

SIMATIC S7-400, CPU 416-3 PN/DP CENTRAL PROCESSING UNIT WITH: 16 MB WORKING MEMORY, (8 MB KB CODE, 8 MB DATA), INTERFACES: 1. IF MPI/DP 12 MBIT/S (X1), 2. IF ETHERNET/PROFINET (X5), 3. IF IF964-DP PLUGABLE (IF1)

| General information                                                        |                                          |
|----------------------------------------------------------------------------|------------------------------------------|
| Product type designation                                                   | CPU416-3 PN/DP                           |
| Hardware product version                                                   | 01                                       |
| Firmware version                                                           | V7.0                                     |
| Engineering with                                                           |                                          |
| <ul style="list-style-type: none"> <li>Programming package</li> </ul>      | STEP 7 V5.5 or higher with HSP 262       |
| CiR – Configuration in RUN                                                 |                                          |
| CiR synchronization time, basic load                                       | 100 ms                                   |
| CiR synchronization time, time per I/O byte                                | 10 µs                                    |
| Supply voltage                                                             |                                          |
| Rated value (DC)                                                           |                                          |
| <ul style="list-style-type: none"> <li>24 V DC</li> </ul>                  | No; Power supply via system power supply |
| Input current                                                              |                                          |
| from backplane bus 5 V DC, typ.                                            | 1.3 A                                    |
| from backplane bus 5 V DC, max.                                            | 1.6 A                                    |
| from backplane bus 24 V DC, max.                                           | 300 mA; 150 mA per DP interface          |
| from interface 5 V DC, max.                                                | 90 mA; At each DP interface              |
| Power loss                                                                 |                                          |
| Power loss, typ.                                                           | 6.5 W                                    |
| Power loss, max.                                                           | 8 W                                      |
| Memory                                                                     |                                          |
| Type of memory                                                             | RAM                                      |
| Work memory                                                                |                                          |
| <ul style="list-style-type: none"> <li>integrated</li> </ul>               | 16 Mbyte                                 |
| <ul style="list-style-type: none"> <li>integrated (for program)</li> </ul> | 8 Mbyte                                  |
| <ul style="list-style-type: none"> <li>integrated (for data)</li> </ul>    | 8 Mbyte                                  |
| <ul style="list-style-type: none"> <li>expandable</li> </ul>               | No                                       |
| Load memory                                                                |                                          |
| <ul style="list-style-type: none"> <li>expandable FEPRM</li> </ul>         | Yes; with Memory Card (FLASH)            |
| <ul style="list-style-type: none"> <li>expandable FEPRM, max.</li> </ul>   | 64 Mbyte                                 |
| <ul style="list-style-type: none"> <li>integrated RAM, max.</li> </ul>     | 1 Mbyte                                  |
| <ul style="list-style-type: none"> <li>expandable RAM</li> </ul>           | Yes; with Memory Card (RAM)              |

|                                             |                                                                                                 |
|---------------------------------------------|-------------------------------------------------------------------------------------------------|
| • expandable RAM, max.                      | 64 Mbyte                                                                                        |
| <b>Backup</b>                               |                                                                                                 |
| • present                                   | Yes                                                                                             |
| • with battery                              | Yes; all data                                                                                   |
| • without battery                           | No                                                                                              |
| <b>Battery</b>                              |                                                                                                 |
| <b>Backup battery</b>                       |                                                                                                 |
| • Backup current, typ.                      | 180 µA; up to 40 °C                                                                             |
| • Backup current, max.                      | 850 µA                                                                                          |
| • Backup time, max.                         | Dealt with in the module data manual with the secondary conditions and the factors of influence |
| • Feeding of external backup voltage to CPU | 5 V DC to 15 V DC                                                                               |
| <b>CPU processing times</b>                 |                                                                                                 |
| for bit operations, typ.                    | 12.5 ns                                                                                         |
| for word operations, typ.                   | 12.5 ns                                                                                         |
| for fixed point arithmetic, typ.            | 12.5 ns                                                                                         |
| for floating point arithmetic, typ.         | 25 ns                                                                                           |
| <b>CPU-blocks</b>                           |                                                                                                 |
| <b>DB</b>                                   |                                                                                                 |
| • Number, max.                              | 10 000; Number range: 1 to 16000                                                                |
| • Size, max.                                | 64 kbyte                                                                                        |
| <b>FB</b>                                   |                                                                                                 |
| • Number, max.                              | 5 000; Number range: 0 to 7999                                                                  |
| • Size, max.                                | 64 kbyte                                                                                        |
| <b>FC</b>                                   |                                                                                                 |
| • Number, max.                              | 5 000; Number range: 0 to 7999                                                                  |
| • Size, max.                                | 64 kbyte                                                                                        |
| <b>OB</b>                                   |                                                                                                 |
| • Number, max.                              | see instruction list                                                                            |
| • Size, max.                                | 64 kbyte                                                                                        |
| • Number of free cycle OBs                  | 1; OB 1                                                                                         |
| • Number of time alarm OBs                  | 8; OB 10-17                                                                                     |
| • Number of delay alarm OBs                 | 4; OB 20-23                                                                                     |
| • Number of cyclic interrupt OBs            | 9; OB 30-38 (shortest cycle that can be set = 500 µs)                                           |
| • Number of process alarm OBs               | 8; OB 40-47                                                                                     |
| • Number of DPV1 alarm OBs                  | 3; OB 55-57                                                                                     |
| • Number of isochronous mode OBs            | 4; OB 61-64                                                                                     |
| • Number of multicomputing OBs              | 1; OB 60                                                                                        |
| • Number of background OBs                  | 1; OB 90                                                                                        |
| • Number of startup OBs                     | 3; OB 100-102                                                                                   |
| • Number of asynchronous error OBs          | 9; OB 80-88                                                                                     |

|                                               |                                                     |
|-----------------------------------------------|-----------------------------------------------------|
| • Number of synchronous error OBs             | 2; OB 121, 122                                      |
| <b>Nesting depth</b>                          |                                                     |
| • per priority class                          | 24                                                  |
| • additional within an error OB               | 2                                                   |
| <b>Counters, timers and their retentivity</b> |                                                     |
| <b>S7 counter</b>                             |                                                     |
| • Number                                      | 2 048                                               |
| <b>Retentivity</b>                            |                                                     |
| — adjustable                                  | Yes                                                 |
| — lower limit                                 | 0                                                   |
| — upper limit                                 | 2 047                                               |
| — preset                                      | Z 0 to Z 7                                          |
| <b>Counting range</b>                         |                                                     |
| — lower limit                                 | 0                                                   |
| — upper limit                                 | 999                                                 |
| <b>IEC counter</b>                            |                                                     |
| • present                                     | Yes                                                 |
| • Type                                        | SFB                                                 |
| • Number                                      | Unlimited (limited only by RAM capacity)            |
| <b>S7 times</b>                               |                                                     |
| • Number                                      | 2 048                                               |
| <b>Retentivity</b>                            |                                                     |
| — adjustable                                  | Yes                                                 |
| — lower limit                                 | 0                                                   |
| — upper limit                                 | 2 047                                               |
| — preset                                      | No times retentive                                  |
| <b>Time range</b>                             |                                                     |
| — lower limit                                 | 10 ms                                               |
| — upper limit                                 | 9 990 s                                             |
| <b>IEC timer</b>                              |                                                     |
| • present                                     | Yes                                                 |
| • Type                                        | SFB                                                 |
| • Number                                      | Unlimited (limited only by RAM capacity)            |
| <b>Data areas and their retentivity</b>       |                                                     |
| retentive data area in total                  | Total working and load memory (with backup battery) |
| <b>Flag</b>                                   |                                                     |
| • Number, max.                                | 16 kbyte; Size of bit memory address area           |
| • Retentivity available                       | Yes                                                 |
| • Retentivity preset                          | MB 0 to MB 15                                       |
| • Number of clock memories                    | 8; in 1 memory byte                                 |
| <b>Data blocks</b>                            |                                                     |

|                                              |                                    |
|----------------------------------------------|------------------------------------|
| • Number, max.                               | 10 000; Number range: 1 to 16000   |
| • Size, max.                                 | 64 kbyte                           |
| Local data                                   |                                    |
| • adjustable, max.                           | 32 kbyte                           |
| • preset                                     | 16 kbyte                           |
| Address area                                 |                                    |
| I/O address area                             |                                    |
| • Inputs                                     | 16 kbyte                           |
| • Outputs                                    | 16 kbyte                           |
| of which distributed                         |                                    |
| — MPI/DP interface, inputs                   | 2 kbyte                            |
| — MPI/DP interface, outputs                  | 2 kbyte                            |
| — DP interface, inputs                       | 8 kbyte                            |
| — DP interface, outputs                      | 8 kbyte                            |
| — PROFINET interface, inputs                 | 8 kbyte                            |
| — PROFINET interface, outputs                | 8 kbyte                            |
| Process image                                |                                    |
| • Inputs, adjustable                         | 16 kbyte                           |
| • Outputs, adjustable                        | 16 kbyte                           |
| • Inputs, default                            | 512 byte                           |
| • Outputs, default                           | 512 byte                           |
| • consistent data, max.                      | 244 byte                           |
| • Access to consistent data in process image | Yes                                |
| Subprocess images                            |                                    |
| • Number of subprocess images, max.          | 15                                 |
| Digital channels                             |                                    |
| • Inputs                                     | 131 072                            |
| — of which central                           | 131 072                            |
| • Outputs                                    | 131 072                            |
| — of which central                           | 131 072                            |
| Analog channels                              |                                    |
| • Inputs                                     | 8 192                              |
| — of which central                           | 8 192                              |
| • Outputs                                    | 8 192                              |
| — of which central                           | 8 192                              |
| Hardware configuration                       |                                    |
| Number of expansion units, max.              | 21                                 |
| connectable OPs                              | 95                                 |
| Multicomputing                               | Yes; 4 CPUs max. (with UR1 or UR2) |
| Interface modules                            |                                    |
| • Number of connectable IMs (total), max.    | 6                                  |

|                                                                                |                                                                                                                                                 |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| • Number of connectable IM 460s, max.                                          | 6                                                                                                                                               |
| • Number of connectable IM 463s, max.                                          | 4; IM 463-2                                                                                                                                     |
| Number of DP masters                                                           |                                                                                                                                                 |
| • integrated                                                                   | 1                                                                                                                                               |
| • via CP                                                                       | 10; CP 443-5 Extended                                                                                                                           |
| • via IM 467                                                                   | 4                                                                                                                                               |
| • Mixed mode IM + CP permitted                                                 | No; IM 467 cannot be used jointly with CP 443-5 Ext. or CP 443-1 in PROFINET IO mode                                                            |
| • via interface module                                                         | 1; IF 964-DP                                                                                                                                    |
| • Number of pluggable S5 modules (via adapter capsule in central device), max. | 6                                                                                                                                               |
| Number of IO Controllers                                                       |                                                                                                                                                 |
| • integrated                                                                   | 1                                                                                                                                               |
| • via CP                                                                       | 4; Max. 4 in the central controller; no mixed operation of different CP 443-1 types in PROFINET IO mode                                         |
| Number of operable FMs and CPs (recommended)                                   |                                                                                                                                                 |
| • FM                                                                           | Limited by number of slots or number of connections                                                                                             |
| • CP, PtP                                                                      | CP 440: Limited by number of slots; CP 441: Limited by number of slots and number of connections                                                |
| • PROFIBUS and Ethernet CPs                                                    | 14; In total max. 10 CPs as DP master and PROFINET controller, of which up to 10 IMs or CPs as DP master and up to 4 CPs as PROFINET controller |
| Slots                                                                          |                                                                                                                                                 |
| • required slots                                                               | 2                                                                                                                                               |
| Time of day                                                                    |                                                                                                                                                 |
| Clock                                                                          |                                                                                                                                                 |
| • Hardware clock (real-time)                                                   | Yes                                                                                                                                             |
| • retentive and synchronizable                                                 | Yes                                                                                                                                             |
| • Resolution                                                                   | 1 ms                                                                                                                                            |
| • Deviation per day (buffered), max.                                           | 1.7 s; Power off                                                                                                                                |
| • Deviation per day (unbuffered), max.                                         | 8.6 s; For power On                                                                                                                             |
| Operating hours counter                                                        |                                                                                                                                                 |
| • Number                                                                       | 16                                                                                                                                              |
| • Number/Number range                                                          | 0 to 15                                                                                                                                         |
| • Range of values                                                              | SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2 <sup>31</sup> - 1 hours                                                                       |
| • Granularity                                                                  | 1 hour                                                                                                                                          |
| • retentive                                                                    | Yes                                                                                                                                             |
| Clock synchronization                                                          |                                                                                                                                                 |
| • supported                                                                    | Yes                                                                                                                                             |
| • to MPI, master                                                               | Yes                                                                                                                                             |
| • to MPI, slave                                                                | Yes                                                                                                                                             |
| • to DP, master                                                                | Yes                                                                                                                                             |

|                                                  |                                                                                                                   |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| • to DP, slave                                   | Yes                                                                                                               |
| • in AS, master                                  | Yes                                                                                                               |
| • in AS, slave                                   | Yes                                                                                                               |
| • on Ethernet via NTP                            | Yes; As client                                                                                                    |
| • to IF 964 DP                                   | Yes                                                                                                               |
| Time difference in system when synchronizing via |                                                                                                                   |
| • Ethernet, max.                                 | 10 ms                                                                                                             |
| • MPI, max.                                      | 200 ms                                                                                                            |
| <b>Interfaces</b>                                |                                                                                                                   |
| Interfaces/bus type                              | 1 x MPI/PROFIBUS DP, 1 x PROFINET (2 ports), 1 x PROFIBUS DP (optionally pluggable)                               |
| Number of RS 485 interfaces                      | 1; Combined MPI / PROFIBUS DP                                                                                     |
| Number of other interfaces                       | 1; PROFIBUS DP with IF 964-DP (plug-in option; MLFB: 6ES7964-2AA04-0AB0)                                          |
| <b>1. Interface</b>                              |                                                                                                                   |
| Interface type                                   | Integrated                                                                                                        |
| Physics                                          | RS 485 / PROFIBUS + MPI                                                                                           |
| Isolated                                         | Yes                                                                                                               |
| Power supply to interface (15 to 30 V DC), max.  | 150 mA                                                                                                            |
| Number of connection resources                   | MPI: 44, DP: 32                                                                                                   |
| <b>Functionality</b>                             |                                                                                                                   |
| • MPI                                            | Yes                                                                                                               |
| • PROFIBUS DP master                             | Yes                                                                                                               |
| • PROFIBUS DP slave                              | Yes                                                                                                               |
| <b>MPI</b>                                       |                                                                                                                   |
| • Number of connections                          | 44; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1 |
| • Transmission rate, max.                        | 12 Mbit/s                                                                                                         |
| <b>Services</b>                                  |                                                                                                                   |
| — PG/OP communication                            | Yes                                                                                                               |
| — Routing                                        | Yes                                                                                                               |
| — Global data communication                      | Yes                                                                                                               |
| — S7 basic communication                         | Yes                                                                                                               |
| — S7 communication                               | Yes                                                                                                               |
| — S7 communication, as client                    | Yes                                                                                                               |
| — S7 communication, as server                    | Yes                                                                                                               |
| <b>DP master</b>                                 |                                                                                                                   |
| • Number of connections, max.                    | 32; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1 |
| • Transmission rate, max.                        | 12 Mbit/s                                                                                                         |
| • Number of DP slaves, max.                      | 32                                                                                                                |
| <b>Services</b>                                  |                                                                                                                   |

|                                                       |                                                                                                                               |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| — PG/OP communication                                 | Yes                                                                                                                           |
| — Routing                                             | Yes; S7 routing                                                                                                               |
| — Global data communication                           | No                                                                                                                            |
| — S7 basic communication                              | Yes                                                                                                                           |
| — S7 communication                                    | Yes                                                                                                                           |
| — S7 communication, as client                         | Yes                                                                                                                           |
| — S7 communication, as server                         | Yes                                                                                                                           |
| — Equidistance                                        | Yes                                                                                                                           |
| — Isochronous mode                                    | Yes                                                                                                                           |
| — SYNC/FREEZE                                         | Yes                                                                                                                           |
| — Activation/deactivation of DP slaves                | Yes                                                                                                                           |
| — Direct data exchange (slave-to-slave communication) | Yes                                                                                                                           |
| — DPV1                                                | Yes                                                                                                                           |
| <b>Address area</b>                                   |                                                                                                                               |
| — Inputs, max.                                        | 2 kbyte                                                                                                                       |
| — Outputs, max.                                       | 2 kbyte                                                                                                                       |
| <b>User data per DP slave</b>                         |                                                                                                                               |
| — User data per DP slave, max.                        | 244 byte                                                                                                                      |
| — Inputs, max.                                        | 244 byte                                                                                                                      |
| — Outputs, max.                                       | 244 byte                                                                                                                      |
| — Slots, max.                                         | 244                                                                                                                           |
| — per slot, max.                                      | 128 byte                                                                                                                      |
| <b>DP slave</b>                                       |                                                                                                                               |
| • Number of connections                               | 32                                                                                                                            |
| • GSD file                                            | <a href="http://support.automation.siemens.com/WW/view/en/113652">http://support.automation.siemens.com/WW/view/en/113652</a> |
| • Transmission rate, max.                             | 12 Mbit/s                                                                                                                     |
| • automatic baud rate search                          | No                                                                                                                            |
| • Address area, max.                                  | 32; Virtual slots                                                                                                             |
| • User data per address area, max.                    | 32 byte                                                                                                                       |
| — of which consistent, max.                           | 32 byte                                                                                                                       |
| <b>Services</b>                                       |                                                                                                                               |
| — PG/OP communication                                 | Yes; with interface active                                                                                                    |
| — S7 routing                                          | Yes; with interface active                                                                                                    |
| — Global data communication                           | No                                                                                                                            |
| — S7 basic communication                              | No                                                                                                                            |
| — S7 communication                                    | Yes                                                                                                                           |
| — S7 communication, as client                         | Yes                                                                                                                           |
| — S7 communication, as server                         | Yes                                                                                                                           |
| — Direct data exchange (slave-to-slave communication) | No                                                                                                                            |

|                                            |                                                                                            |
|--------------------------------------------|--------------------------------------------------------------------------------------------|
| — DPV1                                     | No                                                                                         |
| <b>Transfer memory</b>                     |                                                                                            |
| — Inputs                                   | 244 byte                                                                                   |
| — Outputs                                  | 244 byte                                                                                   |
| <b>2. Interface</b>                        |                                                                                            |
| Interface type                             | PROFINET                                                                                   |
| Physics                                    | Ethernet RJ45                                                                              |
| Isolated                                   | Yes                                                                                        |
| automatic detection of transmission rate   | Yes; Autosensing                                                                           |
| Autonegotiation                            | Yes                                                                                        |
| Autocrossing                               | Yes                                                                                        |
| Change of IP address at runtime, supported | Yes; Assignment by higher-level IO-Controller or by the user program with SFB104 "IP_CONF" |
| Number of connection resources             | 96                                                                                         |
| <b>Interface types</b>                     |                                                                                            |
| • Number of ports                          | 2                                                                                          |
| • integrated switch                        | Yes                                                                                        |
| <b>Media redundancy</b>                    |                                                                                            |
| • supported                                | Yes                                                                                        |
| • Switchover time on line break, typ.      | 200 ms                                                                                     |
| • Number of stations in the ring, max.     | 50                                                                                         |
| <b>Functionality</b>                       |                                                                                            |
| • PROFINET IO Controller                   | Yes                                                                                        |
| • PROFINET IO Device                       | Yes                                                                                        |
| • PROFINET CBA                             | Yes                                                                                        |
| • PROFIBUS DP master                       | No                                                                                         |
| • PROFIBUS DP slave                        | No                                                                                         |
| • Open IE communication                    | Yes                                                                                        |
| • Web server                               | Yes                                                                                        |
| — Number of HTTP clients                   | 5                                                                                          |
| • Point-to-point connection                | No                                                                                         |
| <b>PROFINET IO Controller</b>              |                                                                                            |
| • Transmission rate, max.                  | 100 Mbit/s                                                                                 |
| <b>Services</b>                            |                                                                                            |
| — PG/OP communication                      | Yes                                                                                        |
| — S7 routing                               | Yes                                                                                        |
| — S7 communication                         | Yes                                                                                        |
| — Isochronous mode                         | Yes; Only with IRT and the High Performance option                                         |
| — Open IE communication                    | Yes                                                                                        |
| — Shared device                            | Yes                                                                                        |
| — Prioritized startup                      | Yes                                                                                        |

|                                                                               |                                                                                                                                                                                               |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| — Number of IO devices with prioritized startup, max.                         | 32                                                                                                                                                                                            |
| — Number of connectable IO Devices, max.                                      | 256                                                                                                                                                                                           |
| — Of which IO devices with IRT, max.                                          | 64                                                                                                                                                                                            |
| — of which in line, max.                                                      | 64                                                                                                                                                                                            |
| — Number of IO Devices with IRT and the option "high flexibility"             | 256                                                                                                                                                                                           |
| — of which in line, max.                                                      | 61                                                                                                                                                                                            |
| — Number of connectable IO Devices for RT, max.                               | 256                                                                                                                                                                                           |
| — of which in line, max.                                                      | 256                                                                                                                                                                                           |
| — Activation/deactivation of IO Devices                                       | Yes                                                                                                                                                                                           |
| — Number of IO Devices that can be simultaneously activated/deactivated, max. | 8                                                                                                                                                                                             |
| — IO Devices changing during operation (partner ports), supported             | Yes                                                                                                                                                                                           |
| — Number of IO Devices per tool, max.                                         | 8; 8 parallel calls of the SFC 12 "D_ACT_DP" possible per line. Max. 32 IO Devices changing during operation (partner ports) are supported                                                    |
| — Device replacement without swap medium                                      | Yes                                                                                                                                                                                           |
| — Send cycles                                                                 | 250 µs, 500 µs, 1 ms, 2 ms, 4 ms additionally with IRT with high performance: 250 µs to 4 ms in 125 µs frame                                                                                  |
| — Updating time                                                               | 250 µs to 512 ms; minimum value depends on preset communication share for PROFINET IO, on the number of IO Devices and on the amount of configured user data, see PROFINET system description |
| <b>Address area</b>                                                           |                                                                                                                                                                                               |
| — Inputs, max.                                                                | 8 kbyte                                                                                                                                                                                       |
| — Outputs, max.                                                               | 8 kbyte                                                                                                                                                                                       |
| — User data consistency, max.                                                 | 1 024 byte                                                                                                                                                                                    |
| <b>PROFINET IO Device</b>                                                     |                                                                                                                                                                                               |
| <b>Services</b>                                                               |                                                                                                                                                                                               |
| — PG/OP communication                                                         | Yes                                                                                                                                                                                           |
| — S7 routing                                                                  | Yes                                                                                                                                                                                           |
| — S7 communication                                                            | Yes                                                                                                                                                                                           |
| — Isochronous mode                                                            | No                                                                                                                                                                                            |
| — Open IE communication                                                       | Yes                                                                                                                                                                                           |
| — IRT                                                                         | Yes                                                                                                                                                                                           |
| — Prioritized startup                                                         | Yes                                                                                                                                                                                           |
| — Shared device                                                               | Yes                                                                                                                                                                                           |
| — Number of IO Controllers with shared device, max.                           | 2                                                                                                                                                                                             |
| <b>Transfer memory</b>                                                        |                                                                                                                                                                                               |

|                                                 |                                                                                   |
|-------------------------------------------------|-----------------------------------------------------------------------------------|
| — Inputs, max.                                  | 1 440 byte; Per IO Controller with shared device                                  |
| — Outputs, max.                                 | 1 440 byte; Per IO Controller with shared device                                  |
| <b>Submodules</b>                               |                                                                                   |
| — Number, max.                                  | 64                                                                                |
| — User data per submodule, max.                 | 1 024 byte                                                                        |
| <b>PROFINET CBA</b>                             |                                                                                   |
| • acyclic transmission                          | Yes                                                                               |
| • cyclic transmission                           | Yes                                                                               |
| <b>Open IE communication</b>                    |                                                                                   |
| • Number of connections, max.                   | 94                                                                                |
| • Local port numbers used at the system end     | 0, 20, 21, 25, 80, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 65535 |
| • Keep-alive function, supported                | Yes                                                                               |
| <b>3. Interface</b>                             |                                                                                   |
| Interface type                                  | Pluggable interface module (IF)                                                   |
| Plug-in interface modules                       | IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)                                              |
| Physics                                         | RS 485 / PROFIBUS                                                                 |
| Isolated                                        | Yes                                                                               |
| Power supply to interface (15 to 30 V DC), max. | 150 mA                                                                            |
| automatic detection of transmission rate        | No                                                                                |
| Number of connection resources                  | 32                                                                                |
| <b>Functionality</b>                            |                                                                                   |
| • MPI                                           | No                                                                                |
| • PROFIBUS DP master                            | Yes                                                                               |
| • PROFIBUS DP slave                             | Yes                                                                               |
| <b>DP master</b>                                |                                                                                   |
| • Number of connections, max.                   | 32                                                                                |
| • Transmission rate, max.                       | 12 Mbit/s                                                                         |
| • Number of DP slaves, max.                     | 125                                                                               |
| <b>Services</b>                                 |                                                                                   |
| — PG/OP communication                           | Yes                                                                               |
| — Routing                                       | Yes; S7 routing                                                                   |
| — Global data communication                     | No                                                                                |
| — S7 basic communication                        | Yes                                                                               |
| — S7 communication                              | Yes                                                                               |
| — S7 communication, as client                   | Yes                                                                               |
| — S7 communication, as server                   | Yes                                                                               |
| — Equidistance                                  | Yes                                                                               |
| — Isochronous mode                              | Yes                                                                               |
| — SYNC/FREEZE                                   | Yes                                                                               |
| — Activation/deactivation of DP slaves          | Yes                                                                               |

|                                                                 |                                                                                                                               |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| — Direct data exchange (slave-to-slave communication)           | Yes                                                                                                                           |
| — DPV0                                                          | Yes                                                                                                                           |
| — DPV1                                                          | Yes                                                                                                                           |
| <b>Address area</b>                                             |                                                                                                                               |
| — Inputs, max.                                                  | 8 kbyte                                                                                                                       |
| — Outputs, max.                                                 | 8 kbyte                                                                                                                       |
| <b>User data per DP slave</b>                                   |                                                                                                                               |
| — User data per DP slave, max.                                  | 244 byte                                                                                                                      |
| — Inputs, max.                                                  | 244 byte                                                                                                                      |
| — Outputs, max.                                                 | 244 byte                                                                                                                      |
| — Slots, max.                                                   | 244                                                                                                                           |
| — per slot, max.                                                | 128 byte                                                                                                                      |
| <b>DP slave</b>                                                 |                                                                                                                               |
| • Number of connections                                         | 32                                                                                                                            |
| • GSD file                                                      | <a href="http://support.automation.siemens.com/WW/view/en/113652">http://support.automation.siemens.com/WW/view/en/113652</a> |
| • Transmission rate, max.                                       | 12 Mbit/s                                                                                                                     |
| • automatic baud rate search                                    | No                                                                                                                            |
| • Address area, max.                                            | 32; Virtual slots                                                                                                             |
| • User data per address area, max.                              | 32 byte                                                                                                                       |
| — of which consistent, max.                                     | 32 byte                                                                                                                       |
| <b>Services</b>                                                 |                                                                                                                               |
| — PG/OP communication                                           | Yes                                                                                                                           |
| — S7 routing                                                    | Yes; with interface active                                                                                                    |
| — Global data communication                                     | No                                                                                                                            |
| — S7 basic communication                                        | No                                                                                                                            |
| — S7 communication                                              | Yes                                                                                                                           |
| — S7 communication, as client                                   | Yes                                                                                                                           |
| — S7 communication, as server                                   | Yes                                                                                                                           |
| — Direct data exchange (slave-to-slave communication)           | No                                                                                                                            |
| — DPV1                                                          | No                                                                                                                            |
| <b>Transfer memory</b>                                          |                                                                                                                               |
| — Inputs                                                        | 244 byte                                                                                                                      |
| — Outputs                                                       | 244 byte                                                                                                                      |
| <b>Isochronous mode</b>                                         |                                                                                                                               |
| Isochronous operation (application synchronized up to terminal) | Yes; Via PROFIBUS DP or PROFINET interface                                                                                    |
| Number of DP masters with isochronous mode                      | 2                                                                                                                             |
| User data per isochronous slave, max.                           | 244 byte                                                                                                                      |
| Equidistance                                                    | Yes                                                                                                                           |
| shortest clock pulse                                            | 1 ms; 0.5 ms without use of SFC 126, 127                                                                                      |

|                                                               |                                                                     |
|---------------------------------------------------------------|---------------------------------------------------------------------|
| max. cycle                                                    | 32 ms                                                               |
| <b>Communication functions</b>                                |                                                                     |
| PG/OP communication                                           | Yes                                                                 |
| • Number of connectable OPs without message processing        | 95                                                                  |
| • Number of connectable OPs with message processing           | 95; When using Alarm_S/SQ and Alarm_D/DQ                            |
| Data record routing                                           | Yes                                                                 |
| <b>Global data communication</b>                              |                                                                     |
| • supported                                                   | Yes                                                                 |
| • Number of GD loops, max.                                    | 16                                                                  |
| • Number of GD packets, transmitter, max.                     | 16                                                                  |
| • Number of GD packets, receiver, max.                        | 32                                                                  |
| • Size of GD packets, max.                                    | 54 byte                                                             |
| • Size of GD packet (of which consistent), max.               | 1 variable                                                          |
| <b>S7 basic communication</b>                                 |                                                                     |
| • supported                                                   | Yes                                                                 |
| • User data per job, max.                                     | 76 byte                                                             |
| • User data per job (of which consistent), max.               | 1 variable                                                          |
| <b>S7 communication</b>                                       |                                                                     |
| • supported                                                   | Yes                                                                 |
| • as server                                                   | Yes                                                                 |
| • as client                                                   | Yes                                                                 |
| • User data per job, max.                                     | 64 kbyte                                                            |
| • User data per job (of which consistent), max.               | 462 byte; 1 variable                                                |
| <b>S5 compatible communication</b>                            |                                                                     |
| • supported                                                   | Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5      |
| • User data per job, max.                                     | 8 kbyte                                                             |
| • User data per job (of which consistent), max.               | 240 byte                                                            |
| • Number of simultaneous AG-SEND/AG-RECV orders per CPU, max. | 64/64                                                               |
| <b>Standard communication (FMS)</b>                           |                                                                     |
| • supported                                                   | Yes; Via CP and loadable FB                                         |
| <b>Open IE communication</b>                                  |                                                                     |
| • TCP/IP                                                      | Yes; via integrated PROFINET interface and loadable FBs             |
| — Number of connections, max.                                 | 94                                                                  |
| — Data length, max.                                           | 32 kbyte                                                            |
| — several passive connections per port, supported             | Yes                                                                 |
| • ISO-on-TCP (RFC1006)                                        | Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs |

|                                                                      |                                                                                                 |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| — Number of connections, max.                                        | 94                                                                                              |
| — Data length, max.                                                  | 32 kbyte; 1452 bytes via CP 443-1 Adv.                                                          |
| • UDP                                                                | Yes; via integrated PROFINET interface and loadable FBs                                         |
| — Number of connections, max.                                        | 94                                                                                              |
| — Data length, max.                                                  | 1 472 byte                                                                                      |
| <b>Web server</b>                                                    |                                                                                                 |
| • supported                                                          | Yes                                                                                             |
| • Number of HTTP clients                                             | 5                                                                                               |
| • User-defined websites                                              | Yes                                                                                             |
| <b>PROFINET CBA (at set setpoint communication load)</b>             |                                                                                                 |
| • Setpoint for the CPU communication load                            | 20 %                                                                                            |
| • Number of remote interconnection partners                          | 32                                                                                              |
| • Number of functions, master/slave                                  | 150                                                                                             |
| • Total of all master/slave connections                              | 6 000                                                                                           |
| • Data length of all incoming connections master/slave, max.         | 65 000 byte                                                                                     |
| • Data length of all outgoing connections master/slave, max.         | 65 000 byte                                                                                     |
| • Number of device-internal and PROFIBUS interconnections            | 1 000                                                                                           |
| • Data length of device-internal und PROFIBUS interconnections, max. | 16 000 byte                                                                                     |
| • Data length per connection, max.                                   | 2 000 byte                                                                                      |
| <b>Remote interconnections with acyclic transmission</b>             |                                                                                                 |
| — Sampling frequency: Sampling time, min.                            | 200 ms; Depending on preset communication load, number of interconnections and data length used |
| — Number of incoming interconnections                                | 500                                                                                             |
| — Number of outgoing interconnections                                | 500                                                                                             |
| — Data length of all incoming interconnections, max.                 | 16 000 byte                                                                                     |
| — Data length of all outgoing interconnections, max.                 | 16 000 byte                                                                                     |
| — Data length per connection, max.                                   | 2 000 byte                                                                                      |
| <b>Remote interconnections with cyclic transmission</b>              |                                                                                                 |
| — Transmission frequency: Transmission interval, min.                | 1 ms; Depending on preset communication load, number of interconnections and data length used   |
| — Number of incoming interconnections                                | 300                                                                                             |
| — Number of outgoing interconnections                                | 300                                                                                             |
| — Data length of all incoming interconnections, max.                 | 4 800 byte                                                                                      |
| — Data length of all outgoing interconnections, max.                 | 4 800 byte                                                                                      |
| — Data length per connection, max.                                   | 450 byte                                                                                        |

|                                                                      |                                                                                                                           |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>HMI variables via PROFINET (acyclic)</b>                          |                                                                                                                           |
| — Number of stations that can log on for HMI variables (PN OPC/iMap) | 2x PN OPC/1x iMap                                                                                                         |
| — HMI variable updating                                              | 500 ms                                                                                                                    |
| — Number of HMI variables                                            | 1 500                                                                                                                     |
| — Data length of all HMI variables, max.                             | 48 000 byte                                                                                                               |
| <b>PROFIBUS proxy functionality</b>                                  |                                                                                                                           |
| — supported                                                          | Yes; 32 PROFIBUS slaves max. connectable                                                                                  |
| — Data length per connection, max.                                   | 240 byte; Slave-dependent                                                                                                 |
| <b>Number of connections</b>                                         |                                                                                                                           |
| • overall                                                            | 96                                                                                                                        |
| • usable for PG communication                                        | 95                                                                                                                        |
| — reserved for PG communication                                      | 1                                                                                                                         |
| — adjustable for PG communication, max.                              | 0                                                                                                                         |
| • usable for OP communication                                        | 95                                                                                                                        |
| — reserved for OP communication                                      | 1                                                                                                                         |
| — adjustable for OP communication, max.                              | 0                                                                                                                         |
| • usable for S7 basic communication                                  | 94                                                                                                                        |
| — reserved for S7 basic communication                                | 0                                                                                                                         |
| — adjustable for S7 basic communication, max.                        | 0                                                                                                                         |
| • usable for S7 communication                                        | 94                                                                                                                        |
| — reserved for S7 communication                                      | 0                                                                                                                         |
| — adjustable for S7 communication, max.                              | 0                                                                                                                         |
| • usable for routing                                                 | 47                                                                                                                        |
| — reserved for routing                                               | 0                                                                                                                         |
| — adjustable for routing, max.                                       | 0                                                                                                                         |
| <b>S7 message functions</b>                                          |                                                                                                                           |
| Number of login stations for message functions, max.                 | 95; Max. 95 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 16 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) |
| Symbol-related messages                                              | Yes                                                                                                                       |
| SCAN procedure                                                       | Yes                                                                                                                       |
| Block related messages                                               | Yes                                                                                                                       |
| Process diagnostic messages                                          | Yes                                                                                                                       |
| simultaneously active Alarm-S blocks, max.                           | 1 000; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks                                                       |
| Alarm 8-blocks                                                       | Yes                                                                                                                       |
| • Number of instances for alarm 8 and S7 communication blocks, max.  | 4 000                                                                                                                     |
| • preset, max.                                                       | 600                                                                                                                       |
| Process control messages                                             | Yes                                                                                                                       |

|                                                                    |                                                                      |
|--------------------------------------------------------------------|----------------------------------------------------------------------|
| Number of archives that can log on simultaneously (SFB 37 AR_SEND) | 32                                                                   |
| Number of messages                                                 |                                                                      |
| • overall, max.                                                    | 1 024                                                                |
| • in 100 ms grid, max.                                             | 128                                                                  |
| • in 500 ms grid, max.                                             | 512                                                                  |
| • in 1000 ms grid, max.                                            | 1 024                                                                |
| Number of additional values                                        |                                                                      |
| • with 100 ms grid, max.                                           | 1                                                                    |
| • with 500, 1000 ms grid, max.                                     | 10                                                                   |
| Test commissioning functions                                       |                                                                      |
| Status block                                                       | Yes; Up to 16 simultaneously                                         |
| Single step                                                        | Yes                                                                  |
| Number of breakpoints                                              | 16                                                                   |
| Status/control                                                     |                                                                      |
| • Status/control variable                                          | Yes; Up to 16 variable tables                                        |
| • Variables                                                        | Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters |
| • Number of variables, max.                                        | 70; Status/control                                                   |
| Forcing                                                            |                                                                      |
| • Forcing                                                          | Yes                                                                  |
| • Forcing, variables                                               | Inputs/outputs, bit memories, distributed I/Os                       |
| • Number of variables, max.                                        | 512                                                                  |
| Diagnostic buffer                                                  |                                                                      |
| • present                                                          | Yes                                                                  |
| • Number of entries, max.                                          | 3 200                                                                |
| — adjustable                                                       | Yes                                                                  |
| — preset                                                           | 120                                                                  |
| Service data                                                       |                                                                      |
| • can be read out                                                  | Yes                                                                  |
| Standards, approvals, certificates                                 |                                                                      |
| CE mark                                                            | Yes                                                                  |
| CSA approval                                                       | Yes                                                                  |
| UL approval                                                        | Yes                                                                  |
| cULus                                                              | Yes                                                                  |
| FM approval                                                        | Yes                                                                  |
| RCM (formerly C-TICK)                                              | Yes                                                                  |
| KC approval                                                        | Yes                                                                  |
| EAC (formerly Gost-R)                                              | Yes                                                                  |
| Use in hazardous areas                                             |                                                                      |
| • ATEX                                                             | ATEX II 3 G Ex nA IIC T4 Gc                                          |

|                                               |                                                                               |
|-----------------------------------------------|-------------------------------------------------------------------------------|
| Ambient conditions                            |                                                                               |
| Ambient temperature during operation          |                                                                               |
| • min.                                        | 0 °C                                                                          |
| • max.                                        | 60 °C                                                                         |
| Configuration                                 |                                                                               |
| Configuration software                        |                                                                               |
| • STEP 7                                      | Yes                                                                           |
| Programming                                   |                                                                               |
| • Command set                                 | see instruction list                                                          |
| • Nesting levels                              | 7                                                                             |
| • Access to consistent data in process image  | Yes                                                                           |
| • System functions (SFC)                      | see instruction list                                                          |
| • System function blocks (SFB)                | see instruction list                                                          |
| Programming language                          |                                                                               |
| — LAD                                         | Yes                                                                           |
| — FBD                                         | Yes                                                                           |
| — STL                                         | Yes                                                                           |
| — SCL                                         | Yes                                                                           |
| — CFC                                         | Yes                                                                           |
| — GRAPH                                       | Yes                                                                           |
| — HiGraph®                                    | Yes                                                                           |
| Number of simultaneously active SFCs          |                                                                               |
| — DPSYC_FR                                    | 2; SFC 11; per interface                                                      |
| — D_ACT_DP                                    | 8; SFC 12; per interface                                                      |
| — RD_REC                                      | 8; SFC 59; per interface                                                      |
| — WR_REC                                      | 8; SFC 58; per interface                                                      |
| — WR_PARM                                     | 8; SFC 55; per interface                                                      |
| — PARM_MOD                                    | 1; SFC 57; per interface                                                      |
| — WR_DPARM                                    | 2; SFC 56; per interface                                                      |
| — DPNRM_DG                                    | 8; SFC 13; per interface                                                      |
| — RDSYSST                                     | 8; SFC 51                                                                     |
| — DP_TOPOL                                    | 1; SFC 103; per interface                                                     |
| Number of simultaneously active SFBs          |                                                                               |
| — RDREC                                       | 8; SFB 52; per interface, but not more than 32 across all external interfaces |
| — WRREC                                       | 8; SFB 53; per interface, but not more than 32 across all external interfaces |
| Know-how protection                           |                                                                               |
| • User program protection/password protection | Yes                                                                           |
| • Block encryption                            | Yes; With S7 block Privacy                                                    |
| Dimensions                                    |                                                                               |

|                       |            |
|-----------------------|------------|
| Width                 | 50 mm      |
| Height                | 290 mm     |
| Depth                 | 219 mm     |
| Weights               |            |
| Weight, approx.       | 900 g      |
| <b>last modified:</b> | 10/28/2016 |