SIEMENS

Datasheet 6ES7318-3EL01-0AB0

SIMATIC S7-300 CPU 319-3 PN/DP, CENTRAL PROCESSING UNIT WITH 2 MBYTE WORKING MEMORY, 1. INTERFACE MPI/DP 12MBIT/S, 2. INTERFACE DP-MASTER/SLAVE, 3. INTERFACE ETHERNET PROFINET, WITH 2 PORT SWITCH, MICRO MEMORY CARD NECESSARY

Product type designation	
General information	
Hardware product version	01
Firmware version	V3.2
Engineering with	
• Programming package	STEP7 V 5.5 or higher
Supply voltage	
Rated value (DC)	
• 24 V DC	Yes
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
External protection for supply cables (recommendation)	2 A min.
Mains buffering	
• Mains/voltage failure buffering time	5 ms
• Repeat rate, min.	1 s
Load voltage L+	
Digital inputs	
Load voltage L+	
Digital outputs	
Load voltage L+	
Analog outputs	
Load voltage L+	
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 $A^2 \cdot s$
Digital inputs	
Digital outputs	

Power losses	
Power loss, typ.	14 W

Memory	
Type of memory	other
Work memory	
• Integrated	2 048 kbyte
• expandable	No
• Size of retentive memory for retentive data blocks	700 kbyte
Load memory	
• pluggable (MMC)	Yes
• pluggable (MMC), max.	8 Mbyte
• Data management on MMC (after last programming), min.	10 y
Backup	
• present	Yes
• without battery	Yes

Battery	
Backup battery	

CPU processing times	
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

CPU-blocks	
Number of blocks (total)	4 096; (DBs, FCs, FBs); the maximum number of loadable blocks can be reduced by the MMC used.
DB	
• Number, max.	4 096; Number range: 1 to 16000
• Size, max.	64 kbyte
FB	
• Number, max.	4 096; Number range: 0 to 7999
• Size, max.	64 kbyte
FC	
• Number, max.	4 096; Number range: 0 to 7999

• Size, max.	64 kbyte
OB	
• Size, max.	64 kbyte
• Number of free cycle OBs	1; OB 1
• Number of time alarm OBs	1; OB 10
• Number of delay alarm OBs	2; OB 20, 21
• Number of time 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 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
Nesting depth	
• per priority class	16
• additional within an error OB	4

Counters, timers and their retentivity	
S7 counter	
• Number	2 048
of which retentive with battery	
of which retentive without battery	
Retentivity	
— can be set	Yes
— lower limit	0
— upper limit	2 047
— preset	Z 0 to Z 7
Counting range	
— can be set	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
of which retentive with battery	
of which retentive without battery	
Retentivity	
— can be set	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, total	All, max. 700 KB
Flag	
• Number, max.	8 192 byte
• Retentivity available	Yes; from MB 0 to MB 8191
• Retentivity preset	MB 0 to MB 15
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	4 096; Number range: 1 to 16000
• Size, max.	64 kbyte
• Retentivity adjustable	Yes; via non-retain property on DB
• Retentivity preset	Yes
Local data	
• per priority class, max.	32 768 byte; Max. 2048 bytes per block
Address area	
I/O address area	
• Inputs	8 192 byte
• Outputs	8 192 byte
of which, distributed	
— Inputs	8 192 byte
— Outputs	8 192 byte
Process image	
• Inputs	8 192 byte
• Outputs	8 192 byte
• Inputs, adjustable	8 192 byte
• Outputs, adjustable	8 192 byte
• Inputs, default	256 byte
• Outputs, default	256 byte
Default addresses of the integrated channels	
Subprocess images	

• Number of subprocess images, max.	1; With PROFINET IO, the length of the user data is limited to 1600 bytes
Digital channels	
• Inputs	65 536
• Outputs	65 536
• Inputs, of which central	1 024
• Outputs, of which central	1 024
Analog channels	
• Inputs	4 096
• Outputs	4 096
• Inputs, of which central	256
• Outputs, of which central	256
Addressing volume	
Address space per module	

Hardware configuration	
Number of DP masters	
• Integrated	2
• Via CP	4
Number of operable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10
Rack	
• Racks, max.	4
• Modules per rack, max.	8

Time of day	
Clock	
• Hardware clock (real-time clock)	Yes
• battery-backed and synchronizable	Yes
• Deviation per day, max.	10 s; Typ.: 2 s
• Backup time	6 wk; At 40 °C ambient temperature
• 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 2^31 hours (when using SFC 101)
• Granularity	1 hour
• retentive	Yes; Must be restarted at each restart
Clock synchronization	

• supported	Yes
• to MPI, master	Yes
• to MPI, slave	Yes
• to DP, master	Yes; With DP slave only slave clock
• to DP, slave	Yes
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes; As client

Digital inputs	
Number of digital inputs	0
Number of simultaneously controllable inputs	
all mounting positions	
horizontal installation	
vertical installation	
Input voltage	
Input current	
Input delay (for rated value of input voltage)	
for standard inputs	
for interrupt inputs	
for counter/technological functions	
Cable length	
Technological functions	
Standard DI	

Digital outputs	
Number of digital outputs	0
Switching capacity of the outputs	
Load resistance range	
Output voltage	
Output current	
Parallel switching of 2 outputs	
Switching frequency	
Aggregate current of outputs (per group)	
all mounting positions	
horizontal installation	
vertical installation	
all other mounting positions	
Integrated high-speed cams	
Cable length	

Analog inputs	
Number of analog inputs	0
Input ranges	

Input ranges (rated values), voltages	
Input ranges (rated values), currents	
Input ranges (rated values), resistance thermometer	
Input ranges (rated values), resistors	
Thermocouple (TC)	
Temperature compensation	
Characteristic linearization	
Cable length	

Analog outputs	
Number of analog outputs	0
Output ranges, voltage	
Output ranges, current	
Connection of actuators	
Load impedance (in rated range of output)	
Destruction limits against externally applied voltages and currents	
Cable length	

Analog value creation	
Integration and conversion time/resolution per channel	
Settling time	

Encoder	
Connection of signal encoders	
Connectable encoders	

Errors/accuracies	
Operational limit in overall temperature range	
Basic error limit (operational limit at 25 °C)	
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency	

Interfaces	
Number of USB interfaces	0
Number of parallel interfaces	0
Number of 20 mA interfaces (TTY)	0
Number of RS 232 interfaces	0
Number of RS 422 interfaces	0
Number of other interfaces	1; Ethernet, 2-port switch, 2*RJ45
PROFIBUS DP	
MPI	
Point-to-point	
Integrated protocol driver	
Transmission speed, RS 422/485	

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
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes; A DP slave at both interfaces simultaneously is not possible
• Point-to-point connection	No
MPI	
• 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	No; but via CP and loadable FB
— S7 communication, as server	Yes
DP master	
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	124
Services	
— 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 mode support	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
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
User data per DP slave	
— Inputs, max.	244 byte

— Outputs, max.	244 byte
DP slave	
• 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
Services	
— 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
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte

2. Interface	
Interface type	Integrated RS 485 interface
Physics	RS 485
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
Media redundancy	
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes; A DP slave at both interfaces simultaneously is not possible
• PROFINET IO Controller	No
• PROFINET IO Device	No
• PROFINET CBA	No
• Open IE communication	No
• Web server	No
DP master	
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	124
Services	
— 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 mode support	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
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
User data per DP slave	
— Inputs, max.	244 byte
— Outputs, max.	244 byte
DP slave	
• GSD file	The latest GSD file is available at: http://www.siemens.com/profibus-gsd
• 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
Services	
— 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
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte

PROFINET IO Controller	
Services	
Address area	
PROFINET IO Device	
Services	
Transfer memory	
Submodules	
PROFINET CBA	
Point-to-point connection	
Open IE communication	

3. Interface	
Interface type	PROFINET
Physics	Ethernet RJ45
Isolated	Yes
Integrated switch	Yes
Number of ports	2
Automatic detection of transmission speed	Yes; 10/100 Mbit/s
Autonegotiation	Yes
Autocrossing	Yes
Change of IP address at runtime, supported	Yes
Media redundancy	
• supported	Yes
• Switchover time on line break, typically	200 ms; PROFINET MRP
• Number of stations in the ring, max.	50
Functionality	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO Controller	Yes; Also simultaneously with I-Device functionality
• PROFINET IO Device	Yes; Also simultaneously with IO Controller functionality
• PROFINET CBA	Yes
• Open IE communication	Yes; Via TCP/IP, ISO on TCP, and UDP
• Web server	Yes
— Number of HTTP clients	5
PROFINET IO Controller	
• Transmission rate, max.	100 Mbit/s
• Number of connectable IO devices, max.	256
• Max. number of connectable IO devices for RT	256
— of which in line, max.	256
• Number of IO devices with IRT and the option "high flexibility"	256
— of which in line, max.	61

• Number of IO Devices with IRT and the option "high performance", max.	64
— of which in line, max.	64
• Shared device, supported	Yes
• Prioritized startup supported	Yes
— Number of IO Devices, max.	32
• Activation/deactivation of IO Devices	Yes
— Maximum number of IO devices that can be activated/deactivated at the same time.	8
• IO Devices changing during operation (partner ports), supported	Yes
— Max. number of IO devices per tool	8
• Device replacement without swap medium	Yes
• Send cycles	250 µs, 500 µs,1 ms; 2 ms, 4 ms (not in the case of IRT with "high flexibility" option)
• Updating time	250 µs to 512 ms (depending on the operating mode, see Manual "S7-300 CPU 31xC and CPU 31x, Technical Data" for more details)
Services	
— 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
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
— User data consistency, max.	1 024 byte
PROFINET IO Device	
Services	
— 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
— PROFIenergy, supported	Yes; With SFB 73 / 74 prepared for loadable PROFIenergy standard FB for I-Device
— Shared device	Yes

— Number of IO controllers with shared device, max.	2
Transfer memory	
— Inputs, max.	1 440 byte; Per IO Controller with shared device
— Outputs, max.	1 440 byte; Per IO Controller with shared device
Submodules	
— Number, max.	64
— User data per submodule, max.	1 024 byte
PROFINET CBA	
• acyclic transmission	Yes
• Cyclic transmission	Yes
Open IE communication	
• Open IE communication, supported	Yes
• 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
PROFINET CBA (at 50% communication load)	

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)
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Standard communication (FMS)	
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
— 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
— Several passive connections per port, supported	Yes
• ISO-on-TCP (RFC1006)	Yes; via integrated PROFINET interface and loadable FBs
— Number of connections, max.	32
— Data length, max.	32 768 byte
• UDP	Yes; via integrated PROFINET interface and loadable FBs
— Number of connections, max.	32
— Data length, max.	1 472 byte
Web server	
• supported	Yes
• Number of HTTP clients	5
• User-defined websites	Yes
PROFINET CBA (at set setpoint communication load)	
• 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
Remote interconnections with acyclic transmission	
— 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
Remote interconnections with cyclic transmission	
— 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
HMI variables via PROFINET (acyclic)	
— 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
PROFIBUS proxy functionality	
— supported	Yes
— Number of linked PROFIBUS devices	32
— Data length per connection, max.	240 byte; Slave-dependent
Number of connections	
• 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
• Max. total number of instances	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.

S7 message functions	
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

Test commissioning functions	
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
• Force, variables	Inputs, outputs
• Number of variables, max.	10
Diagnostic buffer	
• present	Yes
• Number of entries, max.	500
— can be set	No
— Of which powerfail-proof	100
• Number of entries readable in RUN, max.	499
— can be set	Yes; From 10 to 499
— preset	10
Service data	
• Can be read out	Yes

Interrupts/diagnostics/status information
Alarms
Diagnostic messages
Diagnostics indication LED

Galvanic isolation
Galvanic isolation digital inputs
Galvanic isolation digital outputs

Galvanic isolation analog inputs	
Galvanic isolation analog outputs	

Standards, approvals, certificates	
Marine approval	
Use in hazardous areas	

Ambient conditions	
Ambient temperature in operation	
• during operating phase, minimum	0 °C
• max.	60 °C
Extended ambient conditions	
Relative humidity	
Resistance	

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
Software libraries	
Know-how protection	
• User program protection/password protection	Yes
• Block encryption	Yes; With S7 block Privacy
Cycle time monitoring	

Dimensions	
Width	120 mm
Height	125 mm
Depth	130 mm

Weights	
Weight, approx.	1 250 g
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