



SIMATIC S7-400H, CPU 417-5H, central processing unit for S7-400H and S7-400F/FH, 5 interfaces: 1x MPI/DP, 1x DP, 1x PN and 2 for sync modules, 32 MB memory (16 MB data/16 MB program)

| General information                         |                                      |
|---|--------------------------------------|
| Product type designation                    | CPU 417-5H PN/DP                     |
| HW functional status                        | 1                                    |
| Firmware version                            | V6.0                                 |
| Product function                            |                                      |
| • Isochronous mode                          | No                                   |
| Engineering with                            |                                      |
| • Programming package                       | As of STEP 7 V5.5 SP2 with HF1       |
| CiR - Configuration in RUN                  |                                      |
| CiR synchronization time, basic load        | 60 ms                                |
| CiR synchronization time, time per I/O byte | 0 µs                                 |
| Supply voltage                              |                                      |
| Rated value (DC)                            | Power supply via system power supply |
| Input current                               |                                      |
| from backplane bus 5 V DC, typ.             | 1.6 A                                |
| from backplane bus 5 V DC, max.             | 1.9 A                                |
| from backplane bus 24 V DC, max.            | 150 mA; 150 mA per DP interface      |
| from interface 5 V DC, max.                 | 90 mA; At each DP interface          |
| Power loss                                  |                                      |
| Power loss, typ.                            | 7.5 W                                |
| Memory                                      |                                      |
| Type of memory                              | RAM                                  |
| Work memory                                 |                                      |
| • integrated                                | 32 Mbyte                             |
| • integrated (for program)                  | 16 Mbyte                             |
| • integrated (for data)                     | 16 Mbyte                             |
| • expandable                                | No                                   |
| Load memory                                 |                                      |
| • expandable FEPR0M                         | Yes; with Memory Card (FLASH)        |
| • expandable FEPR0M, max.                   | 64 Mbyte                             |
| • integrated RAM, max.                      | 1 Mbyte                              |
| • expandable RAM                            | Yes                                  |
| • expandable RAM, max.                      | 64 Mbyte                             |
| Backup                                      |                                      |
| • present                                   | Yes                                  |
| • with battery                              | Yes; all data                        |
| • without battery                           | No                                   |
| Battery                                     |                                      |
| Backup battery                              |                                      |
| • Backup current, typ.                      | 180 µA; Valid up to 40°C             |

|   |   |
|---|---|
| • Backup current, max.                      | 1 000 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   |

#### CPU processing times

|                                     |        |
|-------------------------------------|--------|
| for bit operations, typ.            | 7.5 ns |
| for word operations, typ.           | 7.5 ns |
| for fixed point arithmetic, typ.    | 7.5 ns |
| for floating point arithmetic, typ. | 15 ns  |

#### CPU-blocks

|                |                                  |
|----------------|----------------------------------|
| DB             |                                  |
| • Number, max. | 16 000; Number range: 1 to 16000 |
| • Size, max.   | 64 kbyte                         |

|                |                                |
|----------------|--------------------------------|
| FB             |                                |
| • Number, max. | 8 000; Number range: 0 to 7999 |
| • Size, max.   | 64 kbyte                       |

|                |                                |
|----------------|--------------------------------|
| FC             |                                |
| • Number, max. | 8 000; Number range: 0 to 7999 |
| • Size, max.   | 64 kbyte                       |

|                                    |                      |
|------------------------------------|----------------------|
| OB                                 |                      |
| • 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          |
| • Number of process alarm OBs      | 8; OB 40-47          |
| • Number of DPV1 alarm OBs         | 3; OB 55-57          |
| • Number of startup OBs            | 2; OB 100, 102       |
| • Number of asynchronous error OBs | 9; OB 80-88          |
| • Number of synchronous error OBs  | 2; OB 121, 122       |

|                                 |    |
|---------------------------------|----|
| Nesting depth                   |    |
| • per priority class            | 24 |
| • additional within an error OB | 2  |

#### Counters, timers and their retentivity

|                |            |
|----------------|------------|
| S7 counter     |            |
| • Number       | 2 048      |
| Retentivity    |            |
| — adjustable   | Yes        |
| — preset       | Z 0 to Z 7 |
| Counting range |            |
| — lower limit  | 0          |
| — upper limit  | 999        |

|             |  |
|-------------|--|
| IEC counter |  |
| • present   | Yes                                      |
| • Type      | SFB                                      |
| • Number    | Unlimited (limited only by RAM capacity) |

|               |                    |
|---------------|--------------------|
| S7 times      |                    |
| • Number      | 2 048              |
| Retentivity   |                    |
| — adjustable  | Yes                |
| — preset      | No times retentive |
| Time range    |                    |
| — lower limit | 10 ms              |
| — upper limit | 9 990 s            |

|           |  |
|-----------|--|
| IEC timer |  |
| • present | Yes                                      |
| • Type    | SFB                                      |
| • Number  | Unlimited (limited only by RAM capacity) |

#### Data areas and their retentivity

|   |   |
|---|---|
| Retentive data area (incl. timers, counters, flags), max. | Total working and load memory (with backup battery) |
|---|---|

|   |   |
|---|---|
| <b>Flag</b>   |   |
| • Size, max.  | 16 384 byte   |
| • Retentivity available                             | Yes   |
| • Retentivity preset                                | MB 0 to MB 15   |
| • Number of clock memories                          | 8; in 1 memory byte   |
| <b>Local data</b>                                   |   |
| • adjustable, max.                                  | 64 kbyte  |
| • preset  | 32 kbyte  |
| <b>Address area</b>                                 |   |
| <b>I/O address area</b>                             |   |
| • Inputs  | 16 kbyte  |
| • Outputs   | 16 kbyte  |
| <b>Process image</b>                                |   |
| • Inputs, adjustable                                | 16 kbyte  |
| • Outputs, adjustable                               | 16 kbyte  |
| • Inputs, default                                   | 1 024 byte  |
| • Outputs, default                                  | 1 024 byte  |
| • consistent data, max.                             | 244 byte  |
| • Access to consistent data in process image        | Yes   |
| <b>Subprocess images</b>                            |   |
| • Number of subprocess images, max.                 | 15  |
| <b>Digital channels</b>                             |   |
| • Inputs  | 131 072   |
| — of which central                                  | 131 072   |
| • Outputs   | 131 072   |
| — of which central                                  | 131 072   |
| <b>Analog channels</b>                              |   |
| • Inputs  | 8 192   |
| — of which central                                  | 8 192   |
| • Outputs   | 8 192   |
| — of which central                                  | 8 192   |
| <b>Hardware configuration</b>                       |   |
| Number of expansion units, max.                     | 21  |
| connectable OPs                                     | 119   |
| Multicomputing                                      | No  |
| <b>Interface modules</b>                            |   |
| • Number of connectable IMs (total), max.           | 6   |
| • Number of connectable IM 460s, max.               | 6   |
| • Number of connectable IM 463s, max.               | 4; Single mode only   |
| <b>Number of DP masters</b>                         |   |
| • integrated  | 2   |
| • via CP  | 10; CP 443-5 Extended   |
| • Mixed mode IM + CP permitted                      | No  |
| • via interface module                              | 0   |
| <b>Number of IO Controllers</b>                     |   |
| • integrated  | 1   |
| • via CP  | 0   |
| <b>Number of operable FMs and CPs (recommended)</b> |   |
| • FM  | See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections |
| • CP, PtP   | See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections |
| • PROFIBUS and Ethernet CPs                         | 14; Of which max. 10 CP as DP master  |
| <b>Slots</b>  |   |
| • required slots                                    | 2   |
| <b>Time of day</b>                                  |   |
| <b>Clock</b>  |   |
| • 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; Power on   |
| <b>Operating hours counter</b>                          |   |
| • 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 h   |
| • retentive   | Yes   |
| <b>Clock synchronization</b>                            |   |
| • 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  |
| <b>Time difference in system when synchronizing via</b> |   |
| • Ethernet, max.  | 10 ms; Via NTP  |
| • MPI, max.   | 200 ms  |
| <b>Interfaces</b>                                       |   |
| Number of RS 485 interfaces                             | 2   |
| Number of other interfaces                              | 2; Fiber-optic interface  |
| Optical interface                                       | No  |
| <b>1. Interface</b>                                     |   |
| Interface type  | MPI/PROFIBUS DP   |
| Isolated  | Yes   |
| <b>Interface types</b>                                  |   |
| • RS 485  | Yes   |
| • Output current of the interface, max.                 | 150 mA  |
| <b>Protocols</b>  |   |
| • MPI   | Yes   |
| • PROFIBUS DP master                                    | Yes   |
| • PROFIBUS DP slave                                     | No  |
| <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                             | No  |
| — S7 basic communication                                | No  |
| — S7 communication                                      | Yes   |
| — S7 communication, as client                           | Yes   |
| — S7 communication, as server                           | Yes   |
| <b>PROFIBUS 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   |
| — Global data communication                             | No  |
| — S7 basic communication                                | No  |
| — S7 communication                                      | Yes   |
| — S7 communication, as client                           | Yes   |
| — S7 communication, as server                           | Yes   |
| — Equidistance  | No  |
| — Isochronous mode                                      | No  |
| — SYNC/FREEZE   | No  |

|   |   |
|---|---|
| — Activation/deactivation of DP slaves                            | No  |
| — Direct data exchange (slave-to-slave communication)             | No  |
| — 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>PROFIBUS DP slave</b>  |   |
| • Number of connections   | No configuration of CPU as DP slave   |
| <b>2. Interface</b>   |   |
| Interface type  | PROFINET  |
| Isolated  | Yes   |
| automatic detection of transmission rate                          | Yes; Autosensing  |
| Autonegotiation   | Yes   |
| Autocrossing  | Yes   |
| Change of IP address at runtime, supported                        | No  |
| <b>Interface types</b>  |   |
| • RJ 45 (Ethernet)  | Yes   |
| • Number of ports   | 2   |
| • integrated switch   | Yes   |
| <b>Protocols</b>  |   |
| • PROFINET IO Controller  | Yes   |
| • PROFINET IO Device  | No  |
| • PROFINET CBA  | No  |
| • PROFIBUS DP master  | No  |
| • PROFIBUS DP slave   | No  |
| • Open IE communication   | Yes   |
| • Web server  | No  |
| • Point-to-point connection                                       | No  |
| • Media redundancy  | Yes   |
| <b>PROFINET IO Controller</b>                                     |   |
| • Transmission rate, max.   | 100 Mbit/s  |
| <b>Services</b>   |   |
| — PG/OP communication   | Yes   |
| — S7 communication  | Yes   |
| — Isochronous mode  | No  |
| — Shared device   | Yes; Single mode only   |
| — Prioritized startup   | No  |
| — Number of connectable IO Devices, max.                          | 256; In redundant mode via both interfaces  |
| — Number of connectable IO Devices for RT, max.                   | 256   |
| — of which in line, max.  | 256   |
| — Activation/deactivation of IO Devices                           | No  |
| — IO Devices changing during operation (partner ports), supported | No  |
| — Device replacement without swap medium                          | Yes   |
| — Send cycles   | 250 µs, 500 µs, 1 ms, 2 ms, 4 ms  |
| — Updating time   | 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode |
| <b>Address area</b>   |   |
| — Inputs, max.  | 8 kbyte   |
| — Outputs, max.   | 8 kbyte   |
| — User data consistency, max.                                     | 1 024 byte  |
| <b>Open IE communication</b>                                      |   |
| • Number of connections, max.                                     | 118   |
| • Local port numbers used at the system end                       | 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 65535   |

|   |   |
|---|---|
| • Keep-alive function, supported                      | Yes   |
| <b>3. Interface</b>                                   |   |
| Interface type  | PROFIBUS DP   |
| <b>Interface types</b>                                |   |
| • RS 485  | Yes   |
| • Output current of the interface, max.               | 150 mA  |
| <b>Protocols</b>                                      |   |
| • PROFIBUS DP master                                  | Yes   |
| • PROFIBUS DP slave                                   | No  |
| <b>PROFIBUS 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   |
| — Global data communication                           | No  |
| — S7 basic communication                              | No  |
| — S7 communication                                    | Yes   |
| — S7 communication, as client                         | Yes   |
| — S7 communication, as server                         | Yes   |
| — Equidistance  | No  |
| — Isochronous mode                                    | No  |
| — SYNC/FREEZE   | No  |
| — Activation/deactivation of DP slaves                | No  |
| — Direct data exchange (slave-to-slave communication) | No  |
| — 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>4. Interface</b>                                   |   |
| Interface type  | Pluggable synchronization submodule (FO)                            |
| Plug-in interface modules                             | Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0    |
| <b>5. Interface</b>                                   |   |
| Interface type  | Pluggable synchronization submodule (FO)                            |
| Plug-in interface modules                             | Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0    |
| <b>Protocols</b>                                      |   |
| <b>Redundancy mode</b>                                |   |
| <b>Media redundancy</b>                               |   |
| — Switchover time on line break, typ.                 | 200 ms  |
| — Number of stations in the ring, max.                | 50  |
| <b>SIMATIC communication</b>                          |   |
| • S7 routing  | Yes   |
| <b>Open IE communication</b>                          |   |
| • TCP/IP  | Yes; via integrated PROFINET interface and loadable FBs             |
| — Number of connections, max.                         | 118   |
| — 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.                         | 118   |
| — Data length, max.                                   | 32 kbyte; 1 452 bytes via CP 443-1 Adv.                             |
| • UDP   | Yes; via integrated PROFINET interface and loadable FBs             |
| — Number of connections, max.                         | 118   |

|   |  |
|---|--|
| — Data length, max.   | 1 472 byte   |
| <b>Web server</b>   |  |
| • supported   | No   |
| <b>Isochronous mode</b>   |  |
| Equidistance  | No   |
| <b>communication functions / header</b>                             |  |
| PG/OP communication   | Yes  |
| • Number of connectable OPs without message processing              | 119  |
| • Number of connectable OPs with message processing                 | 119; When using Alarm_S/SQ and Alarm_D/DQ  |
| Data record routing   | Yes  |
| <b>Global data communication</b>                                    |  |
| • supported   | No   |
| <b>S7 basic communication</b>                                       |  |
| • communication function / S7 basic communication                   | No   |
| <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 CP max. 10 and FC AG_SEND and FC AG_RECV)  |
| • 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>Number of connections</b>  |  |
| • overall   | 120  |
| • usable for PG communication                                       |  |
| — reserved for PG communication                                     | 1  |
| — adjustable for PG communication, max.                             | 0  |
| • usable for OP communication                                       |  |
| — reserved for OP communication                                     | 1  |
| — adjustable for OP communication, max.                             | 0  |
| • usable for S7 basic communication                                 |  |
| — reserved for S7 basic communication                               | 0  |
| — adjustable for S7 basic communication, max.                       | 0  |
| • usable for S7 communication                                       |  |
| — reserved for S7 communication                                     | 0  |
| — adjustable for S7 communication, max.                             | 0  |
| • usable for routing  |  |
| — reserved for routing  | 0  |
| — adjustable for routing, max.                                      | 0  |
| <b>S7 message functions</b>   |  |
| Number of login stations for message functions, max.                | 119; max. 119 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 16 with Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) |
| Symbol-related messages   | No   |
| SCAN procedure  | No   |
| Program alarms  | 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. | 10 000   |
| • preset, max.  | 1 200  |
| Process control messages  | Yes  |
| Number of archives that can log on simultaneously (SFB 37 AR_SEND)  | 64   |
| <b>Test commissioning functions</b>                                 |  |
| Status block  | Yes  |

|  |  |
|--|--|
| Single step  | Yes  |
| Number of breakpoints  | 16   |
| <b>Status/control</b>  |  |
| • 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   |
| <b>Forcing</b>   |  |
| • Forcing  | Yes  |
| • Forcing, variables   | Inputs/outputs, bit memories, distributed I/Os                       |
| • Number of variables, max.  | 512  |
| <b>Diagnostic buffer</b>   |  |
| • present  | Yes  |
| • Number of entries, max.  | 3 200  |
| — adjustable   | Yes  |
| — preset   | 120  |
| <b>Service data</b>  |  |
| • can be read out  | Yes  |
| <b>EMC</b>   |  |
| Emission of radio interference acc. to EN 55 011                           |  |
| • Limit class A, for use in industrial areas                               | Yes  |
| • Limit class B, for use in residential areas                              | No   |
| <b>configuration / header</b>  |  |
| Configuration software   |  |
| • STEP 7   | Yes  |
| configuration / programming / header                                       |  |
| • 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  |
| configuration / programming / number of simultaneously active SFC / header |  |
| — RD_REC   | 8  |
| — WR_REC   | 8  |
| — WR_PARM  | 8  |
| — PARM_MOD   | 1  |
| — WR_DPARM   | 2  |
| — DPNRM_DG   | 8  |
| — RDSYSST  | 8  |
| — DP_TOPO  | 1  |
| configuration / programming / number of simultaneously active SFB / header |  |
| — RDREC  | 8  |
| — WRREC  | 8  |
| <b>Know-how protection</b>   |  |
| • User program protection/password protection                              | Yes  |
| • Block encryption   | Yes; With S7 block Privacy   |
| <b>Dimensions</b>  |  |
| Width  | 50 mm  |
| Height   | 290 mm   |
| Depth  | 219 mm   |
| <b>Weights</b>   |  |
| Weight, approx.  | 995 g  |

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