



Figure similar

***** Replacement part ***** SIMATIC S7-400, CPU 416F-2, Central processing unit with: work memory 5.6 MB, (2.8 MB code, 2.8 MB data), 1st interface MPI/DP 12 Mbit/s, 2nd interface PROFIBUS DP Can be used with software package Distributed Safety as of V5.2+SP2

General information	
Product type designation	CPU 416F-2
Firmware version	V5.3
Product function	
<ul style="list-style-type: none"> • Isochronous mode 	Yes; For PROFIBUS only
Engineering with	
<ul style="list-style-type: none"> • Programming package 	STEP 7 V5.3 SP2 or higher with hardware update, Distributed Safety V5.2 SP2 or higher
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O byte	10 μ s
Supply voltage	
Rated value (DC)	Power supply via system power supply
Input current	
from backplane bus 5 V DC, typ.	0.9 A
from backplane bus 5 V DC, max.	1.1 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.	4.5 W
Power loss, max.	5 W
Memory	
Type of memory	other
Work memory	
<ul style="list-style-type: none"> • integrated 	5.6 Mbyte
<ul style="list-style-type: none"> • integrated (for program) 	2.8 Mbyte
<ul style="list-style-type: none"> • integrated (for data) 	2.8 Mbyte
<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. 	1 Mbyte
<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 • without battery 	<p>Yes; all data</p> <p>No</p>
Battery	
Backup battery	
<ul style="list-style-type: none"> • Backup current, typ. • Backup current, max. • Backup time, max. • Feeding of external backup voltage to CPU 	<p>125 μA; up to 40 °C</p> <p>550 μA</p> <p>See reference manual, module data, Chapter 3.3</p> <p>5 V DC to 15 V DC</p>
CPU processing times	
for bit operations, typ.	30 ns
for word operations, typ.	30 ns
for fixed point arithmetic, typ.	30 ns
for floating point arithmetic, typ.	90 ns
CPU-blocks	
DB	
<ul style="list-style-type: none"> • Number, max. • Size, max. 	<p>10 000; Number range: 1 to 16000</p> <p>64 kbyte</p>
FB	
<ul style="list-style-type: none"> • Number, max. • Size, max. 	<p>5 000; Number range: 0 to 7999</p> <p>64 kbyte</p>
FC	
<ul style="list-style-type: none"> • Number, max. • Size, max. 	<p>5 000; Number range: 0 to 7999</p> <p>64 kbyte</p>
OB	
<ul style="list-style-type: none"> • Number, max. • Size, max. • Number of free cycle OBs • Number of time alarm OBs • Number of delay alarm OBs • Number of cyclic interrupt OBs • Number of process alarm OBs • Number of DPV1 alarm OBs • Number of isochronous mode OBs • Number of multicomputing OBs • Number of background OBs • Number of startup OBs • Number of asynchronous error OBs • Number of synchronous error OBs 	<p>see instruction list</p> <p>64 kbyte</p> <p>1; OB 1</p> <p>8; OB 10-17</p> <p>4; OB 20-23</p> <p>9; OB 30-38 (shortest cycle that can be set = 500 μs)</p> <p>8; OB 40-47</p> <p>3; OB 55-57</p> <p>4; OB 61-64</p> <p>1; OB 60</p> <p>1; OB 90</p> <p>2; OB 100, 102</p> <p>9; OB 80-88</p> <p>2; OB 121, 122</p>
Nesting depth	
<ul style="list-style-type: none"> • per priority class • additional within an error OB 	<p>24</p> <p>2</p>
Counters, timers and their retentivity	
S7 counter	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • present • Type • Number 	<p>Yes</p> <p>SFB</p> <p>Unlimited (limited only by RAM capacity)</p>
S7 times	
<ul style="list-style-type: none"> • 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
• 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)
Flag	
• Size, 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
Local data	
• adjustable, max.	32 kbyte
• preset	16 kbyte
Address area	
I/O address area	
• Inputs	16 kbyte
• Outputs	16 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
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 not suitable for use with CP 443-5 Ext. and CP 443-1 EX4x, EX20, GX20 (in PROFINET IO mode)

<ul style="list-style-type: none"> • via interface module 	0
<ul style="list-style-type: none"> • Number of pluggable S5 modules (via adapter capsule in central device), max. 	6
Number of IO Controllers	
<ul style="list-style-type: none"> • integrated 	0
<ul style="list-style-type: none"> • via CP 	4; No mixed operation of CP443-1 EX40 and CP443-1 EX 41/EX20/GX20, max. 4 in central controller
Number of operable FMs and CPs (recommended)	
<ul style="list-style-type: none"> • FM 	Limited by number of slots and number of connections
<ul style="list-style-type: none"> • CP, PtP 	CP 440: Limited by number of slots; CP 441: limited by number of connections
<ul style="list-style-type: none"> • PROFIBUS and Ethernet CPs 	14; Of which 10 CPs max. or IMs as DP master, 4 PROFINET controller maximum
Slots	
<ul style="list-style-type: none"> • required slots 	1
Time of day	
Clock	
<ul style="list-style-type: none"> • Hardware clock (real-time) 	Yes
<ul style="list-style-type: none"> • retentive and synchronizable 	Yes
<ul style="list-style-type: none"> • Resolution 	1 ms
<ul style="list-style-type: none"> • Deviation per day (buffered), max. 	1.7 s; Power off
<ul style="list-style-type: none"> • Deviation per day (unbuffered), max. 	8.6 s; For power On
Operating hours counter	
<ul style="list-style-type: none"> • Number 	16
<ul style="list-style-type: none"> • Number/Number range 	0 to 15
<ul style="list-style-type: none"> • Range of values 	SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2 ³¹ - 1 hours
<ul style="list-style-type: none"> • Granularity 	1 h
<ul style="list-style-type: none"> • retentive 	Yes
Clock synchronization	
<ul style="list-style-type: none"> • supported 	Yes
<ul style="list-style-type: none"> • to MPI, master 	Yes
<ul style="list-style-type: none"> • to MPI, slave 	Yes
<ul style="list-style-type: none"> • to DP, master 	Yes
<ul style="list-style-type: none"> • to DP, slave 	Yes
<ul style="list-style-type: none"> • in AS, master 	Yes
<ul style="list-style-type: none"> • in AS, slave 	Yes
<ul style="list-style-type: none"> • on Ethernet via NTP 	No; Via CP
<ul style="list-style-type: none"> • to IF 964 DP 	No
Time difference in system when synchronizing via	
<ul style="list-style-type: none"> • MPI, max. 	200 ms
Interfaces	
Number of RS 485 interfaces	2; Combined MPI / PROFIBUS DP and PROFIBUS DP
Optical interface	No
1. Interface	
Interface type	MPI/PROFIBUS DP
Isolated	Yes
Interface types	
<ul style="list-style-type: none"> • RS 485 	Yes
<ul style="list-style-type: none"> • Output current of the interface, max. 	150 mA
Protocols	
<ul style="list-style-type: none"> • MPI 	Yes
<ul style="list-style-type: none"> • PROFIBUS DP master 	Yes
<ul style="list-style-type: none"> • PROFIBUS DP slave 	Yes
MPI	
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Transmission rate, max. 	12 Mbit/s
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
PROFIBUS 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; 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
Address area	
— Inputs, max.	2 kbyte
— Outputs, max.	2 kbyte
User data per DP slave	
— User data per DP slave, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
PROFIBUS DP slave	
• Number of connections	32
• GSD file	http://support.automation.siemens.com/WW/view/en/113652
• 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
Services	
— PG/OP communication	Yes; with interface active
— 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
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
2. Interface	
Interface type	PROFIBUS DP

Isolated	Yes
Interface types	
• RS 485	Yes
• Output current of the interface, max.	150 mA
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
PROFIBUS DP master	
• Number of connections, max.	32
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	125
Services	
— 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
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
User data per DP slave	
— User data per DP slave, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
PROFIBUS DP slave	
• Number of connections	32
• GSD file	http://support.automation.siemens.com/WW/view/en/113652
• 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; with interface active
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
Protocols	
SIMATIC communication	
• S7 routing	Yes
Open IE communication	
• ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB
— Data length, max.	1 452 bytes via CP 443-1 Adv.
Web server	
• supported	No
Isochronous mode	
Equidistance	Yes
Number of DP masters with isochronous mode	2

User data per isochronous slave, max.	244 byte
shortest clock pulse	1 ms; 0.5 ms without use of SFC 126, 127
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	63; When using Alarm_S/SQ and Alarm_D/DQ
Data record routing	Yes
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.	54 byte
• Size of GD packet (of which consistent), max.	1 variable
S7 basic communication	
• supported	Yes
• 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
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
• Number of simultaneous AG-SEND/AG-RECV orders per CPU, max.	64/64
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
Number of connections	
• overall	64
• usable for PG communication	63
— reserved for PG communication	1
— adjustable for PG communication, max.	0
• usable for OP communication	63
— reserved for OP communication	1
— adjustable for OP communication, max.	0
• usable for S7 basic communication	62
— reserved for S7 basic communication	0
— adjustable for S7 basic communication, max.	0
• usable for S7 communication	62
— reserved for S7 communication	0
— adjustable for S7 communication, max.	0
• usable for routing	31
— reserved for routing	0
— adjustable for routing, max.	0
S7 message functions	
Number of login stations for message functions, max.	63; Max. 63 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC)
Symbol-related messages	Yes
SCAN procedure	Yes
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
<ul style="list-style-type: none"> Number of instances for alarm 8 and S7 communication blocks, max. 	4 000
<ul style="list-style-type: none"> preset, max. 	600
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	32
Number of messages	
<ul style="list-style-type: none"> overall, max. 	1 024
<ul style="list-style-type: none"> in 100 ms grid, max. 	128
<ul style="list-style-type: none"> in 500 ms grid, max. 	512
<ul style="list-style-type: none"> in 1000 ms grid, max. 	1 024
Number of additional values	
<ul style="list-style-type: none"> with 100 ms grid, max. 	1
<ul style="list-style-type: none"> with 500, 1000 ms grid, max. 	10
Test commissioning functions	
Status block	Yes; Up to 2 simultaneously
Single step	Yes
Number of breakpoints	4
Status/control	
<ul style="list-style-type: none"> Status/control variable 	Yes; Up to 16 variable tables
<ul style="list-style-type: none"> Variables 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
<ul style="list-style-type: none"> Number of variables, max. 	70; Status/control
Forcing	
<ul style="list-style-type: none"> Forcing 	Yes
<ul style="list-style-type: none"> Forcing, variables 	Inputs, outputs, bit memories, peripheral inputs, peripheral outputs
<ul style="list-style-type: none"> Number of variables, max. 	512
Diagnostic buffer	
<ul style="list-style-type: none"> present 	Yes
<ul style="list-style-type: none"> Number of entries, max. 	3 200
<ul style="list-style-type: none"> — adjustable 	Yes
<ul style="list-style-type: none"> — preset 	120
Service data	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> ATEX 	ATEX II 3G Ex nA IIC T4 Gc
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> min. 	0 °C
<ul style="list-style-type: none"> max. 	60 °C
Configuration	
Configuration software	
<ul style="list-style-type: none"> STEP 7 	Yes
Programming	
<ul style="list-style-type: none"> Command set 	see instruction list
<ul style="list-style-type: none"> Nesting levels 	7
<ul style="list-style-type: none"> Access to consistent data in process image 	Yes
<ul style="list-style-type: none"> 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
— 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
Dimensions	
Width	25 mm
Height	290 mm
Depth	219 mm
Weights	
Weight, approx.	700 g
last modified:	3/25/2021 