kote: In the update time also depends on communication share ast for PROFINET I/O, on the number of I/O devices, and on the quantity of contained used that time of 200 µs to 8 ms       - for send cycle of 20 µs     600 µs to 8 ms       - for send cycle of 20 µs     250 µs to 4 ms. Kote: In the case of IRT with isochronous mode, the minimum value of the update time also depends on communication share ast for PROFINET IO, on the number of I/O devices.       - for send cycle of 20 µs     250 µs to 128 ms       - for send cycle of 20 µs     250 µs to 128 ms       - for send cycle of 400 µs     250 µs to 128 ms       - for send cycle of 250 µs     250 µs to 128 ms       - for send cycle of 250 µs     250 µs to 128 ms       - for send cycle of 250 µs     250 µs to 128 ms   | — Direct data exchange   | Yes; Requirement: IRT and isochronous mode (MRPD optional)   |
| - Produced simula     Yes: Max: 32 PROFINET Gevices.       - Number of connectable IO Devices, max.     256       - Number of connectable IO Devices for RT, max.     256       - Number of IO Devices that an be simultaneously     81       - Number of IO Devices that an be simultaneously     81       - Number of IO Devices that an be simultaneously     81       - Number of IO Devices period, max.     256       - Number of IO Devices period, max.     8       - Updating times     8       - Updating times     8       - For send cycle of 250 µs     250 µs to 4 ms; Note: in the case of IRT with isochronous mode, the minimum update of 500 µs to 500 µ   | — IRT  | Yes  |
| - Number of connectable IO Devices, max.     255 (In total, up 1 + 100 distributed I/O devices can be connected via ASI.,<br>- Of which in time, max.     64       - Of which in time, max.     256       - A under of Connectable IO Devices for RT, max.     256       - Number of IO Devices that can be simultaneously<br>activated/destributed, max.     8       - Updating times     8       - Updating times     8       - Updating times     8       - For send cycle of 250 µs     50 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum<br>update time of 500 µs of the isochronous OB is declaive<br>update time for IRT       - For send cycle of 150 µs     500 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum<br>update time of so0 µs of the isochronous OB is declaive<br>update time of so0 µs of the isochronous OB is declaive<br>update time of so0 µs of the isochronous OB is declaive<br>update time of so0 µs of the isochronous OB is declaive<br>update time of so0 µs of the isochronous OB is declaive<br>update time of so0 µs of the isochronous OB is declaive<br>update time of so0 µs of the isochronous OB is declaive<br>update time for RT       - For send cycle of 250 µs     500 µs to 255 ms       - For send cycle of 270 µs     250 µs to 255 ms       - For send cycle of 270 µs     250 µs to 255 ms       - For send cycle of 1 ms     1 ms to 512 ms       - For send cycle of 270 µs     2 ms to 512 ms       - For send cycle of 270 µs     2 ms to 512 ms       - For send cycle of 270 µs     2 ms to 512 ms       - Fo  | - PROFlenergy  | Yes  |
| PROFIBUS "PROFINET           — O' which 10 devices with IRT, max.         54           — Number of connectable 10 Devices for RT, max.         256           — Number of 10 Devices that can be simultaneously advatedideent/wate, max.         8           — Number of 10 Devices per tool, max.         8           — Updating times         8           — Updating times         8           — Updating times         8           — Updating times         250 jus to 4 mis, Note: in the case of IRT with isochronous mode, the minimum value of the update time alto depends on communication share there of 900 jus to 5 ms           — for send cycle of 500 jus         500 jus to 4 ms           — for send cycle of 900 jus         500 jus to 5 ms           — for send cycle of 2 ms         2 ms to 32 ms           — for send cycle of 1 ms         1 ms to 16 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 1 ms         1 ms to 16 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 1 ms         1 ms to 512 ms           — for send cycle of 1 ms         1 ms to 512 ms           — for send cycle of 1 ms         1 ms to 512 ms   | — Prioritized startup  | Yes; Max. 32 PROFINET devices  |
| - Number of connectable 10 Devices for RT, max.     256       - of which in line, max.     256       - Number of IO Devices fint can be simultaneously advated/dead/twice, max.     8       - Number of IO Devices period, max.     8       - Updating times     The minimum value of the update time also depends on communication share ter PROFINET IO, in the number of IO devices, and on the quantity of configured user data       - Updating times     250 us to 4 ms; Note: In the case of IRT with isochronous mode, the minimum value of the update time af S0 up is of the isochronous of B is decisive       - for send cycle of 250 us     250 us to 4 ms; Note: In the case of IRT with isochronous mode, the minimum value of the update time af S0 up is of the isochronous of B is decisive       - for send cycle of 2ms     250 us to 4 ms       - for send cycle of 2ms     250 us to 4 ms       - for send cycle of 1 ms     1 ms to 4 ms       - for send cycle of 2ms     250 us to 2ms       - for send cycle of 2ms     250 us to 2ms       - for send cycle of 1 ms     1 ms to 64 ms       - for send cycle of 1 ms     1 ms to 512 ms       - for send cycle of 1 ms     2ms to 512 ms       - for send cycle of 1 ms     Yes       - PGOP communication     Yes       - for send cycle of 2 ms     2 ms to 512 ms       - for send cycle of 1 ms     1 mot for       - for send cycle of 2 ms     2 ms to 512 ms       - for send c  | - Number of connectable IO Devices, max.                                 |  |
| - of which in in, max.     256       - Number of 100 benkes that can be simultaneously addiededistivited, max.     8       - Updating times     8       - Updating times     250 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value of the update time also depends on communication share saft for PROFINET 10, on the number of 10 devices, and on the quantity of comparison of 500 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value of the update time of 500 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value of the update time of 500 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value to 60 mis to 4 mis to 500 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value of the update time of 500 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value of the update time of 500 jas to 4 mis. Note: in the case of IRT with isochronous mode, the minimum value of the update time of 500 jas to 4 mis to 16 mis       - for send cycle of 10 mis     1 mis to 16 mis       - for send cycle of 20 jas     250 jas to 28 mis       - for send cycle of 20 jas     250 jas to 128 mis       - for send cycle of 20 jas     250 jas to 28 mis       - for send cycle of 20 jas     250 jas to 128 mis       - for send cycle of 20 jas     250 jas to 28 mis       - for send cycle of 20 mis     2 mis to 512 mis       - for send cycle of 2 mis     2 mis to 512 mis       - for send cycle of 2 mis     2 mis to 128 mis       - for send cycle of 3 mis     4 mis to 12 mis   | <ul> <li>— Of which IO devices with IRT, max.</li> </ul>                 | 64   |
|  | <ul> <li>— Number of connectable IO Devices for RT, max.</li> </ul>      | 256  |
| activated/deactivated, max. Activated/deactivated, max. Activated/deactivated, max. Activated for PGOFINET Of the update time also depends on communication share and for PGOFINET Of the update time also depends on communication share and for PGOFINET Of the update time also depends on communication share and for PGOFINET Of the update time also depends on communication share and pole of 250 µs Activated for PGOFINET Of the update time also depends on communication share and pole of 250 µs Activated for PGOFINET Of the update time also depends on communication share and pole of 250 µs Activated for PGOFINET Of the update time also depends on communication share and pole of 250 µs Activated for PGOFINET Of the update time also depends on communication of "odd" send option of a mode of the activate of 000 µs to 8 ms Activated for PGOFINET Of the update time also depends on communication of "odd" send option of a mode of a ms Activate of 250 µs Activated for PGOFINET Of the update time also depends on communication of "odd" send option of a mode of a ms Activate of 250 µs Activate of | — of which in line, max.   | 256  |
| − Updating times         The minimum value of the update time also depends on communication share set for PROFINETIO, on the number of IO devices, and on the quantity of configured user data.           Update time for IRT         250 µs to 4 ms; Note: in the case of IRT with isochronous mode, the minimum value for and cycle of 250 µs         250 µs to 4 ms; Note: in the case of IRT with isochronous mode, the minimum value of 500 µs to 8 ms           − for send cycle of 250 µs         250 µs to 4 ms; Note: in the case of IRT with isochronous mode, the minimum value of 500 µs to 8 ms           − for send cycle of 1 ms         1 ms to 16 ms           − for send cycle of 20 µs         250 µs to 28 ms           − for send cycle of 250 µs         250 µs to 128 ms           − for send cycle of 250 µs         250 µs to 28 ms           − for send cycle of 250 µs         500 µs to 25 ms           − for send cycle of 250 µs         500 µs to 25 ms           − for send cycle of 250 µs         500 µs to 25 ms           − for send cycle of 250 µs         500 µs to 25 ms           − for send cycle of 200 µs         500 µs to 25 ms           − for send cycle of 250 µs         128 ms           − for send cycle of 4 ms         4 ms to 512 ms           − for send cycle of 4 ms         Ves           − FOFOP communication         Yes           − FOFOP communication         Yes           − IPG CPO communication   |  | 8; in total across all interfaces  |
| set for PROFINET IO, on the number of IO devices, and on the quantity of onfigured user data Uddate time for IRT  - for send cycle of 250 µs - for send cycle of 250 µs - for send cycle of 500 µs - for send cycle of 1ms - for send cycle of 1ms - for send cycle of 1ms - for send cycle of 2ms - f | <ul> <li>— Number of IO Devices per tool, max.</li> </ul>                | 8  |
| - for send cycle of 250 µs250 µs to 4 ms: Note: In the case of IRT with isochronous mode, the minimum<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of the isochronous OB is decisive<br>update time of 500 µs of 250 µs of                                       | — Updating times   | set for PROFINET IO, on the number of IO devices, and on the quantity of   |
| update time of 500 µs of the isochronous OB is declsive           - 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           - Wth IRT and parameterization of "odd" send cycle         Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs 3           - for send cycle of 250 µs         250 µs to 128 ms           - for send cycle of 250 µs         250 µs to 128 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           - for send cycle of 4 ms         2 ms to 512 ms           - for send cycle of 4 ms         4 ms to 512 ms           - for send cycle of 4 ms         4 ms to 512 ms           - for send cycle of 4 ms         4 ms to 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for Send cycle of 4 ms         4 set 512 ms           - PG/OP communication         Yes           - Asset management record         Yes           - Number  | Update time for IRT  | , and the second s |
| update time of 500 µs of the isochronous OB is declsive           - 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           - Wth IRT and parameterization of "odd" send cycle         Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs 3           - for send cycle of 250 µs         250 µs to 128 ms           - for send cycle of 250 µs         250 µs to 128 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           - for send cycle of 4 ms         2 ms to 512 ms           - for send cycle of 4 ms         4 ms to 512 ms           - for send cycle of 4 ms         4 ms to 512 ms           - for send cycle of 4 ms         4 ms to 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for send cycle of 4 ms         4 set 512 ms           - for Send cycle of 4 ms         4 set 512 ms           - PG/OP communication         Yes           - Asset management record         Yes           - Number  |  |  |
| - for send cycle of 1 ms1 ms to 16 ms- for send cycle of 2 ms2 ms to 32 ms- for send cycle of 4 ms4 ms to 64 ms- With IRT and parameterization of "odd" send cyclesUpdate time = set "odd" send chck (any multiple of 125 µs: 375 µs, 625 µs3Vightate time for RT- for send cycle of 250 µs- for send cycle of 500 µs500 µs to 256 ms- for send cycle of 1 ms1 ms to 512 ms- for send cycle of 1 ms2 ms to 512 ms- for send cycle of 2 ms2 ms to 512 ms- for send cycle of 4 ms4 ms to 512 ms- for send cycle of 4 ms4 ms to 512 ms- for send cycle of 4 ms4 ms to 512 ms- for send cycle of 2 ms2 ms to 512 ms- for send cycle of 4 ms4 to 512 ms- for send cycle of 4 msYes- for send cycle of 4 msYes<   |  |  |
| - for send cycle of 2 ms2 ms to 32 ms- for send cycle of 4 ms4 ms to 64 ms- With IRT and parameterization of "odd" send cyclesUpdate time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs3Vubtate time for RT500 µs to 256 ms- for send cycle of 250 µs500 µs to 256 ms- for send cycle of 27 ms2 ms to 512 ms- for send cycle of 27 ms2 ms to 512 ms- for send cycle of 2 ms2 ms to 512 ms- for send cycle of 2 ms4 ms to 512 ms- for send cycle of 4 ms4 ms to 512 ms- for send cycle of 4 ms4 ms to 512 ms- FROFINET ICD DeviceYes- FROFINET ICD DeviceYes- Shared device 7 wsYes per user program- Shared deviceYes per user program- Shared device 7 wsYes yes user program- Shared deviceYes yes user program- Number of IO Controllers with shared device, max.1- Number of ports1- Number of portsYes; IPv4- PROFINET IC DeviceYes- Shared deviceYes- Shared deviceYes- NoYes- Number of ports1- Number of ports1- Number of ports1- Number of portsYes- PROFINET IC DeviceYes- Shared deviceYes- Shared deviceYes- PROFINE   | — for send cycle of 500 μs   | 500 µs to 8 ms   |
| for send cycle of 4 ms4 ms to 64 ms With IRT and parameterization of "odd" send cycleVipdate time = set "odd" send cycle (any multiple of 125 µs: 375 µs, 625 µs3Update time for RT for send cycle of 250 µs500 µs to 128 ms for send cycle of 100 µs500 µs to 286 ms for send cycle of 1 ms1 ms to 512 ms for send cycle of 1 ms1 ms to 512 ms for send cycle of 4 ms4 ms to 512 ms for send cycle of 4 ms4 ms to 512 ms for send cycle of 4 ms4 ms to 512 ms for send cycle of 4 ms4 ms to 512 ms for send cycle of 4 msVes for Send cy  |  | 1 ms to 16 ms  |
|  | — for send cycle of 2 ms   | 2 ms to 32 ms  |
| Update time for RT           — for send cycle of 250 µs         250 µs to 256 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 4 ms         4 ms to 512 ms           — for send cycle of 4 ms         4 ms to 512 ms           — for send cycle of 4 ms         4 ms to 512 ms           — for send cycle of 4 ms         4 ms to 512 ms           — for send cycle of 4 ms         4 ms to 512 ms           — for send cycle of 4 ms         4 ms to 512 ms           — for send cycle of 4 ms         4 ms to 512 ms           — for Send cycle of 4 ms         4 ms to 512 ms           — FROFINET IO Device         Yes           Services         — lsochronous mode         No           — IRT         Yes yer user program           — Shared device         Yes         Yes           — Number of IO Controllers with shared device, max.         4           — Asset management record         Yes yer user program           2. Interface types  | — for send cycle of 4 ms   | 4 ms to 64 ms  |
|  | <ul> <li>— With IRT and parameterization of "odd" send cycles</li> </ul> |  |
|  | Update time for RT   |  |
| - for send cycle of 1 ms1 ms to 512 ms- for send cycle of 2 ms2 ms to 512 ms- for send cycle of 4 ms4 ms to 512 ms- for send cycle of 4 ms4 ms to 512 msPROFINET IO DeviceServices- PG/OP communicationYes- Isochronous modeNo- Isochronous modeYes; per user program- Shared deviceYes; per user program- Shared deviceYes- Number of IO Controllers with shared device, max.4- Asset management recordYes; per user program- RIJ 45 (Ethernet)Yes; X2• Number of ports1• Interface types1- PROFINET IO ControllerYes; IPv4• PROFINET IO ControllerYes• Web serverYes• Web serverYes• Media redundancyNo• PCOPO communicationYes• PCOPO communication <td< td=""><td>— for send cycle of 250 μs</td><td>250 µs to 128 ms</td></td<>  | — for send cycle of 250 μs   | 250 µs to 128 ms   |
| - for send cycle of 2 ms2 ms to 512 ms- for send cycle of 4 ms4 ms to 512 msPROFINET IO DeviceServices- PG/OP communicationYes- Isochronous modeNo- IRTYes- PROFIenergyYes; per user program- Shared deviceYes- Number of IO Controllers with shared device, max.4- Asset management recordYes; yer user program- RI 45 (Ethernet)Yes; yer user program- RI 45 (Ethernet)Yes; X2• Number of ports1• Interface typesYes; X2• ROFINET IO ControllersYes; IPV4• PROFINET IO ControllerYes; IPV4• PROFINET IO ControllerYes• Veb serverYes• Web serverYes• Web serverYes• Media redundancyYes• PC/OP communicationYes• Veb serverYes• Media redundancyYes• PC/OP communicationYes• PC/OP communication• PC/O  | — for send cycle of 500 μs   | 500 µs to 256 ms   |
| → For send cycle of 4 ms       4 ms to 512 ms         PROFINET IO Device         Services         → PG/OP communication       Yes         → Isochronous mode       No         → IRT       Yes         → PROFIenergy       Yes; per user program         → Shared device       Yes; per user program         → Number of IO Controllers with shared device, max.       4         → Asset management record       Yes; per user program         2. Interface       Yes; per user program         Interface types       Yes; X2         • RJ 45 (Ethernet)       Yes; X2         • Number of ports       1         • Itigrated switch       No         Protocol       Yes; IPV4         • PROFINET IO Controller       Yes         • IP protocol       Yes         • ROFINET IO Device       Yes         • SIMATIC communication       Yes         • Open IE communication       Yes         • Web server       Yes         • Web server       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Media redundancy       No         • PROFINET IO Controller       Yes         • Media red  | — for send cycle of 1 ms   | 1 ms to 512 ms   |
| PROFINET IO Device         Services         - PG/OP communication       Yes         - Isochronous mode       No         - Isochronous mode       Yes         - IRT       Yes         - PROFIenergy       Yes; per user program         - Shared device       Yes         - Number of IO Controllers with shared device, max.       4         - Asset management record       Yes; per user program         2. Interface types       Yes; X2         Interface types       1         • RJ 45 (Ethernet)       Yes; X2         • Number of ports       1         • integrade switch       No         • Protocol       Yes; IPv4         • PROFINET IO Controller       Yes         • IP protocol       Yes         • SIMATIC communication       Yes         • Open IE communication       Yes         • Web server       Yes         • Web server       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Media redundancy       No         PROFINET IO Controller       Yes <t< td=""><td>— for send cycle of 2 ms</td><td>2 ms to 512 ms</td></t<>  | — for send cycle of 2 ms   | 2 ms to 512 ms   |
| Services           - PG/OP communication         Yes           - Isochronous mode         No           - IRT         Yes           - PROFIenergy         Yes; per user program           - Shared device         Yes; per user program           - Number of IO Controllers with shared device, max.         4           - Asset management record         Yes; per user program           2. Interface         Yes; per user program           2. Interface types         Yes; X2           Interface types         1           • RJ 45 (Ethernet)         Yes; X2           • Number of ports         1           • Integrated switch         No           Protocols         Yes           • PROFINET IO Controller         Yes; IPv4           • PROFINET IO Controller         Yes           • SIMATIC communication         Yes           • Open IE communication         Yes           • Web server         Yes           • Media redundancy         No           • PROFINET IO Controller         Yes           • Media redundancy         No           • PROFINET IO Controller         Yes           • Media redundancy         No  | — for send cycle of 4 ms   | 4 ms to 512 ms   |
| PG/OP communicationYesIscohronous modeNoIscohronous modeYesIRTYesPROFIenergyYes; per user programShared deviceYesNumber of IO Controllers with shared device, max.4Asset management recordYes; per user programAsset management recordYes; per user program2.InterfaceYes; per user programInterface typesYes; X2• RJ 45 (Ethernet)Yes; X2• Number of ports1• Integrated switchNoProtocolsYes; IPv4• PROFINET IO ControllerYes; IPv4• PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyYes• Media redundancyYes• PROFINET IO ControllerYes• Media redundancyYes• Devices   |  |  |
| Isochronous modeNoIRTYes-PROFlenergyYes; per user programShared deviceYesNumber of IO Controllers with shared device, max.4Asset management recordYes; per user program2.Interface typesIterface typesRJ 45 (Ethernet)Yes; X2Number of ports1Integrated switchNoProtoolsYes; IPv4PROFINET IO ControllerYesPROFINET IO ControllerYesPG/OP communicationYesPG/OP communicationYesPG/OP communicationYesPG/OP communicationYesPG/OP communicationYes-   |  |  |
| - IRTYes- PROFlenergyYes; per user program- Shared deviceYes- Number of IO Controllers with shared device, max.4- Asset management recordYes; per user program2. InterfaceYes; per user program2. Interface typesYes; X2• Number of ports1• Number of ports1• Interfacet switchNoProtocolsYes; IPv4• PROFINET IO ControllerYes• PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Media redundancyYes• Media redundancyNoPROFINET IO ControllerYes• Media redundancyNoPROFINET IO ControllerYes• PROFINET IO ControllerYes• Media redundancyNoPROFINET IO ControllerNo• Media redundancyNo• DeviceNo• Media redundancyNo• DeviceNo• PROFINET IO ControllerNo• DeviceNo• Media redundancyNo• Media redundancyNo• PROFINET IO ControllerYes• PROFINET IO ControllerNo• PROFINET IO ControllerNo• Media redundancyNo• PROFINET IO ControllerNo• PROFINET IO ControllerNo• PROFINET IO ControllerNo• PROFINET IO ControllerNo• PROFINET IO ControllerNo <td>— PG/OP communication</td> <td></td>   | — PG/OP communication  |  |
| PROFlenergyYes; per user program- Shared deviceYes- Number of IO Controllers with shared device, max.4- Asset management recordYes; per user program2. InterfaceInterface typesInterface types- RJ 45 (Ethernet)Yes; X2• Number of ports1• Integrated switchNoProtocol• IP protocolYes; IPV4• PROFINET IO ControllerYes• PROFINET IO ControllerYes• SIMATIC communicationYes• Open IE communicationYes• Media redundancyNoPROFINET IO Controller• PROFINET IO ControllerYes• Media redundancyNo• DeviceYes• Media redundancyNo• DeviceYes• DeviceYes• Media redundancyNo• DeviceYes• DeviceNo• Media redundancyNo• DeviceNo• DeviceNo  |  |  |
| - Shared device     Yes       - Number of IO Controllers with shared device, max.     4       - Asset management record     Yes; per user program       2. Interface     Interface types       • RJ 45 (Ethernet)     Yes; X2       • Number of ports     1       • integrated switch     No       Protocols     Yes; IPv4       • PROFINET IO Controller     Yes       • SIMATIC communication     Yes       • Open IE communication     Yes       • Web server     Yes       • Media redundancy     No       PROFINET IO Controller     Yes       • Media redundancy     No  |  | Yes  |
| - Number of IO Controllers with shared device, max.       4         - Asset management record       Yes; per user program         2. Interface       Interface types         • RJ 45 (Ethernet)       Yes; X2         • Number of ports       1         • integrated switch       No         Protocols       Yes; IPv4         • PROFINET IO Controller       Yes         • PROFINET IO Device       Yes         • Open IE communication       Yes         • Web server       Yes         • Media redundancy       Yes         PROFINET IO Controller       Yes         • Open IE communication       Yes         • Media redundancy       Yes         • Media redundancy       No         • PROFINET IO Controller       Yes         • Media redundancy       No  |  | Yes; per user program  |
| - Asset management record       Yes; per user program         2.Interface         2.Interface types         • RJ 45 (Ethernet)       Yes; X2         • Number of ports       1         • Integrated switch       No         Protocols       Yes; IPv4         • PROFINET IO Controller       Yes         • PROFINET IO Device       Yes         • SIMATIC communication       Yes         • Open IE communication       Yes         • Web server       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Services       Yes         - PROFINET IO Controller       Yes         • Open IE communication       Yes         • Open IE communication       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Media redundancy       No   |  |  |
| 2. Interface         Interface types         • RJ 45 (Ethernet)       Yes; X2         • Number of ports       1         • integrated switch       No         Protocols       Yes; IPv4         • PROFINET IO Controller       Yes         • PROFINET IO Device       Yes         • SIMATIC communication       Yes         • Open IE communication       Yes         • Web server       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Open IE communication       Yes         • Open IE communication       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         • Media redundancy       No         • PROFINET IO Controller       Yes         • Isochronous mode       No  | <ul> <li>Number of IO Controllers with shared device, max.</li> </ul>    | 4  |
| Interface types         • RJ 45 (Ethernet)       Yes; X2         • Number of ports       1         • integrated switch       No         Protocols          • IP protocol       Yes; IPv4         • PROFINET IO Controller       Yes         • PROFINET IO Device       Yes         • SIMATIC communication       Yes         • Open IE communication       Yes         • Web server       Yes         • Media redundancy       No         PROFINET IO Controller         Yes         • Media redundancy       Yes         • Media redundancy       No         PROFINET IO Controller         Services         - PG/OP communication       Yes         - Isochronous mode       No  | -  | Yes; per user program  |
| RJ 45 (Ethernet)Yes; X2Number of ports1integrated switchNoProtocolsIP protocolYes; IPv4• PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyNoPROFINET IO ControllerYes• PROFINET IO ControllerYes• Media redundancyNoPROFINET IO ControllerNo• PROFINET IO ControllerYes• Media redundancyNo• PROFINET IO ControllerYes• In the profice of th  | 2. Interface   |  |
| • Number of ports1• integrated switchNoProtocolsProtocol• IP protocolYes; IPv4• PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyYes• PROFINET IO ControllerYes• PROFINET IO ControllerYes• PROFINET IO ControllerYes• PROFINET CommunicationYes• PROFINET ControllerYes• PROFINET IO ControllerNo• PROFINET IO ControllerYes• PROFINET IO ControllerNo  | · ·  |  |
| • integrated witchNoProtocols• IP protocolYes; IPv4• PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyNoROFINET IO ControllerServicesYes- PG/OP communicationYes- PG/OP communicationNo• NoNo  |  |  |
| Protocols         • IP protocol       Yes; IPv4         • PROFINET IO Controller       Yes         • PROFINET IO Device       Yes         • SIMATIC communication       Yes         • Open IE communication       Yes         • Web server       Yes         • Media redundancy       Yes         PROFINET IO Controller       Yes         • PROFINET IO Controller       Yes         • Media redundancy       No         PROFINET IO Controller       Yes         - PG/OP communication       Yes         - PG/OP communication       Yes         - Isochronous mode       No   | -  |  |
| • IP protocolYes; IPv4• PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyNoPROFINET IO ControllerYesServices PG/OP communicationYes- Isochronous modeNo  |  | No   |
| • PROFINET IO ControllerYes• PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyNoPROFINET IO ControllerYesServicesYes- PG/OP communicationYes- Isochronous modeNo  |  |  |
| • PROFINET IO DeviceYes• SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyNoPROFINET IO ControllerYes• ServicesYes- PG/OP communicationYes- PG/OP communicationYesNoNo   | •  |  |
| • SIMATIC communicationYes• Open IE communicationYes• Web serverYes• Media redundancyNo• PROFINET IO ControllerYesServicesYes- PG/OP communicationYes- Isochronous modeNo  | PROFINET IO Controller   | Yes  |
| • Open IE communicationYes• Web serverYes• Media redundancyNo• PROFINET IO ControllerYes• PROFORCOMMUNICATIONYes• PG/OP communicationYes• Isochronous modeNo   | PROFINET IO Device   | Yes  |
| • Web server     Yes       • Media redundancy     No       • PROFINET IO Controller     Services       • PG/OP communication     Yes       • Isochronous mode     No   | SIMATIC communication  | Yes  |
| Media redundancy No PROFINET IO Controller Services      PG/OP communication Yes     No  | Open IE communication  | Yes  |
| PROFINET IO Controller         Services       — PG/OP communication       Yes         — Isochronous mode       No  | Web server   | Yes  |
| Services       — PG/OP communication     Yes       — Isochronous mode     No   | · · ·  | No   |
| — PG/OP communication     Yes       — Isochronous mode     No  | PROFINET IO Controller   |  |
| — Isochronous mode No  | Services   |  |
|  | — PG/OP communication  | Yes  |
| — Direct data exchange No  | — Isochronous mode   | No   |
|  | — Direct data exchange   | No   |

|  | Na  |
|--|---|
|  | No  |
| — PROFlenergy  | Yes   |
| — Prioritized startup  | No  |
| <ul> <li>Number of connectable IO Devices, max.</li> </ul>   | 32; In total, up to 1 000 distributed I/O devices can be connected via AS-i,<br>PROFIBUS or PROFINET  |
| <ul> <li>Number of connectable IO Devices for RT, max.</li> </ul>  | 32  |
| — of which in line, max.   | 32  |
| <ul> <li>— Number of IO Devices that can be simultaneously<br/>activated/deactivated, max.</li> </ul>  | 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<br>set for PROFINET IO, on the number of IO devices, and on the quantity of<br>configured user data  |
| Update time for RT   | 0   |
| — for send cycle of 1 ms   | 1 ms to 512 ms  |
| PROFINET IO Device   |   |
| Services   |   |
| - PG/OP communication  | Yes   |
| — Isochronous mode   | No  |
| — IRT  | No  |
| — PROFlenergy  | Yes   |
| — Prioritized startup  | No  |
|  |   |
| Shared device     Number of IQ Controllers with shared device, max   | Yes   |
| <ul> <li>Number of IO Controllers with shared device, max.</li> </ul>  | 4   |
| — Asset management record  | Yes; per user program   |
| Interface types  |   |
| RJ 45 (Ethernet)   |   |
| • 100 Mbps   | Yes   |
| <ul> <li>Autonegotiation</li> </ul>  | Yes   |
| Autocrossing   | Yes   |
| <ul> <li>Industrial Ethernet status LED</li> </ul>   | Yes   |
|  |   |
| Protocols  |   |
| Protocols<br>PROFIsafe   | Yes   |
|  | Yes   |
| PROFIsafe  | Yes<br>192; via integrated interfaces of the CPU and connected CPs / CMs  |
| PROFIsafe<br>Number of connections   |   |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.  | 192; via integrated interfaces of the CPU and connected CPs / CMs   |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web   | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10   |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces<br>• Number of S7 routing paths  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108  |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108  |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces<br>• Number of S7 routing paths<br>Redundancy mode<br>• H-Sync forwarding  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16  |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces<br>• Number of S7 routing paths<br>Redundancy mode<br>• H-Sync forwarding<br>Media redundancy<br>— MRP   | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50   |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces<br>• Number of S7 routing paths<br>Redundancy mode<br>• H-Sync forwarding<br>Media redundancy  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50<br>Yes; Requirement: IRT  |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces<br>• Number of S7 routing paths<br>Redundancy mode<br>• H-Sync forwarding<br>Media redundancy<br>— MRP   | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50   |
| PROFIsafe<br>Number of connections<br>• Number of connections, max.<br>• Number of connections reserved for ES/HMI/web<br>• Number of connections via integrated interfaces<br>• Number of S7 routing paths<br>Redundancy mode<br>• H-Sync forwarding<br>Media redundancy<br>— MRP<br>— MRPD   | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50<br>Yes; Requirement: IRT  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ.   | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50<br>Yes; Requirement: IRT<br>200 ms; For MRP, bumpless for MRPD  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max.  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50<br>Yes; Requirement: IRT<br>200 ms; For MRP, bumpless for MRPD  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50<br>Yes; Requirement: IRT<br>200 ms; For MRP, bumpless for MRPD<br>50  |
| PROFIsafe         Number of connections         • Number of connections, max.         • Number of connections reserved for ES/HMI/web         • Number of connections via integrated interfaces         • Number of S7 routing paths         Redundancy mode         • H-Sync forwarding         Media redundancy         - MRP         - MRPD         - Switchover time on line break, typ.         - Number of stations in the ring, max.         SIMATIC communication         • S7 communication, as server  | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client  | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes Yes   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max.  | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes Yes   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP   | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes See online help (S7 communication, user data size) Yes  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max.   | <ul> <li>192; via integrated interfaces of the CPU and connected CPs / CMs</li> <li>10</li> <li>108</li> <li>16</li> <li>Yes</li> <li>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50</li> <li>Yes; Requirement: IRT</li> <li>200 ms; For MRP, bumpless for MRPD</li> <li>50</li> <li>Yes</li> <li>Yes</li> <li>See online help (S7 communication, user data size)</li> </ul>   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. — several passive connections per port, supported   | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes See online help (S7 communication, user data size) Yes 64 kbyte Yes   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. — several passive connections per port, supported ISO-on-TCP (RFC1006)  | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes See online help (S7 communication, user data size) Yes 64 kbyte Yes Yes Yes   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. — several passive connections per port, supported ISO-on-TCP (RFC1006) — Data length, max.  | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes Yes Kequirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes See online help (S7 communication, user data size) Yes 64 kbyte Yes 64 kbyte Yes 64 kbyte  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. — several passive connections per port, supported ISO-on-TCP (RFC1006) — Data length, max. UDP  | 192; via integrated interfaces of the CPU and connected CPs / CMs<br>10<br>108<br>16<br>Yes<br>Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP<br>Client; max. number of devices in the ring: 50<br>Yes; Requirement: IRT<br>200 ms; For MRP, bumpless for MRPD<br>50<br>Yes<br>See online help (S7 communication, user data size)<br>Yes<br>64 kbyte<br>Yes<br>64 kbyte<br>Yes<br>64 kbyte<br>Yes   |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. UDP — Data length, max. UDP — Data length, max.   | 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16 Yes Yes Yes Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD 50 Yes See online help (S7 communication, user data size) Yes 64 kbyte Yes 64 kbyte Yes 64 kbyte Yes 2 kbyte; 1 472 bytes for UDP broadcast  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. — UDP — Data length, max. — UDP — Data length, max. — UDP   | 192; via integrated interfaces of the CPU and connected CPs / CMs         10         108         16         Yes         Yes         Ves; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50         Yes; Requirement: IRT         200 ms; For MRP, bumpless for MRPD 50         Yes         Yes         See online help (S7 communication, user data size)         Yes         Yes         64 kbyte         Yes         64 kbyte         Yes         2 kbyte; 1 472 bytes for UDP broadcast         Yes; Max. 5 multicast circuits  |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. — several passive connections per port, supported UDP — Data length, max. — UDP — Data length, max. — UDP MITIC as the provide of t | 192; via integrated interfaces of the CPU and connected CPs / CMs         10         108         16         Yes         Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50         Yes; Requirement: IRT         200 ms; For MRP, bumpless for MRPD 50         Yes         See online help (S7 communication, user data size)         Yes         64 kbyte         Yes         64 kbyte         Yes         2 kbyte; 1 472 bytes for UDP broadcast         Yes; Max. 5 multicast circuits         No |
| PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy — MRP — MRP — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication S7 communication, as server S7 communication, as client User data per job, max. Open IE communication TCP/IP — Data length, max. — UDP — Data length, max. — UDP — Data length, max. — UDP   | 192; via integrated interfaces of the CPU and connected CPs / CMs         10         108         16         Yes         Yes         Ves; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50         Yes; Requirement: IRT         200 ms; For MRP, bumpless for MRPD 50         Yes         Yes         See online help (S7 communication, user data size)         Yes         Yes         64 kbyte         Yes         64 kbyte         Yes         2 kbyte; 1 472 bytes for UDP broadcast         Yes; Max. 5 multicast circuits  |

| • LLDP   | Yes   |
|--|---|
| Web server   |   |
| • HTTP   | Yes; Standard and user pages  |
| • HTTPS  | Yes; Standard and user pages  |
| OPC UA   |   |
| Runtime license required   | Yes   |
| OPC UA Client  | Yes   |
| <ul> <li>Application authentication</li> </ul>   | Yes   |
| — Security policies  | Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256       |
| — User authentication  | "anonymous" or by user name & password  |
| <ul> <li>Number of connections, max.</li> </ul>  | 10  |
| <ul> <li>Number of nodes of the client interfaces,<br/>recommended max.</li> </ul>   | 2 000   |
| <ul> <li>— Number of elements for one call of<br/>OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_L<br/>max.</li> </ul>             | 300   |
| <ul> <li>— Number of elements for one call of<br/>OPC_UA_NameSpaceGetIndexList, max.</li> </ul>                                  | 20  |
| <ul> <li>— Number of elements for one call of<br/>OPC_UA_MethodGetHandleList, max.</li> </ul>                                    | 100   |
| <ul> <li>Number of simultaneous calls of the client<br/>instructions for session management, per connection,<br/>max.</li> </ul> | 1   |
| <ul> <li>— Number of simultaneous calls of the client<br/>instructions for data access, per connection, max.</li> </ul>          | 5   |
| - Number of registerable nodes, max.   | 5 000   |
| <ul> <li>— Number of registerable method calls of<br/>OPC_UA_MethodCall, max.</li> </ul>   | 100   |
| <ul> <li>— Number of inputs/outputs when calling<br/>OPC_UA_MethodCall, max.</li> </ul>  | 20  |
| OPC UA Server  | Yes; Data access (read, write, subscribe), method call, custom address space          |
| <ul> <li>Application authentication</li> </ul>   | Yes   |
| — Security policies  | Available security policies: None, Basic128Rsa15, Basic256Rsa15,<br>Basic256Sha256    |
| — User authentication  | "anonymous" or by user name & password  |
| <ul> <li>Number of sessions, max.</li> </ul>   | 48  |
| <ul> <li>Number of accessible variables, max.</li> </ul>   | 100 000   |
| <ul> <li>Number of registerable nodes, max.</li> </ul>   | 20 000  |
| <ul> <li>Number of subscriptions per session, max.</li> </ul>  | 20  |
| — Sampling interval, min.  | 100 ms  |
| — Publishing interval, min.  | 200 ms  |
| - Number of server methods, max.   | 50  |
| - Number of inputs/outputs per server method, max.   | 20  |
| - Number of monitored items, recommended max.  | 2 000; for 1 s sampling interval and 1 s send interval                                |
| — Number of server interfaces, max.  | 10  |
| - Number of nodes for user-defined server interfaces,  | 5 000   |
| max.   |   |
| Further protocols  |   |
| • MODBUS   | Yes; MODBUS TCP   |
| sochronous mode  |   |
| Equidistance   | Yes   |
| 7 message functions  |   |
| Number of login stations for message functions, max.   | 32  |
| Program alarms   | Yes   |
| Number of configurable program messages, max.  | 10 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH |
| Number of loadable program messages in RUN, max.   | 5 000   |
| Number of simultaneously active program alarms   |   |
| <ul> <li>Number of program alarms</li> </ul>   | 800   |
| <ul> <li>Number of alarms for system diagnostics</li> </ul>  | 200   |
| Number of alarms for motion technology objects   | 160   |
| est commissioning functions  |   |
| 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)                          |

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| Single step  | No  |
|--|---|
| Number of breakpoints  | 8   |
| Status/control   |   |
| Status/control variable  | Yes   |
| Variables  | Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters  |
| Number of variables, max.  |   |
| — of which status variables, max.  | 200; per job  |
| — of which control variables, max.   | 200; per job  |
| Forcing  |   |
| • Forcing, variables   | Peripheral inputs/outputs   |
| Number of variables, max.  | 200   |
| Diagnostic buffer  |   |
| • present  | Yes   |
| Number of entries, max.  | 3 200   |
| — of which powerfail-proof   | 500   |
| Traces   |   |
| Number of configurable Traces  | 4; Up to 512 KB of data per trace are possible  |
| Interrupts/diagnostics/status information  |   |
| Diagnostics indication LED   |   |
| • RUN/STOP LED   | Yes   |
| • ERROR LED  | Yes   |
| • MAINT LED  | Yes   |
| • STOP ACTIVE LED  | Yes   |
| Connection display LINK TX/RX  | Yes   |
| Supported technology objects   |   |
| Motion Control   | Yes; Note: The number of axes affects the cycle time of the PLC program;<br>selection guide via the TIA Selection Tool or SIZER |
| Number of available Motion Control resources for   | 2 400   |
| 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   |   |
| <ul> <li>Number of positioning axes at motion control cycle</li> </ul>                               | 7   |
| of 4 ms (typical value)  |   |
| <ul> <li>— Number of positioning axes at motion control cycle<br/>of 8 ms (typical value)</li> </ul> | 14  |
| Controller   |   |
| PID_Compact  | Yes; Universal PID controller with integrated optimization  |
| PID_3Step  | Yes; PID controller with integrated optimization for valves   |
| PID-Temp   | Yes; PID controller with integrated optimization for temperature  |
| Counting and measuring   |   |
| High-speed counter   | Yes   |
| Standards, approvals, certificates   |   |
| Highest safety class achievable in safety mode   |   |
| <ul> <li>Performance level according to ISO 13849-1</li> </ul>                                       | PLe   |
| • SIL acc. to IEC 61508  | SIL 3   |
| Probability of failure (for service life of 20 years and repair time                                 | of 100 hours)   |
| <ul> <li>Low demand mode: PFDavg in accordance with<br/>SIL3</li> </ul>                              | < 2.00E-05  |
| <ul> <li>— High demand/continuous mode: PFH in accordance<br/>with SIL3</li> </ul>                   | < 1.00E-09  |
| Ambient conditions   |   |
| Ambient temperature during operation   |   |
| <ul> <li>horizontal installation, min.</li> </ul>  | -40 °C; = Tmin (incl. condensation/frost)   |
| <ul> <li>horizontal installation, max.</li> </ul>  | 60 °C; = Tmax; display: 50 °C, the display is switched off at an operating temperature of typically 50 °C                       |
|  | -40 °C: = Tmin  |

| • vertical installation, max.  | 40 °C; = Tmax; display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off  |
|--|---|
| Ambient temperature during storage/transportation  |   |
| • min.   | -40 °C  |
| • max.   | 70 °C   |
| Altitude during operation relating to sea level  |   |
| Installation altitude above sea level, max.  | 5 000 m; Restrictions for installation altitudes > 2 000 m, see manual  |
| Ambient air temperature-barometric pressure-altitude   | Restrictions for installation altitudes > 2 000 m, see entry ID: 109763260  |
| Relative humidity  |   |
| <ul> <li>With condensation, tested in accordance with IEC 60068-<br/>2-38, max.</li> </ul>   | 100 %; RH incl. condensation / frost (no commissioning in bedewed state),<br>horizontal installation  |
| Resistance   |   |
| Coolants and lubricants  |   |
| <ul> <li>Resistant to commercially available coolants and<br/>lubricants</li> </ul>  | Yes; Incl. diesel and oil droplets in the air   |
| Use in stationary industrial systems   |   |
| <ul> <li>— to biologically active substances according to EN 60721-3-3</li> </ul>  | Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request  |
| <ul> <li>— to chemically active substances according to EN<br/>60721-3-3</li> </ul>  | Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); $^{\star}$   |
| <ul> <li>— to mechanically active substances according to EN 60721-3-3</li> </ul>  | Yes; Class 3S4 incl. sand, dust, *  |
| Use on ships/at sea  |   |
| <ul> <li>— to biologically active substances according to EN 60721-3-6</li> </ul>  | Yes; Class 6B2 mold, fungal and dry rot spores (excluding fauna)  |
| <ul> <li>— to chemically active substances according to EN 60721-3-6</li> </ul>  | Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *  |
| <ul> <li>— to mechanically active substances according to EN 60721-3-6</li> </ul>  | Yes; Class 6S3 incl. sand, dust; *  |
| Usage in industrial process technology   |   |
| <ul> <li>Against chemically active substances acc. to EN 60654-4</li> </ul>  | Yes; Class 3 (excluding trichlorethylene)   |
| <ul> <li>Environmental conditions for process, measuring<br/>and control systems acc. to ANSI/ISA-71.04</li> </ul>                                 | Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil) |
| Remark   |   |
| <ul> <li>— Note regarding classification of environmental<br/>conditions acc. to EN 60721, EN 60654-4 and<br/>ANSI/ISA-71.04</li> </ul>            | * The supplied plug covers must remain in place over the unused interfaces during operation!  |
| Conformal coating  |   |
| <ul> <li>Coatings for printed circuit board assemblies acc. to EN 61086</li> </ul>   | Yes; Class 2 for high reliability   |
| <ul> <li>Protection against fouling acc. to EN 60664-3</li> </ul>  | Yes; Type 1 protection  |
| <ul> <li>Military testing according to MIL-I-46058C, Amendment 7</li> </ul>  | Yes; Discoloration of coating possible during service life  |
| <ul> <li>Qualification and Performance of Electrical Insulating<br/>Compound for Printed Board Assemblies according to IPC-<br/>CC-830A</li> </ul> | Yes; Conformal coating, Class A   |
| configuration / header   |   |
| configuration / programming / header   |   |
| Programming language   |   |
| - LAD  | Yes; incl. failsafe   |
| — FBD  | Yes; incl. failsafe   |
| — STL  | Yes   |
| — SCL  | Yes   |
| — GRAPH  | Yes   |
| Know-how protection  |   |
| User program protection/password protection  | Yes   |
| Copy protection  | Yes   |
| Block protection   | Yes   |
| Access protection  |   |
| <ul> <li>Password for display</li> </ul>   | Yes   |
| Protection level: Write protection   | Yes; Specific write protection both for Standard and for Failsafe   |
| <ul> <li>Protection level: Read/write protection</li> </ul>  | Yes   |
| Protection level: Complete protection  | Yes   |
| programming / cycle time monitoring / header   |   |
| lower limit  | adjustable minimum cycle time   |

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| • upper limit   | adjustable maximum cycle time |
|-----------------|-------------------------------|
| Dimensions      |                               |
| Width           | 70 mm                         |
| Height          | 147 mm                        |
| Depth           | 129 mm                        |
| Weights         |                               |
| Weight, approx. | 550 g                         |
|                 |                               |

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