

SIMATIC PCS 7, CPU 410E PROCESS AUTOMATION, CENTRAL UNIT FOR S7-400 AND S7-400H/F/FH, 5 INTERFACES: 2X PN, 1X DP, 2X FOR SYNC-MODULE FOR SPARE PART USAGE, WITHOUT SYSTEM EXPANSION CARD



General information	
Product type designation	CPU 410E
Firmware version	V8.2
Design of PLC basic unit	With Conformal Coating (ISA-S71.04 severity level G1; G2; G3) and operating temperature to 70 °C
Product function	
• SysLog	Yes; via TCP; up to 4 receivers can be parameterized; buffer capacity max. 3 200 entries
• Field interface security	Yes
Engineering with	
• Programming package	SIMATIC PCS 7 V9.0 or higher
CiR – Configuration in RUN	
CiR synchronization time, basic load	60 ms
CiR synchronization time, time per I/O byte	0 µs
Input current	
from backplane bus 5 V DC, typ.	2 A
from backplane bus 5 V DC, max.	2.4 A
from backplane bus 24 V DC, max.	150 mA; DP interface

from interface 5 V DC, max.	90 mA; At the DP interface
<b>Power loss</b>	
Power loss, typ.	10 W
<b>Processor</b>	
CPU speed	450 MHz; Multi-processor system
<b>Memory</b>	
PCS 7 process objects	200; Max.; with PO200M System Expansion Card
<b>Work memory</b>	
<ul style="list-style-type: none"> <li>• integrated</li> <li>• integrated (for program)</li> <li>• integrated (for data)</li> <li>• expandable</li> </ul>	<ul style="list-style-type: none"> <li>4 Mbyte; max., dependent on the System Expansion Card used</li> <li>Dependent on the System Expansion Card used</li> <li>Dependent on the System Expansion Card used</li> <li>Dependent on the System Expansion Card used</li> </ul>
<b>Load memory</b>	
<ul style="list-style-type: none"> <li>• integrated RAM, max.</li> <li>• expandable RAM</li> </ul>	<ul style="list-style-type: none"> <li>48 Mbyte</li> <li>No</li> </ul>
<b>Backup</b>	
<ul style="list-style-type: none"> <li>• present</li> <li>• with battery</li> <li>• without battery</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>Yes; all data</li> <li>Yes; Program and data of the load memory</li> </ul>
<b>Battery</b>	
<b>Backup battery</b>	
<ul style="list-style-type: none"> <li>• Backup current, typ.</li> <li>• Backup current, max.</li> <li>• Backup time, max.</li> <li>• Feeding of external backup voltage to CPU</li> </ul>	<ul style="list-style-type: none"> <li>370 <math>\mu</math>A; Valid up to 40°C</li> <li>2.1 mA</li> <li>Dealt with in the module data manual with the secondary conditions and the factors of influence</li> <li>No</li> </ul>
<b>CPU processing times</b>	
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
average processing time of PCS 7 typicals	110 $\mu$ s; with APL Typicals
Process tasks, max.	9; Individually adjustable from 10 ms to 5 s
<b>CPU-blocks</b>	
<b>DB</b>	
<ul style="list-style-type: none"> <li>• Number, max.</li> <li>• Size, max.</li> </ul>	<ul style="list-style-type: none"> <li>16 000; Number range: 1 to 16 000 (= Instances)</li> <li>Dependent on the System Expansion Card used</li> </ul>
<b>FB</b>	
<ul style="list-style-type: none"> <li>• Number, max.</li> <li>• Size, max.</li> </ul>	<ul style="list-style-type: none"> <li>8 000; Number range: 0 to 7999</li> <li>64 kbyte</li> </ul>

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 (= Process Tasks)
• 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

### Counters, timers and their retentivity

S7 counter	
• Number	2 048
Retentivity	
— adjustable	Yes
Counting range	
— lower limit	0
— upper limit	999
IEC counter	
• Number	Unlimited (limited only by RAM capacity)
S7 times	
• Number	2 048
Retentivity	
— adjustable	Yes
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 in total	Total working and load memory (with backup battery)
Flag	
• Number, max.	16 384 byte
• Retentivity available	Yes

<b>Data blocks</b>	
• Number, max.	16 000; Number range: 1 to 16000
• Size, max.	Dependent on the System Expansion Card used
<b>Local data</b>	
• adjustable, max.	64 kbyte
• preset	64 kbyte
<b>Address area</b>	
<b>I/O address area</b>	
• Inputs	2 048 byte; max., dependent on the System Expansion Card used
• Outputs	2 048 byte; max., dependent on the System Expansion Card used
of which distributed	
— DP interface, inputs	1 536 byte; max., dependent on the System Expansion Card used
— DP interface, outputs	1 536 byte; max., dependent on the System Expansion Card used
— PROFINET interface, inputs	1 536 byte; max., dependent on the System Expansion Card used
— PROFINET interface, outputs	1 536 byte; max., dependent on the System Expansion Card used
<b>Process image</b>	
• Inputs, adjustable	16 kbyte
• Outputs, adjustable	16 kbyte
• Inputs, default	16 kbyte; Total peripheral address range, cannot be changed
• Outputs, default	16 kbyte; Total peripheral address range, cannot be changed
• 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	16 384; max., dependent on the System Expansion Card used
— of which central	16 384; max., dependent on the System Expansion Card used
• Outputs	16 384; max., dependent on the System Expansion Card used
— of which central	16 384; max., dependent on the System Expansion Card used
<b>Analog channels</b>	
• Inputs	1 024; max., dependent on the System Expansion Card used
— of which central	1 024; max., dependent on the System Expansion Card used
• Outputs	1 024; max., dependent on the System Expansion Card used
— of which central	1 024; max., dependent on the System Expansion Card used
<b>Hardware configuration</b>	
connectable OPs	119
Multicomputing	No
<b>Number of DP masters</b>	
• integrated	1
• via CP	4; CP 443-5 Extended
<b>Number of IO Controllers</b>	

• integrated	2
• via CP	0
<b>Number of operable FMs and CPs (recommended)</b>	
• CP, LAN	4
• PROFIBUS and Ethernet CPs	4
<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
• Granularity	1 hour
• retentive	Yes
<b>Clock synchronization</b>	
• supported	Yes
• to DP, master	Yes
• to DP, slave	Yes
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Possible as client and master/slave via SIMATIC process
<b>Interfaces</b>	
Number of PROFINET interfaces	2
Number of RS 485 interfaces	1; PROFIBUS DP
Number of other interfaces	2; 2x synchronization
<b>1. Interface</b>	
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	16
<b>Functionality</b>	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	No
<b>DP master</b>	
• Number of connections, max.	16

• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	96
• Number of slots per interface, max.	1 632
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes; S7 routing
— 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	Yes; Single mode only
— Direct data exchange (slave-to-slave communication)	No
— DPV1	Yes
<b>Address area</b>	
— Inputs, max.	1 536 byte; Up to 1 500 IOs (channels)
— Outputs, max.	1 536 byte; Up to 1 500 IOs (channels)
<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

## 2. Interface

Interface type	PROFINET
Physics	Ethernet RJ45
Isolated	Yes
automatic detection of transmission rate	Yes; Autosensing
Autonegotiation	Yes
Autocrossing	Yes
System redundancy	Yes
Redundant subnetworks	Yes
Change of IP address at runtime, supported	No
Number of connection resources	120
<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	No
• PROFINET CBA	No
• Open IE communication	Yes
• Web server	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
— Open IE communication	Yes
— Shared device	No; however, usable as part of S7
— Prioritized startup	No
— Number of connectable IO Devices, max.	250
— Number of connectable IO Devices for RT, max.	250
— of which in line, max.	250
— Activation/deactivation of IO Devices	Yes; Single mode only
— 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.	1 536 kbyte; Up to 1 500 IOs (channels)
— Outputs, max.	1 536 kbyte; Up to 1 500 IOs (channels)
— 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	PROFINET
Physics	Ethernet RJ45
Isolated	Yes

automatic detection of transmission rate	Yes; Autosensing
Autonegotiation	Yes
Autocrossing	Yes
System redundancy	Yes
Redundant subnetworks	Yes
Number of connection resources	120
<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	No
• PROFINET CBA	No
• Open IE communication	Yes
• Web server	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
— Open IE communication	Yes
— Shared device	No; however, usable as part of S7
— Prioritized startup	No
— Number of connectable IO Devices, max.	250
— Number of connectable IO Devices for RT, max.	250
— of which in line, max.	250
— Activation/deactivation of IO Devices	Yes; Single mode only
— 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.	1 536 byte; Up to 1 500 IOs (channels)
— Outputs, max.	1 536 byte; Up to 1 500 IOs (channels)



— 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>4. Interface</b>	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization module 6ES7960-1AA06-0XA0, 6ES7960-1AB06-0XA0 or 6ES7960-1AA08-0XA0

<b>5. Interface</b>	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization module 6ES7960-1AA06-0XA0, 6ES7960-1AB06-0XA0 or 6ES7960-1AA08-0XA0

<b>Protocols</b>	
Supports protocol for PROFINET IO	Yes
PROFINET CBA	No
PROFIsafe	Yes
PROFIBUS	Yes
AS-Interface	Yes; Via add-on

<b>Protocols (Ethernet)</b>	
• TCP/IP	Yes

<b>Open IE communication</b>	
• TCP/IP	
— Data length, max.	32 kbyte
• ISO-on-TCP (RFC1006)	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs
— Data length, max.	32 kbyte; 1452 bytes via CP 443-1 Adv.
• UDP	
— Data length, max.	1 472 byte

<b>Further protocols</b>	
• Foundation Fieldbus	Yes; via DP/FF Link
• MODBUS	Yes; Via add-on

<b>Communication functions</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>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 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
• usable for OP communication	
— reserved for OP communication	1
<b>S7 message functions</b>	
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.	10 000
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	4
<b>Status/control</b>	
• Status/control variable	Yes
• Number of variables, max.	70
<b>Diagnostic buffer</b>	
• present	Yes
• Number of entries, max.	3 200
<b>Service data</b>	
• 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
<b>Use in hazardous areas</b>	
• ATEX	ATEX II 3G Ex nA IIC T4 Gc

## Ambient conditions

<b>Ambient temperature during operation</b>	
• min.	0 °C
• max.	70 °C

## Configuration

<b>Configuration software</b>	
• STEP 7	Yes; Dependent on the System Expansion Card used
<b>Programming</b>	
• 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
<b>Programming language</b>	
— LAD	Dependent on the System Expansion Card used
— FBD	Dependent on the System Expansion Card used
— STL	Dependent on the System Expansion Card used
— SCL	Yes
— CFC	Yes
— GRAPH	Dependent on the System Expansion Card used
— HiGraph®	Dependent on the System Expansion Card used
<b>Number of simultaneously active SFCs</b>	
— 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
<b>last modified:</b>	10/13/2017