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# Manufacturer's Manual

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SIEMENS SIMATIC S7-400

## 6ES7416-3FS07-0AB0

**SIMATIC S7-400 CPU 416F-3 PN/DP**

Selected official pages retain the original technical tables, ratings, notes and pagination.

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Siemens CPU manual A5E00850746-AN, 03/2023; Hardware and Installation A5E00850741-01

CPU pages 335-350; installation sections 2.13 and 7.3

This technical extract does not replace the complete equipment and system manuals. Check the installed hardware and project before use.

# 10.9 Technical specifications of CPU 416-3 PN/DP (6ES7416-3ES07-0AB0), CPU 416F-3 PN/DP (6ES7416-3FS07-0AB0)

## Data

| | 6ES7416-3ES07-0AB0<br>6ES7416-3FS07-0AB0 |
|---|---|
| General information | |
| Product type designation | CPU 416-3 PN/DP<br>CPU 416F-3 PN/DP |
| Hardware version | 01 |
| Firmware version | V7.0 |
| Engineering with | |
| Programming package | as of STEP 7 V5.5 with HSP 262 |
| CiR Configuration in RUN | |
| CiR synchronization time, base load | 100 ms |
| CiR synchronization time, time per I/O byte | 10 µs |
| Power supply | |
| Rated value (DC) | |
| 24 V DC | No; voltage supplied via the system voltage supply |
| Input current | |
| From backplane bus 5 V DC, typ. | 1.3 A |
| From backplane bus 5 V DC, max. | 1.6 A |
| From the backplane bus 24 V DC, max. | 300 mA; 150 mA per DP interface |
| From interface 5 V DC, max. | 90 mA; for each DP interface |
| Power loss | |
| Typical power loss | 6.5 W |
| Power loss, max. | 8 W |
| Memory | |
| Type of memory | RAM |
| Work memory | |
| Integrated | 16 MB |
| integrated (for program) | 8 MB |
| integrated (for data) | 8 MB |
| Expandable | No |
| Load memory | |
| Expandable FEPROM | Yes; with memory card (FLASH) |
| Expandable FEPROM, max. | 64 MB |
| integrated RAM, max. | 1 MB |
| Expandable RAM | Yes; with memory card (RAM) |
| Expandable RAM, max. | 64 MB |
| Battery backup | |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| Available | Yes |
| With battery | Yes; all data |
| Without battery | No |
| Battery | |
| Backup battery | |
| Backup battery current, typ. | 180 µA; to 40 °C |
| Backup battery current, max. | 850 µA |
| Backup battery time, max. | Covered by the conditions and effects described in the Module data manual |
| Feed of external backup voltage to the CPU | 5 to 15 V DC |
| CPU processing times | |
| For bit operations, typ. | 12.5 ns |
| For word operations, typ. | 12.5 ns |
| For integer arithmetic, typ. | 12.5 ns |
| For floating-point arithmetic, typ. | 25 ns |
| CPU blocks | |
| DB | |
| Number, max. | 10000; number range: 1 to 16000 |
| Size, max. | 64 KB |
| FB | |
| Number, max. | 5000; number range: 0 to 7999 |
| Size, max. | 64 KB |
| FC | |
| Number, max. | 5000; number range: 0 to 7999 |
| Size, max. | 64 KB |
| OB | |
| Size, max. | 64 KB |
| Number of free-cycle OBs | 1; OB 1 |
| Number of time-of-day interrupt OBs | 8; OB 10-17 |
| Number of time-delay interrupt OBs | 4; OB 20-23 |
| Number of cyclic interrupt OBs | 9; OB 30-38 (smallest configurable cycle = 500 µs) |
| Number of hardware interrupt OBs | 8; OB 40-47 |
| Number of DPV1 interrupt OBs | 3; OB 55-57 |
| Number of isochronous OBs | 4; OB 61-64 |
| Number of multi-computing OBs | 1; OB 60 |
| Number of background OBs | 1; OB 90 |
| Number of startup OBs | 3; OB 100, 101, 102 with CPU 416-3 PN/DP<br>2; OB 100, 102 with CPU 416F-3 PN/DP |
| Number of asynchronous error OBs | 9; OB 80-88 |
| Number of synchronous error OBs | 2; OB 121, 122 |
| Nesting depth | |

| | 6ES7416-3ES07-0AB0<br>6ES7416-3FS07-0AB0 |
|---|---|
| Per priority class | 24 |
| Additional levels within an error OB | 2 |
| Counters, timers and their retentivity | |
| S7 counters | |
| Number | 2048 |
| Retentivity | |
| Adjustable | Yes |
| Low limit | 0 |
| High limit | 2047 |
| Default | C 0 to C 7 |
| Counting range | |
| Low limit | 0 |
| High limit | 999 |
| IEC counters | |
| Available | Yes |
| Type | SFB |
| Number | Unlimited (limited only by the work memory) |
| S7 timers | |
| Number | 2048 |
| Retentivity | |
| Adjustable | Yes |
| Low limit | 0 |
| High limit | 2047 |
| Default | No retentive timers |
| Time range | |
| Low limit | 10 ms |
| High limit | 9990 s |
| IEC timers | |
| Available | Yes |
| Type | SFB |
| Number | Unlimited (limited only by the work memory) |
| Data areas and their retentivity | |
| Retentive data area, total | Total work and load memory (with backup battery) |
| Bit memories | |
| Number, max. | 16 KB; size of bit memory address area |
| Retentivity available | Yes |
| Default retentivity | MB 0 to MB 15 |
| Number of clock memories | 8; in 1 memory byte |
| Local data | |
| Adjustable, max. | 32 KB |

| | | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|---|
| Default | 16 KB | |
| Address area | | |
| I/O address area | | |
| Inputs | 16 KB | |
| Outputs | 16 KB | |
| of which are distributed | | |
| MPI/DP interface, inputs | 2 KB | |
| MPI/DP interface, outputs | 2 KB | |
| DP interface, inputs | 8 KB | |
| DP interface, outputs | 8 KB | |
| PN interface, inputs | 8 KB | |
| PN interface, outputs | 8 KB | |
| Process image | | |
| Inputs, adjustable | 16 KB | |
| Outputs, adjustable | 16 KB | |
| Inputs, preset | 512 bytes | |
| Outputs, preset | 512 bytes | |
| Consistent data, max. | 244 bytes | |
| Access to consistent data in the process image | Yes | |
| Process image partitions | | |
| Number of process image partitions, max. | 15 | |
| Digital channels | | |
| Inputs | 131072 | |
| of which are central | 131072 | |
| Outputs | 131072 | |
| of which are central | 131072 | |
| Analog channels | | |
| Inputs | 8192 | |
| of which are central | 8192 | |
| Outputs | 8192 | |
| of which are central | 8192 | |
| Hardware configuration | | |
| Number of expansion units, max. | 21 | |
| Multicomputing | Yes; max. 4 CPU (with UR1 or UR2) | |
| Interface modules | | |
| Number of plug-in IMs (total), max. | 6 | |
| Number of plug-in IM 460s, max. | 6 | |
| Number of plug-in IM 463s, max. | 4; IM 463-2 | |
| Number of DP masters | | |
| Integrated | 1 | |

| | 6ES7416-3ES07-0AB0<br>6ES7416-3FS07-0AB0 |
|---|---|
| Via IM 467 | 4 |
| Via CP | 10; CP 443-5 Extended |
| Mixed IM + CP operation allowed | No; IM 467 cannot be used in combination with CP 443-5 Ext. or CP 443-1 n PROFINET IO mode |
| Via interface module | 1; IF 964-DP |
| Number of plug-in S5 modules (via adapter bay, in the central controller), max. | 6 |
| Number of IO controllers | |
| Integrated | 1 |
| Via CP | 4; max. 4 in central controller; no mixed operation of different CP 443-1 types in PROFINET IO mode |
| Number of usable FMs and CPs (recommendation) | |
| FM | limited by the number of slots or connections |
| CP, point-to-point | CP 440: limited by the number of slots; CP 441: limited by the number of slots or connections |
| PROFIBUS and Ethernet CPs | 14; in total max. 10 CP as DP master and PROFINET controller, of which up to 10 IM or CP as DP master and up to 4 CP as PROFINET controller |
| Slots | |
| Slots required | 2 |
| Time of day | |
| Clock | |
| Hardware clock (real-time clock) | Yes |
| With battery backup, can be synchronized | Yes |
| Resolution | 1 ms |
| Deviation per day (with battery backup), max. | 1.7 s; Power off |
| Deviation per day (without battery backup), max. | 8.6 s; with 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 2^31 - 1 hour |
| Resolution | 1 hour |
| Retentive | Yes |
| Time synchronization | |
| Supported | Yes |
| on MPI, master | Yes |
| on MPI, slave | Yes |
| on DP, master | Yes |
| on DP, slave | Yes |
| in the AS, master | Yes |
| in the AS, slave | Yes |
| On Ethernet via NTP | Yes; as client |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| On IF 964 DP | Yes |
| Time difference in the system with synchronization via | |
| Ethernet, max. | 10 ms |
| MPI, max. | 200 ms |
| Interfaces | |
| Interfaces/bus type | 1x MPI/PROFIBUS DP, 1x PROFINET (2 ports), 1x PROFIBUS DP (optionally plug-in) |
| Number of RS 485 interfaces | 1; combination MPI / PROFIBUS DP |
| Number of other interfaces | 1; PROFIBUS DP with IF 964-DP (optionally plug-in; MLFB: 6ES7964-2AA04-0AB0) |
| 1st interface | |
| Interface type | Integrated |
| Hardware | RS 485 / PROFIBUS + MPI |
| Electrically isolated | Yes |
| Power supply at interface (15 to 30 V DC), max. | 150 mA |
| Number of connection resources | MPI: 44, DP: 32 |
| Functionality | |
| MPI | Yes |
| DP master | Yes |
| DP slave | Yes |
| MPI | |
| Number of connections | 44; a diagnostics repeater in the segment reduces the number of connection resources on the segment by 1 |
| Transmission rate, max. | 12 Mbps |
| Services | |
| 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 |
| DP master | |
| Number of connections, max. | 32; a diagnostics repeater in the segment reduces the number of connection resources on the segment by 1 |
| Transmission rate, max. | 12 Mbps |
| Number of DP slaves, max. | 32 |
| Services | |
| PG/OP communication | Yes |
| Global data communication | No |
| S7 basic communication | Yes |

| | 6ES7416-3ES07-0AB0<br>6ES7416-3FS07-0AB0 |
|---|---|
| S7 communication | Yes |
| S7 communication, as client | Yes |
| S7 communication, as server | Yes |
| Support for constant bus cycle time | Yes |
| Isochronous mode | Yes |
| SYNC/FREEZE | Yes |
| Enabling/disabling of DP slaves | Yes |
| Direct data exchange (peer-to-peer) | Yes |
| DPV1 | Yes |
| Address area | |
| Inputs, max. | 2 KB |
| Outputs, max. | 2 KB |
| User data per DP slave | |
| User data per DP slave, max. | 244 bytes |
| Inputs, max. | 244 bytes |
| Outputs, max. | 244 bytes |
| Slots, max. | 244 |
| Per slot, max. | 128 bytes |
| DP slave | |
| Number of connections | 32 |
| GSD file | https://support.industry.siemens.com/cs/ww/en/view/113652 |
| Transmission rate, max. | 12 Mbps |
| Automatic baud rate detection | No |
| Address area, max. | 32; virtual slots |
| User data per address area, max. | 32 bytes |
| Consistent user data per address area, max. | 32 bytes |
| Services | |
| PG/OP communication | Yes; with active interface |
| S7 routing | Yes; with active interface |
| Global data communication | No |
| S7 basic communication | No |
| S7 communication | Yes |
| S7 communication, as client | Yes |
| S7 communication, as server | Yes |
| Direct data exchange (peer-to-peer) | No |
| DPV1 | No |
| Transfer memory | |
| Inputs | 244 bytes |
| Outputs | 244 bytes |
| 2nd interface | |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| Interface type | PROFINET |
| Hardware | Ethernet RJ45 |
| Electrically isolated | Yes |
| Integrated switch | Yes |
| Number of ports | 2 |
| Automatic determination of transmission rate | Yes; Autosensing |
| Autonegotiation | Yes |
| Autocrossing | Yes |
| Change of the IP address at runtime, supported | Yes; specified by higher-level IO controller or by the user program with SFB 104 "IP_CONF" |
| Number of connection resources | 96 |
| Media redundancy | |
| Supported | Yes |
| Changeover time at line interruption, typ. | 200 ms |
| Number of nodes on the ring, max. | 50 |
| Functionality | |
| DP master | No |
| DP slave | No |
| PROFINET IO controller | Yes |
| PROFINET IO device | Yes |
| PROFINET CBA | Yes |
| Open IE communication | Yes |
| Point-to-point link | No |
| PROFINET IO controller | |
| Transmission rate, max. | 100 Mbps |
| Number of connectable IO devices, max. | 256 |
| Number of connectable IO devices for RT, max. | 256 |
| of which in line, max. | 256 |
| Number of IO devices with IRT and the "high flexibility" option | 256 |
| of which in line, max. | 61 |
| Max. number of IO devices with IRT and the "high performance" option | 64 |
| of which in line, max. | 64 |
| Shared device | Yes |
| Prioritized startup | Yes |
| Number of IO devices, max. | 32 |
| Enabling/disabling of IO devices | Yes |
| Max. number of I/O devices that can be enabled/disabled simultaneously | 8 |
| Hot-swapping of I/O devices (partner ports), supported | Yes |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| Number of IO devices per tool, max. | 8; 8 parallel calls of SFC 12 "D_ACT_DP" per segment are possible. Hot-swapping of maximum 32 I/O devices (partner ports) supported |
| Device replacement without swap medium | Yes |
| Send clocks | 250 µs, 500 µs, 1 ms, 2 ms, 4 ms also for IRT with higher performance: 250 µs to 4 ms at an interval of 125 µs |
| Update time | 250 µs to 512 ms; The minimum value depends on the communication slice set for PROFINET IO, the number of IO devices, and the amount of configured user data; see PROFINET system description |
| Services | |
| 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 |
| Address area | |
| Inputs, max. | 8 KB |
| Outputs, max. | 8 KB |
| User data consistency, max. | 1024 bytes |
| PROFINET IO device | |
| Services | |
| 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 |
| Transfer memory | |
| Inputs, max. | 1440 bytes; per IO controller with shared device |
| Outputs, max. | 1440 bytes; per IO controller with shared device |
| Submodules | |
| Number, max. | 64 |
| User data per submodule, max. | 1024 bytes |
| Open IE communication | |
| Number of connections, max. | 94 |
| Local port numbers used by the system | 0, 20, 21, 25, 80, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 65535 |
| Keep Alive function supported | Yes |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| 3rd interface | |
| Interface type | Plug-in interface module (IF) |
| Plug-in interface modules | IF 964-DP (MLFB: 6ES7964-2AA04-0AB0) |
| Hardware | RS 485 / PROFIBUS |
| Electrically isolated | Yes |
| Power supply at interface (15 to 30 V DC), max. | 150 mA |
| Automatic determination of transmission rate | No |
| Number of connection resources | 32 |
| Functionality | |
| MPI | No |
| DP master | Yes |
| DP slave | Yes |
| DP master | |
| Number of connections, max. | 32 |
| Transmission rate, max. | 12 Mbps |
| Number of DP slaves, max. | 125 |
| Services | |
| PG/OP communication | Yes |
| Global data communication | No |
| S7 basic communication | Yes |
| S7 communication | Yes |
| S7 communication, as client | Yes |
| S7 communication, as server | Yes |
| Support for constant bus cycle time | Yes |
| Isochronous mode | Yes |
| SYNC/FREEZE | Yes |
| Enabling/disabling of DP slaves | Yes |
| Direct data exchange (peer-to-peer) | Yes |
| DPV1 | Yes |
| Address area | |
| Inputs, max. | 8 KB |
| Outputs, max. | 8 KB |
| User data per DP slave | |
| User data per DP slave, max. | 244 bytes |
| Inputs, max. | 244 bytes |
| Outputs, max. | 244 bytes |
| Slots, max. | 244 |
| Per slot, max. | 128 bytes |
| DP slave | |
| Number of connections | 32 |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| GSD file | https://support.industry.siemens.com/cs/ww/en/view/113652 |
| Transmission rate, max. | 12 Mbps |
| Automatic baud rate detection | No |
| Address area, max. | 32; virtual slots |
| User data per address area, max. | 32 bytes |
| Consistent user data per address area, max. | 32 bytes |
| Services | |
| PG/OP communication | Yes |
| S7 routing | Yes; with active interface |
| Global data communication | No |
| S7 basic communication | No |
| S7 communication | Yes |
| S7 communication, as client | Yes |
| S7 communication, as server | Yes |
| Direct data exchange (peer-to-peer) | No |
| DPV1 | No |
| Transfer memory | |
| Inputs | 244 bytes |
| Outputs | 244 bytes |
| Isochronous mode | |
| Isochronous mode (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 bytes |
| Constant bus cycle time | Yes |
| Minimum clock cycle | 1 ms; 0.5 ms without use of SFC 126, 127 |
| Maximum clock cycle | 32 ms |
| Communication functions | |
| 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 |
| Global data communication | |
| Supported | Yes |
| Number of GD circles, max. | 16 |
| Number of GD packets, sender, max. | 16 |
| Number of GD packets, receiver, max. | 32 |
| Size of GD packets, max. | 54 bytes |
| Size of GD packets (of which are consistent), max. | 1 variable |
| S7 basic communication | |
| Supported | Yes |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| User data per job, max. | 76 bytes |
| 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 KB |
| User data per job (of which consistent), max. | 462 bytes; 1 variable |
| S5-compatible communication | |
| Supported | Yes; via FC AG_SEND and AG_RECV, maximum via 10 CP 443-1 or 443-5 |
| User data per job, max. | 8 KB |
| User data per job (of which consistent), max. | 240 bytes |
| Number of simultaneous AG-SEND/AG-RECV jobs per CPU, max. | 64/64 |
| Standard communication (FMS) | |
| Supported | Yes; via CP and loadable FBs |
| Open IE communication | |
| TCP/IP | Yes; via integrated PROFINET interface and loadable FBs |
| Number of connections, max. | 94 |
| Data length, max. | 32 KB |
| Multiple 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 KB; 1452 bytes via CP 443-1 Adv. |
| UDP | Yes; via integrated PROFINET interface and loadable FBs |
| Number of connections, max. | 94 |
| Data length, max. | 1472 bytes |
| Web server | |
| Supported | Yes |
| Number of HTTP clients | 5 |
| User-defined websites | Yes |
| PROFINET CBA (with configured communication load setpoint) | |
| Reference setting for CPU communication load | 20% |
| Number of remote interconnection partners | 32 |
| Number of master/slave functions | 150 |
| Total of all master/slave connections | 6000 |
| Data length of all incoming master/slave I/Os, max. | 65000 bytes |
| Data length of all outgoing master/slave connections, max. | 65000 bytes |
| Number of device-internal and PROFIBUS interconnections | 1000 |

| | 6ES7416-3ES07-0AB0<br>6ES7416-3FS07-0AB0 |
|---|---|
| Data length of the device-internal and PROFIBUS interconnections, max. | 16000 bytes |
| Data length per connection, max. | 2000 bytes |
| Remote interconnections with non-cyclic transmission | |
| Sampling rate: Sampling interval, min. | 200 ms; Depends on preset communication load, number of interconnections and used data length |
| Number of incoming interconnections | 500 |
| Number of outgoing interconnections | 500 |
| Data length of all incoming interconnections, max. | 16000 bytes |
| Data length of all outgoing interconnections, max. | 16000 bytes |
| Data length per connection, max. | 2000 bytes |
| Remote interconnections with cyclic transmission | |
| Transmission rate: Minimum transmission time | 1 ms; Depends on preset communication load, number of interconnections and used data length |
| Number of incoming interconnections | 300 |
| Number of outgoing interconnections | 300 |
| Data length of all incoming interconnections, max. | 4800 bytes |
| Data length of all outgoing interconnections, max. | 4800 bytes |
| Data length per connection, max. | 450 bytes |
| HMI variables via PROFINET (non-cyclic) | |
| Number of stations that can be logged on for HMI variables (PN OPC/IMAP) | 2x PN OPC / 1x IMAP |
| Update of HMI variables | 500 ms |
| Number of HMI variables | 1500 |
| Data length of all HMI variables, max. | 48000 bytes |
| PROFIBUS proxy functionality | |
| Supported | Yes; max. 32 PROFIBUS slaves can be connected |
| Data length per connection, max. | 240 bytes; slave dependent |
| Number of connections | |
| Total | 96 |
| Suitable for PG communication | 95 |
| Reserved for PG communication | 1 |
| Assignable for PG communication, max. | 0 |
| Suitable for OP communication | 95 |
| Reserved for OP communication | 1 |
| Assignable for OP communication, max. | 0 |
| Suitable for S7 basic communication | 94 |
| Reserved for S7 basic communication | 0 |
| Assignable for S7 basic communication, max. | 0 |
| Suitable for S7 communication | 94 |
| Reserved for S7 communication | 0 |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| Assignable for S7 communication, max. | 0 |
| Suitable for routing | 47 |
| Reserved for routing | 0 |
| Assignable for routing, max. | 0 |
| S7 message functions | |
| Number of stations that can be logged on for signaling 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 diagnostics messages | Yes |
| Simultaneously active Alarm_S blocks, max. | 1000; simultaneously active Alarm_S/SQ blocks and Alarm_D/DQ blocks |
| Alarm_8 blocks | Yes |
| Number of instances for Alarm_8 and S7 communication blocks, max. | 4000 |
| Preset, max. | 600 |
| Process control messages | Yes |
| Number of archives that can be logged on simultaneously (SFB 37 AR_SEND) | 32 |
| Number of messages | |
| Total, max. | 1024 |
| In 100 ms interval, max. | 128 |
| in 500 ms interval, max. | 512 |
| in 1000 ms interval, max. | 1024 |
| Number of additional values | |
| In 100 ms interval, max. | 1 |
| In 500, 1000 ms interval, max. | 10 |
| Test and commissioning functions | |
| Block status | Yes; up to 16 simultaneously |
| Single-step | Yes |
| Number of breakpoints | 16 |
| Status/modify | |
| Status/modify variable | Yes; up to 16 variable tables |
| Variables | Inputs/outputs, bit memory, DB, I/O inputs/outputs, timers, counters |
| Number of variables, max. | 70; Status / Modify |
| Forcing | |
| Forcing | Yes |
| Force, variables | Inputs/outputs, bit memories, distributed I/O |
| Number of variables, max. | 512 |

| | | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|---|
| Diagnostics buffer | | |
| Available | Yes | |
| Number of entries, max. | 3200 | |
| Adjustable | Yes | |
| Default | 120 | |
| Service data | | |
| Readable | Yes | |
| Standards, approvals, certificates | | |
| UKCA | Yes | |
| CE mark | Yes | |
| CSA approval | Yes | |
| UL approval | Yes | |
| cULus | Yes | |
| FM approval | Yes | |
| RCM (formerly C-TICK) | Yes | |
| CCC | Yes | |
| KC approval | Yes | |
| EAC (formerly Gost-R) | Yes | |
| Use in hazardous areas | | |
| ATEX | ATEX II 3 G Ex ec IIC T4 Gc | |
| Ambient conditions | | |
| Ambient temperature during operation | | |
| Min. | 0° C | |
| Max. | 60 °C | |
| Configuration | | |
| Programming | | |
| Instruction set | See instruction list | |
| Nesting levels | 7 | |
| 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 | |

| | **6ES7416-3ES07-0AB0**<br>**6ES7416-3FS07-0AB0** |
|---|---|
| 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/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 |

## 2.13 Installing Modules in a Rack

### Introduction

All modules are installed using the same procedure.

**Caution**

Modules and racks can be damaged.

Do not apply any undue force when installing the modules in a rack, because you will more than likely damage the devices.

Carefully follow the steps described below for the installation sequence.

### Tool

The tool needed to install the modules is a cylindrical screwdriver with 3.5 mm blade width.

### Installation Sequence

To install modules in a rack:

1. Remove the dummy plates from the slots at which you intend to insert modules. Grasp the dummy plate at the points marked and pull it forward and off.

   With double and triple-width modules, you must remove the dummy plates from all the slots to be covered by the relevant module.
2. Remove the cover, if applicable, from the module (see Figure 2-3).
3. Disconnect the power supply connector at the power supply module.
4. Attach the first module and swing it downwards (see Figure 2-4).

   If you feel a resistance when swinging the module down, raise it slightly and then continue.
5. Tighten the module screws top and bottom with a torque of 0.8 to 1.1 N/m (see Figure 2-5). Triple-width modules are secured with two screws at the top and at the bottom.
6. Refit the module cover, if applicable.
7. Fit the remaining modules in the same way.

The individual steps for installation are explained below.

The method of removing modules is described in Chapter 7.

## Removing the Cover

With modules which have a cover (for example, power supply modules and CPUs), you remove this before installing the module in the rack. Proceed as follows:

1. Push the interlock lever down (1).
2. Swing the cover forward and off (2).

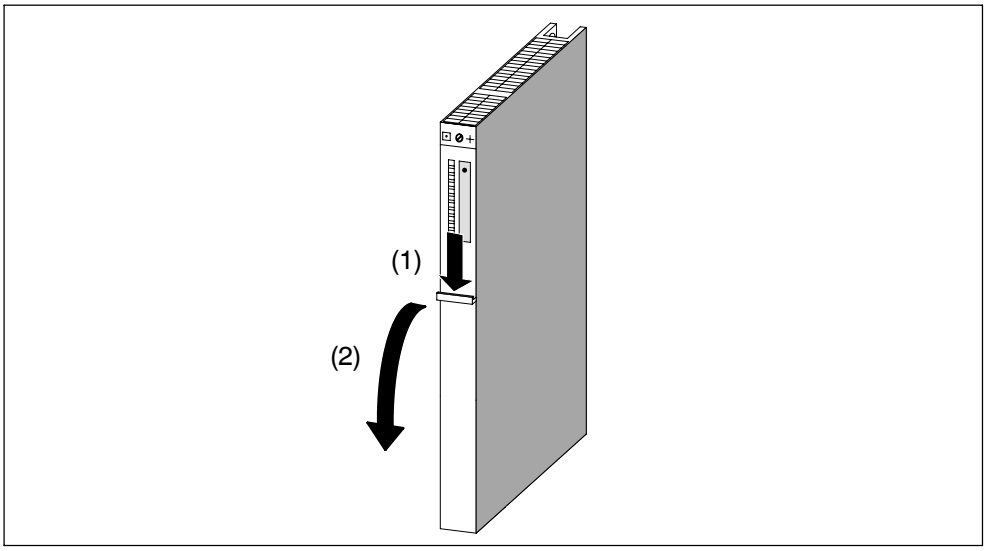


Figure 2-3 Removing the Cover

## Attaching the Modules

Attach the modules one by one (1) and swing them carefully downwards (2). If you feel a resistance when swinging the module down, raise it slightly and then continue.

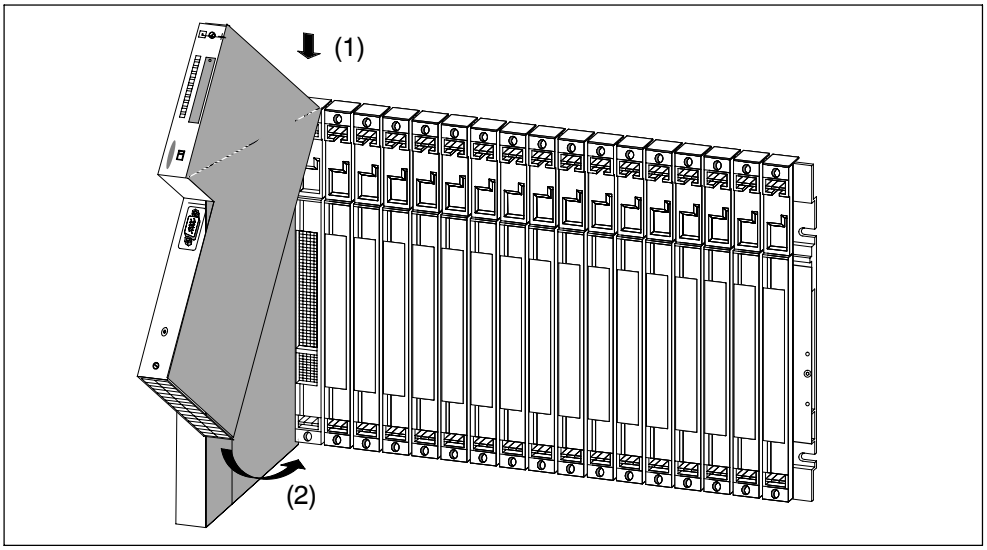


Figure 2-4 Attaching the Modules

## Screwing the Modules in Place

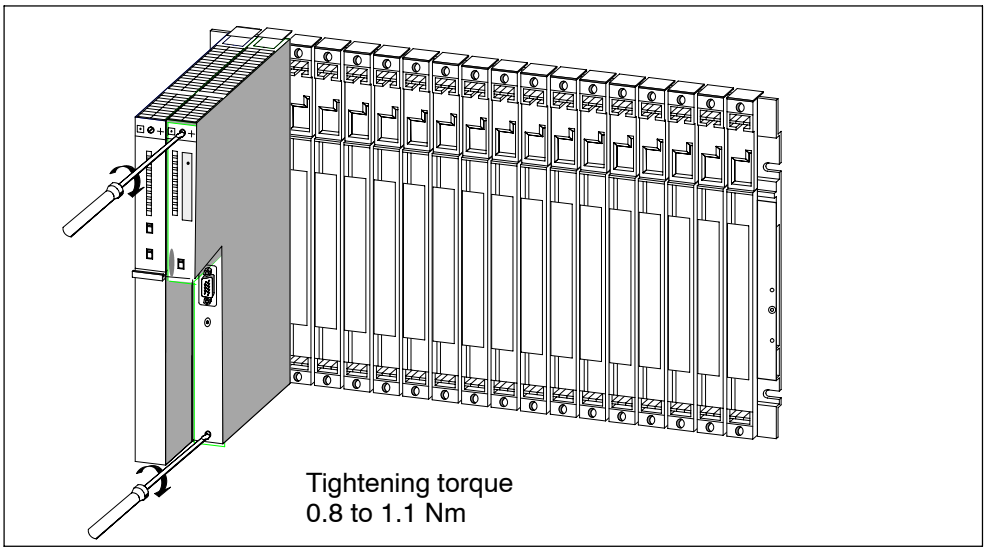


Figure 2-5 Screwing the Modules in Place

## 7.3 Replacing CPUs

### Slot Numbering

If you have provided the modules in your system with slot numbering, you must remove the number from the old module when replacing it and apply the number to the new module.

### Saving the Data

Save the user program including configuration data.

### Removing the Module

1. Set the CPU mode switch to STOP.
2. Set the standby switch of the power supply module to ⏻ (0 V output voltages).
3. Remove the cover of the CPU.
4. Disconnect the MPI connector, if applicable.
5. Disconnect the connector at the EXT. BATT. socket, if applicable.
6. Remove the memory card.
7. Loosen the mounting screws of the module.
8. Swing the module out.

## Installing a New Module

1. Attach the new module of the same type and swing it downwards.
2. Screw the module on.
3. If applicable, plug the connector for the external battery supply into the socket.
4. Set the CPU mode switch to STOP.
5. Insert the memory card.
6. Set the standby switch of the power supply module to I (output voltages at rated value).

   The remaining procedure depends on whether you use a Flash card and whether or not you have configured your system for networking.
7. Proceed as follows to operate with a Flash card:

   Transfer the user and configuration data.

   Set the CPU mode switch to RUN.

   Close the cover.
8. If your system is not configured for networking, proceed as follows:

   Transfer the user and configuration data by means of the programming device, via the programming device cable (see Section 6.3).

   Set the CPU mode switch to RUN.

   Close the cover.
9. If your system is configured for networking, proceed as follows:

   Transfer the user and configuration data by means of the programming device, via the programming device cable (see Section 6.3).

   Set up your network by plugging in the MPI connector.

   Set the CPU mode switch to RUN.

   Close the cover.

## How the S7-400 Behaves after Exchanging Modules

If an error occurs after replacing a module, you can read out the cause of the error from the diagnostic buffer.