

SIMATIC S7-400, CPU 416-3 CENTRAL PROCESSING UNIT WITH:
 5.6 MB WORKING MEMORY, (2.8 MB CODE, 2,8 MB DATA), 1.
 INTERFACE MPI/DP 12 MBIT/S, 2. INTERFACE PROFIBUS DP, 3.
 IF IFM MODULES PLUGGABLE

| General information | |
|--|---|
| Firmware version | V4.0 |
| Engineering with | |
| <ul style="list-style-type: none"> Programming package | STEP 7 V5.2 SP1 HF3 or higher with HW update |
| CiR – Configuration in RUN | |
| CiR synchronization time, basic load | 100 ms |
| CiR synchronization time, time per I/O byte | 40 µs |
| Supply voltage | |
| Rated value (DC) | Yes |
| <ul style="list-style-type: none"> 24 V DC | |
| Input current | |
| from backplane bus 5 V DC, typ. | 1.2 A |
| from backplane bus 5 V DC, max. | 1.4 A |
| from backplane bus 24 V DC, max. | Total current consumption of the components connected to the MPI/DP interfaces, but no more than 150 mA per interface |
| Power loss | |
| Power loss, typ. | 5 W |
| Memory | |
| Work memory | |
| <ul style="list-style-type: none"> integrated (for program) | 2 800 kbyte |
| <ul style="list-style-type: none"> integrated (for data) | 2 800 kbyte |
| <ul style="list-style-type: none"> expandable | No |
| Load memory | |
| <ul style="list-style-type: none"> expandable FEPR0M | Yes; with Memory Card (FLASH) |
| <ul style="list-style-type: none"> expandable FEPR0M, max. | 64 Mbyte |
| <ul style="list-style-type: none"> integrated RAM, max. | 256 kbyte |
| <ul style="list-style-type: none"> expandable RAM | Yes; with Memory Card (RAM) |
| <ul style="list-style-type: none"> expandable RAM, max. | 64 Mbyte |
| Backup | |
| <ul style="list-style-type: none"> present | Yes |
| <ul style="list-style-type: none"> with battery | Yes; all data |
| <ul style="list-style-type: none"> without battery | No |

Battery

Backup battery

- | | |
|---|-------------------|
| • Backup current, typ. | 550 μ A |
| • Backup current, max. | 1 530 μ A |
| • Backup time, max. | 144 d |
| • Feeding of external backup voltage to CPU | 5 V DC to 15 V DC |

CPU processing times

- | | |
|-------------------------------------|--------------|
| for bit operations, typ. | 0.04 μ s |
| for word operations, typ. | 0.04 μ s |
| for fixed point arithmetic, typ. | 0.04 μ s |
| for floating point arithmetic, typ. | 0.12 μ s |

CPU-blocks

DB

- | | |
|----------------|----------------------|
| • Number, max. | 4 095; DB 0 reserved |
| • Size, max. | 64 kbyte |

FB

- | | |
|----------------|----------|
| • Number, max. | 2 048 |
| • Size, max. | 64 kbyte |

FC

- | | |
|----------------|----------|
| • Number, max. | 2 048 |
| • Size, max. | 64 kbyte |

OB

- | | |
|----------------------------------|----------------------|
| • Number, max. | see instruction list |
| • Size, max. | 64 kbyte |
| • Number of time alarm OBs | 8 |
| • Number of delay alarm OBs | 4 |
| • Number of cyclic interrupt OBs | 9 |
| • Number of process alarm OBs | 8 |
| • Number of multicomputing OBs | 1 |

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 |
| — lower limit | 0 |
| — upper limit | 2 047 |
| — preset | Z 0 to Z 7 |

| | |
|---|---|
| Counting range | |
| — lower limit | 0 |
| — upper limit | 999 |
| IEC counter | |
| • present | Yes |
| • Type | SFB |
| S7 times | |
| • Number | 2 048 |
| Retentivity | |
| — adjustable | Yes |
| — lower limit | 0 |
| — upper limit | 2 047 |
| — preset | No times retentive |
| Time range | |
| — lower limit | 10 ms |
| — upper limit | 9 990 s |
| IEC timer | |
| • present | Yes |
| • Type | SFB |
| Data areas and their retentivity | |
| retentive data area in total | Total working and load memory (with backup battery) |
| Flag | |
| • Number, max. | 16 kbyte |
| • Retentivity available | Yes; MB 0 to MB 16383 |
| • Retentivity preset | MB 0 to MB 15 |
| • Number of clock memories | 8; 1 memory byte |
| Data blocks | |
| • Number, max. | 4 095; DB 0 reserved |
| • 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; for each line that is operated in isochronous mode, i.e. to which an OB61 to 62 has been assigned, the distributed IO address areas are halved |
| — DP interface, outputs | 8 kbyte; for each line that is operated in isochronous mode, i.e. to which an OB61 to 62 has been assigned, the distributed IO address areas are halved |

| | |
|--|--|
| 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; of which 6 ER with K-bus |
| connectable OPs | 63 without message processing, 12 with message processing |
| 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 | 2 |
| • via CP | 10; CP 443-5 Extended |
| • via IM 467 | 4 |
| • Mixed mode IM + CP permitted | No; IM 467 cannot be used with CP 443-5 Ext., IM 467 cannot be used with CP 443-1 EX40 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 operable FMs and CPs (recommended) | |

| | |
|--|---|
| <ul style="list-style-type: none"> • FM • CP, PtP • CP, LAN • PROFIBUS and Ethernet CPs | <p>Limited by number of slots and number of connections</p> <p>CP 440: Limited by number of slots; CP 441: limited by number of connections</p> <p>Limited by number of slots and number of connections</p> <p>14; incl. CP 443-5 Ext. and IM 467</p> |
| Slots | |
| <ul style="list-style-type: none"> • required slots | 2 |
| Time of day | |
| Clock | |
| <ul style="list-style-type: none"> • Hardware clock (real-time) • retentive and synchronizable • Resolution • Deviation per day (buffered), max. • Deviation per day (unbuffered), max. | <p>Yes</p> <p>Yes</p> <p>1 ms</p> <p>1.7 s; Power on</p> <p>8.6 s; Power off</p> |
| Operating hours counter | |
| <ul style="list-style-type: none"> • Number • Number/Number range • Range of values • Granularity • retentive | <p>8</p> <p>0 to 7</p> <p>0 to 32767 hours</p> <p>1 hour</p> <p>Yes</p> |
| Clock synchronization | |
| <ul style="list-style-type: none"> • supported • to MPI, master • to MPI, slave • to DP, master • to DP, slave • in AS, master • in AS, slave • to IF 964 DP | <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; as Master or Slave</p> |
| 1. Interface | |
| Interface type | Integrated |
| Physics | RS 485 / PROFIBUS |
| Isolated | Yes |
| Power supply to interface (15 to 30 V DC), max. | 150 mA |
| Number of connection resources | MPI: 44, DP: 32 |
| Functionality | |
| <ul style="list-style-type: none"> • MPI • PROFIBUS DP master • PROFIBUS DP slave | <p>Yes</p> <p>Yes</p> <p>Yes</p> |
| MPI | |
| <ul style="list-style-type: none"> • Number of connections | 44 |

| | |
|---|---|
| • Transmission rate, max. | 12 Mbit/s |
| Services | |
| — PG/OP communication | Yes |
| — Routing | Yes |
| — Global data communication | Yes |
| — S7 basic communication | Yes |
| — S7 communication | Yes |
| DP master | |
| • 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 |
| Services | |
| — PG/OP communication | Yes |
| — Routing | Yes |
| — Global data communication | Yes |
| — S7 basic communication | Yes |
| — S7 communication | Yes |
| — Equidistance | Yes |
| — SYNC/FREEZE | Yes |
| — Activation/deactivation of DP slaves | Yes |
| — Direct data exchange (slave-to-slave communication) | Yes |
| Address area | |
| — Inputs, max. | 2 kbyte |
| — Outputs, max. | 2 kbyte |
| User data per DP slave | |
| — Inputs, max. | 244 byte |
| — Outputs, max. | 244 byte |
| — Slots, max. | 244 |
| — per slot, max. | 128 byte |
| DP slave | |
| • GSD file | http://www.ad.siemens.de/csi_e/gsd |
| • Transmission rate, max. | 12 Mbit/s |
| • Address area, max. | 32 |
| • User data per address area, max. | 32 byte |
| — of which consistent, max. | 32 byte |
| Services | |
| — PG/OP communication | Yes |
| — Routing | Yes |
| Transfer memory | |
| — Inputs | 244 byte |

— Outputs

244 byte

2. Interface

| | |
|---|---|
| Interface type | Integrated |
| Physics | RS 485 / PROFIBUS |
| Isolated | Yes |
| Power supply to interface (15 to 30 V DC), max. | 150 mA |
| Number of connection resources | 32 |
| Functionality | |
| • PROFIBUS DP master | Yes |
| • PROFIBUS DP slave | Yes |
| DP master | |
| • 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. | 125 |
| Services | |
| — PG/OP communication | Yes |
| — Routing | Yes |
| — Global data communication | Yes |
| — S7 basic communication | Yes |
| — S7 communication | Yes |
| — Equidistance | Yes |
| — SYNC/FREEZE | Yes |
| — Activation/deactivation of DP slaves | Yes |
| — Direct data exchange (slave-to-slave communication) | Yes |
| Address area | |
| — Inputs, max. | 8 kbyte |
| — Outputs, max. | 8 kbyte |
| User data per DP slave | |
| — Inputs, max. | 244 byte |
| — Outputs, max. | 244 byte |
| — Slots, max. | 244 |
| — per slot, max. | 128 byte |
| DP slave | |
| • GSD file | http://www.ad.siemens.de/csi_e/gsd |
| • Transmission rate, max. | 12 Mbit/s |
| • Address area, max. | 32 |
| • User data per address area, max. | 32 byte |
| — of which consistent, max. | 32 byte |
| Services | |
| — Routing | Yes |

| | |
|------------------------|----------|
| Transfer memory | |
| — Inputs | 244 byte |
| — Outputs | 244 byte |

3. Interface

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|---------------------------|--|
| Interface type | Pluggable interface module (IF), technical data as for 2nd interface |
| Plug-in interface modules | IF 964-DP |

Isochronous mode

| | |
|---|----------|
| Isochronous operation (application synchronized up to terminal) | Yes |
| User data per isochronous slave, max. | 244 byte |
| Equidistance | Yes |
| shortest clock pulse | 1 ms |
| max. cycle | 32 ms |

Communication functions

| | |
|--|-----|
| PG/OP communication | Yes |
| • Number of connectable OPs without message processing | 63 |
| • Number of connectable OPs with message processing | 12 |

| | |
|---|------------|
| Global data communication | |
| • 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. | 64 byte |
| • Size of GD packet (of which consistent), max. | 1 variable |

| | |
|---|--|
| S7 basic communication | |
| • supported | Yes; in MPI mode via: SFC X_SEND, X_RCV, X_GET and X_PUT; in DP master mode via: SFC I_GET and I_PUT |
| • User data per job, max. | 76 byte |
| • User data per job (of which consistent), max. | 1 variable |

| | |
|---|----------------------|
| S7 communication | |
| • 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 |

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|------------------------------------|--|
| S5 compatible communication | |
| • 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 |
| Standard communication (FMS) | |
| • supported | Yes; Via CP and loadable FB |
| Number of connections | |
| • overall | 64 |
| • usable for PG communication | |
| — reserved for PG communication | 1 |
| • usable for OP communication | |
| — reserved for OP communication | 1 |
| S7 message functions | |
| Number of login stations for message functions, max. | 12 |
| Symbol-related messages | Yes |
| Block related messages | Yes |
| simultaneously active Alarm-S blocks, max. | 200; ALARM_S/SQ blocks or ALARM_D/DQ blocks |
| Alarm 8-blocks | Yes |
| • Number of instances for alarm 8 and S7 communication blocks, max. | 1 800 |
| • 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 |
| Single step | Yes |
| Number of breakpoints | 4 |
| Status/control | |
| • Status/control variable | Yes |
| • Variables | Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters |
| • Number of variables, max. | 70 |
| 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 |
| Configuration | |
| Configuration software | |
| • STEP 7 | Yes |
| Programming | |
| • Command set | see instruction list |
| • Nesting levels | 8 |
| • 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 |
| — D_ACT_DP | 4 |
| — RD_REC | 8 |
| — WR_REC | 8 |
| — WR_PARM | 8 |
| — PARM_MOD | 1 |
| — WR_DPARAM | 2 |
| — DPNRM_DG | 8 |
| — RDSYSST | 8; 1 to 8 |
| — DP_TOPOL | 1 |
| Number of simultaneously active SFBs | |
| — RDREC | 8 |
| — WRREC | 8 |
| Know-how protection | |
| • User program protection/password protection | Yes |
| Dimensions | |
| Width | 50 mm |
| Height | 290 mm |

| | |
|-----------------------|------------|
| Depth | 219 mm |
| Weights | |
| Weight, approx. | 1 070 g |
| last modified: | 03/24/2017 |