

SIMATIC S7-300 CPU319F-3 PN/DP, Central processing unit with 2.5 MB work memory, 1st interface MPI/DP 12 Mbit/s, 2nd interface DP master/slave 3rd interface Ethernet PROFINET, Micro Memory Card required



Mobile: 00989122160416  
00989124094952  
Office: 00982136610286  
00982136610801

General information	
HW functional status	01
Firmware version	V3.2
Engineering with	
<ul style="list-style-type: none"> <li>Programming package</li> </ul>	STEP 7 V5.5 or higher, Distributed Safety V5.4 SP4
Supply voltage	
Rated value (DC)	Yes
<ul style="list-style-type: none"> <li>24 V DC</li> </ul>	Yes
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
external protection for power supply lines (recommendation)	2 A min.
Mains buffering	
<ul style="list-style-type: none"> <li>Mains/voltage failure stored energy time</li> </ul>	5 ms
<ul style="list-style-type: none"> <li>Repeat rate, min.</li> </ul>	1 s
Input current	
Current consumption (rated value)	1 250 mA
Current consumption (in no-load operation), typ.	500 mA

Inrush current, typ.	4 A
$I^2t$	1.2 A <sup>2</sup> ·s
<b>Power loss</b>	
Power loss, typ.	14 W
<b>Memory</b>	
<b>Work memory</b>	
<ul style="list-style-type: none"> <li>integrated</li> </ul>	2 560 kbyte
<ul style="list-style-type: none"> <li>expandable</li> </ul>	No
<ul style="list-style-type: none"> <li>Size of retentive memory for retentive data blocks</li> </ul>	700 kbyte
<b>Load memory</b>	
<ul style="list-style-type: none"> <li>Plug-in (MMC)</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Plug-in (MMC), max.</li> </ul>	8 Mbyte
<ul style="list-style-type: none"> <li>Data management on MMC (after last programming), min.</li> </ul>	10 y
<b>Backup</b>	
<ul style="list-style-type: none"> <li>present</li> </ul>	Yes
<ul style="list-style-type: none"> <li>without battery</li> </ul>	Yes
<b>CPU processing times</b>	
for bit operations, typ.	0.004 μs
for word operations, typ.	0.01 μs
for fixed point arithmetic, typ.	0.01 μs
for floating point arithmetic, typ.	0.04 μs
<b>CPU-blocks</b>	
Number of blocks (total)	4 096; (DBs, FCs, FBs); the maximum number of loadable blocks can be reduced by the MMC used.
<b>DB</b>	
<ul style="list-style-type: none"> <li>Number, max.</li> </ul>	4 096; Number range: 1 to 16000
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	64 kbyte
<b>FB</b>	
<ul style="list-style-type: none"> <li>Number, max.</li> </ul>	4 096; Number range: 0 to 7999
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	64 kbyte
<b>FC</b>	
<ul style="list-style-type: none"> <li>Number, max.</li> </ul>	4 096; Number range: 0 to 7999
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	64 kbyte
<b>OB</b>	
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	64 kbyte
<ul style="list-style-type: none"> <li>Number of free cycle OBs</li> </ul>	1; OB 1
<ul style="list-style-type: none"> <li>Number of time alarm OBs</li> </ul>	1; OB 10
<ul style="list-style-type: none"> <li>Number of delay alarm OBs</li> </ul>	2; OB 20, 21

• Number of cyclic interrupt OBs	4; OB 32, 33, 34, 35 (OB 35: smallest settable clock pulse = 500 µs)
• Number of process alarm OBs	1; OB 40
• Number of DPV1 alarm OBs	3; OB 55, 56, 57
• Number of isochronous mode OBs	1; OB 61
• Number of startup OBs	1; OB 100
• Number of asynchronous error OBs	6; OB 80, 82, 83, 85, 86, 87 (OB83 only for PROFINET IO)
• Number of synchronous error OBs	2; OB 121, 122
<b>Nesting depth</b>	
• per priority class	16
• additional within an error OB	4

### Counters, timers and their retentivity

#### S7 counter

• Number	2 048
<b>Retentivity</b>	
— adjustable	Yes
— lower limit	0
— upper limit	2 047
— preset	Z 0 to Z 7

#### Counting range

— adjustable	Yes
— lower limit	0
— upper limit	999

#### IEC counter

• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)

#### S7 times

• Number	2 048
<b>Retentivity</b>	
— adjustable	Yes
— lower limit	0
— upper limit	2 047
— preset	No retentivity

#### 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	all, max. 700 KB
<b>Flag</b>	
• Number, max.	8 192 byte
• Retentivity preset	MB 0 to MB 15
• Number of clock memories	8; 1 memory byte
<b>Data blocks</b>	
• Retentivity adjustable	Yes; via non-retain property on DB
• Retentivity preset	Yes
<b>Address area</b>	
<b>I/O address area</b>	
• Inputs	8 192 byte
• Outputs	8 192 byte
<b>Process image</b>	
• Inputs	8 192 byte
• Outputs	8 192 byte
• Inputs, adjustable	8 192 byte
• Outputs, adjustable	8 192 byte
• Inputs, default	1 024 byte
• Outputs, default	1 024 byte
<b>Subprocess images</b>	
• Number of subprocess images, max.	1; With PROFINET IO, the length of the user data is limited to 1600 bytes
<b>Digital channels</b>	
• Inputs	65 536
— of which central	1 024
• Outputs	65 536
— of which central	1 024
<b>Analog channels</b>	
• Inputs	4 096
— of which central	256
• Outputs	4 096
— of which central	256
<b>Hardware configuration</b>	
<b>Number of DP masters</b>	
• integrated	2
• via CP	4
<b>Number of operable FMs and CPs (recommended)</b>	
• FM	8
• CP, PtP	8
• CP, LAN	10

Rack	
• Racks, max.	4
• Modules per rack, max.	8
Time of day	
Clock	
• Hardware clock (real-time)	Yes
• retentive and synchronizable	Yes
• Backup time	6 wk; At 40 °C ambient temperature
• Deviation per day, max.	10 s; Typ.: 2 s
• Behavior of the clock following POWER-ON	Clock continues running after POWER OFF
• Behavior of the clock following expiry of backup period	Clock continues to run with the time at which the power failure occurred
Operating hours counter	
• Number	4
• Number/Number range	0 to 3
• Range of values	0 to 2 <sup>31</sup> hours (when using SFC 101)
• Granularity	1 h
• retentive	Yes; Must be restarted at each restart
Clock synchronization	
• supported	Yes
• to MPI, master	Yes
• to MPI, slave	Yes
• in AS, master	Yes
• in AS, slave	Yes
Digital inputs	
Number of digital inputs	0
Digital outputs	
Number of digital outputs	0
Analog inputs	
Number of analog inputs	0
Analog outputs	
Number of analog outputs	0
Interfaces	
Number of industrial Ethernet interfaces	1
Number of PROFINET interfaces	1
Number of RS 485 interfaces	2
Number of RS 422 interfaces	0
1. Interface	
Interface type	Integrated RS 485 interface

Physics	RS 485
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
<b>Protocols</b>	
• MPI	Yes
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes; A DP slave at both interfaces simultaneously is not possible
• Point-to-point connection	No
<b>MPI</b>	
• Transmission rate, max.	12 Mbit/s
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
— S7 communication, as client	No; but via CP and loadable FB
— S7 communication, as server	Yes
<b>PROFIBUS DP master</b>	
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	124
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	Yes; I blocks only
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes
— Equidistance	Yes
— Isochronous mode	No
— SYNC/FREEZE	Yes
— Activation/deactivation of DP slaves	Yes
— Number of DP slaves that can be simultaneously activated/deactivated, max.	8
— Direct data exchange (slave-to-slave communication)	Yes; as subscriber
— DPV1	Yes
<b>Address area</b>	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
<b>User data per DP slave</b>	

— Inputs, max.	244 byte
— Outputs, max.	244 byte
<b>PROFIBUS DP slave</b>	
• Transmission rate, max.	12 Mbit/s
• automatic baud rate search	Yes; only with passive interface
• Address area, max.	32
• User data per address area, max.	32 byte
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes; with interface active
— Global data communication	No
— S7 basic communication	No
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes; Connection configured on one side only
— Direct data exchange (slave-to-slave communication)	Yes
— DPV1	No
<b>Transfer memory</b>	
— Inputs	244 byte
— Outputs	244 byte

<b>2. Interface</b>	
Interface type	Integrated RS 485 interface
Physics	RS 485
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
<b>Protocols</b>	
• MPI	No
• PROFINET IO Controller	No
• PROFINET IO Device	No
• PROFINET CBA	No
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes; A DP slave at both interfaces simultaneously is not possible
• Open IE communication	No
• Web server	No
<b>PROFIBUS DP master</b>	
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	124
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes

— Global data communication	No
— S7 basic communication	Yes; I blocks only
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes; Connection configured on one side only
— Equidistance	Yes
— Isochronous mode	Yes; OB 61 - isochronous mode is possible either on DP or PROFINET IO (not simultaneously)
— SYNC/FREEZE	Yes
— Activation/deactivation of DP slaves	Yes
— Number of DP slaves that can be simultaneously activated/deactivated, max.	8
— Direct data exchange (slave-to-slave communication)	Yes; as subscriber
— DPV1	Yes
<b>Address area</b>	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
<b>User data per DP slave</b>	
— Inputs, max.	244 byte
— Outputs, max.	244 byte
<b>PROFIBUS DP slave</b>	
• GSD file	The latest GSD file is available at: <a href="http://www.siemens.com/profibus-gsd">http://www.siemens.com/profibus-gsd</a>
• Transmission rate, max.	12 Mbit/s
• automatic baud rate search	Yes; only with passive interface
• Address area, max.	32
• User data per address area, max.	32 byte
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes; with interface active
— Global data communication	No
— S7 basic communication	No
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes; Connection configured on one side only
— Direct data exchange (slave-to-slave communication)	Yes
— DPV1	No
<b>Transfer memory</b>	
— Inputs	244 byte
— Outputs	244 byte



### 3. Interface

Interface type	PROFINET
Physics	Ethernet RJ45
Isolated	Yes
automatic detection of transmission rate	Yes; 10/100 Mbit/s
Autonegotiation	Yes
Autocrossing	Yes
Change of IP address at runtime, supported	Yes
<b>Interface types</b>	
<ul style="list-style-type: none"> <li>• Number of ports</li> <li>• integrated switch</li> </ul>	<p>2</p> <p>Yes</p>
<b>Protocols</b>	
<ul style="list-style-type: none"> <li>• MPI</li> <li>• PROFINET IO Controller</li> <li>• PROFINET IO Device</li> <li>• PROFINET CBA</li> <li>• PROFIBUS DP master</li> <li>• PROFIBUS DP slave</li> <li>• Open IE communication</li> <li>• Web server</li> </ul>	<p>No</p> <p>Yes; Also simultaneously with I-Device functionality</p> <p>Yes; Also simultaneously with IO Controller functionality</p> <p>Yes</p> <p>No</p> <p>No</p> <p>Yes; Via TCP/IP, ISO on TCP, and UDP</p> <p>Yes</p>
<b>PROFINET IO Controller</b>	
<ul style="list-style-type: none"> <li>• Transmission rate, max.</li> </ul>	100 Mbit/s
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— S7 communication	Yes; with loadable FBs, max. configurable connections: 16, max. number of instances: 32
— Isochronous mode	Yes; OB 61 - isochronous mode is possible either on DP or PROFINET IO (not simultaneously)
— Open IE communication	Yes; Via TCP/IP, ISO on TCP, and UDP
— Shared device	Yes
— Prioritized startup	Yes
— Number of IO devices with prioritized startup, max.	32
— Number of connectable IO Devices, max.	256
— Of which IO devices with IRT, max.	64
— of which in line, max.	64
— Number of IO Devices with IRT and the option "high flexibility"	256
— of which in line, max.	61
— Number of connectable IO Devices for RT, max.	256
— of which in line, max.	256

— Activation/deactivation of IO Devices	Yes
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8
— IO Devices changing during operation (partner ports), supported	Yes
— Number of IO Devices per tool, max.	8
— Device replacement without swap medium	Yes
— Send cycles	250 $\mu$ s, 500 $\mu$ s, 1 ms; 2 ms, 4 ms (not in the case of IRT with "high flexibility" option)
— Updating time	250 $\mu$ s to 512 ms (depending on the operating mode, see Manual "S7-300 CPU 31xC and CPU 31x, technical Data" for more details)
<b>Address area</b>	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
— User data consistency, max.	1 024 byte
<b>PROFINET IO Device</b>	
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— S7 communication	Yes; with loadable FBs, max. configurable connections: 16, max. number of instances: 32
— Isochronous mode	No
— Open IE communication	Yes; Via TCP/IP, ISO on TCP, and UDP
— IRT	Yes
— PROFINergy	Yes; With SFB 73 / 74 prepared for loadable PROFINergy standard FB for I-Device
— Shared device	Yes
— Number of IO Controllers with shared device, max.	2
<b>Transfer memory</b>	
— Inputs, max.	1 440 byte; Per IO Controller with shared device
— Outputs, max.	1 440 byte; Per IO Controller with shared device
<b>Submodules</b>	
— Number, max.	64
— User data per submodule, max.	1 024 byte
<b>PROFINET CBA</b>	
• acyclic transmission	Yes
• cyclic transmission	Yes
<b>Open IE communication</b>	
• Number of connections, max.	32
• Local port numbers used at the system end	0, 20, 21, 23, 25, 80, 102, 135, 161, 443, 8080, 34962, 34963, 34964, 65532, 65533, 65534, 65535

- Keep-alive function, supported

Yes

## Protocols

### Redundancy mode

#### Media redundancy

- Switchover time on line break, typ. 200 ms; PROFINET MRP
- Number of stations in the ring, max. 50

### Open IE communication

- TCP/IP
  - Number of connections, max. 32
  - Data length for connection type 01H, max. 1 460 byte
  - Data length for connection type 11H, max. 32 768 byte
- ISO-on-TCP (RFC1006)
  - Number of connections, max. 32
  - Data length, max. 32 768 byte
- UDP
  - Number of connections, max. 32
  - Data length, max. 1 472 byte

### Web server

- supported Yes
- User-defined websites Yes
- Number of HTTP clients 5

## Isochronous mode

- Isochronous operation (application synchronized up to terminal) Yes; Via 2nd PROFIBUS DP or PROFINET interface

## Communication functions

- PG/OP communication Yes

- Data record routing Yes

### Global data communication

- supported Yes
- Number of GD loops, max. 8
- Number of GD packets, max. 8
- Number of GD packets, transmitter, max. 8
- Number of GD packets, receiver, max. 8
- Size of GD packets, max. 22 byte
- Size of GD packet (of which consistent), max. 22 byte

### S7 basic communication

- supported Yes
- User data per job, max. 76 byte
- User data per job (of which consistent), max. 76 byte; 76 bytes (with X\_SEND or X\_RCV); 64 bytes (with X\_PUT or X\_GET as server)

### S7 communication

• supported	Yes
• as server	Yes
• as client	Yes; via integrated PROFINET interface and loadable FB or via CP and loadable FB
• User data per job, max.	See online help of STEP 7 (shared parameters of the SFBs/FBs and of the SFCs/FCs of S7 Communication)
<b>S5 compatible communication</b>	
• supported	Yes; via CP and loadable FC
<b>PROFINET CBA (at set setpoint communication load)</b>	
• Setpoint for the CPU communication load	20 %
• Number of remote interconnection partners	32
• Number of functions, master/slave	50
• Total of all master/slave connections	3 000
• Data length of all incoming connections master/slave, max.	24 000 byte
• Data length of all outgoing connections master/slave, max.	24 000 byte
• Number of device-internal and PROFIBUS interconnections	1 000
• Data length of device-internal und PROFIBUS interconnections, max.	8 000 byte
• Data length per connection, max.	1 400 byte
<b>Remote interconnections with acyclic transmission</b>	
— Sampling frequency: Sampling time, min.	200 ms
— Number of incoming interconnections	100
— Number of outgoing interconnections	100
— Data length of all incoming interconnections, max.	3 200 byte
— Data length of all outgoing interconnections, max.	3 200 byte
— Data length per connection, max.	1 400 byte
<b>Remote interconnections with cyclic transmission</b>	
— Transmission frequency: Transmission interval, min.	1 ms
— Number of incoming interconnections	300
— Number of outgoing interconnections	300
— Data length of all incoming interconnections, max.	4 800 byte
— Data length of all outgoing interconnections, max.	4 800 byte
— Data length per connection, max.	450 byte
<b>HMI variables via PROFINET (acyclic)</b>	

— Number of stations that can log on for HMI variables (PN OPC/iMap)	3; 2x PN OPC/1x iMap
— HMI variable updating	500 ms
— Number of HMI variables	600
— Data length of all HMI variables, max.	9 600 byte

<b>PROFIBUS proxy functionality</b>	
— supported	Yes
— Number of linked PROFIBUS devices	32
— Data length per connection, max.	240 byte; Slave-dependent

<b>Number of connections</b>	
• overall	32
• usable for PG communication	31
— reserved for PG communication	1
— adjustable for PG communication, min.	1
— adjustable for PG communication, max.	31
• usable for OP communication	31
— reserved for OP communication	1
— adjustable for OP communication, min.	1
— adjustable for OP communication, max.	31
• usable for S7 basic communication	30
— reserved for S7 basic communication	0
— adjustable for S7 basic communication, min.	0
— adjustable for S7 basic communication, max.	30
• usable for S7 communication	16
— reserved for S7 communication	0
— adjustable for S7 communication, min.	0
— adjustable for S7 communication, max.	16
• total number of instances, max.	32
• usable for routing	X1 as MPI: max. 10; X1 as DP master: max. 24; X1 as DP slave (active): max. 14; X2 as DP master: max. 24; X2 as DP slave (active): max. 14; X3 as PROFINET: 48 max.

<b>S7 message functions</b>	
Number of login stations for message functions, max.	32; Depending on the configured connections for PG/OP and S7 basic communication
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	300

<b>Test commissioning functions</b>	
Status block	Yes; Up to 2 simultaneously
Single step	Yes
Number of breakpoints	4

Status/control	
• Status/control variable	Yes
• Variables	Inputs, outputs, memory bits, DB, times, counters
• Number of variables, max.	30
— of which status variables, max.	30
— of which control variables, max.	14
Forcing	
• Forcing	Yes
• Forcing, variables	Inputs, outputs
• Number of variables, max.	10
Diagnostic buffer	
• present	Yes
• Number of entries, max.	500
— adjustable	No
— of which powerfail-proof	100
• Number of entries readable in RUN, max.	499
— adjustable	Yes; From 10 to 499
— preset	10
Service data	
• can be read out	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	0 °C
• max.	60 °C
Configuration	
Configuration software	
• STEP 7	Yes; V5.5 or higher
Programming	
• Command set	see instruction list
• Nesting levels	8
• 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
Know-how protection	

- User program protection/password protection Yes
- Block encryption Yes; With S7 block Privacy

#### Dimensions

Width	120 mm
Height	125 mm
Depth	130 mm

#### Weights

Weight, approx.	1 250 g
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