# SIEMENS

SIMATIC DP, IM151-8F PN/DP CPU f. ET200S, 256 KB work memory, int. PROFINET interface (with three RJ45 ports) as IO controller/I-device without battery, MMC required

| General information | |
|---|---|
| HW functional status | 01 |
| Firmware version | V3.2 |
| Engineering with | |
| ● Programming package | STEP 7 V5.5 or higher, Distributed Safety V5.4 SP4 |

| Supply voltage | |
|---|---|
| Rated value (DC) | 24 V |
| permissible range, lower limit (DC) | 20.4 V |
| permissible range, upper limit (DC) | 28.8 V |
| Reverse polarity protection | Yes; against destruction |
| external protection for power supply lines (recommendation) | 2 A min. |
| Mains buffering | |
| ● Mains/voltage failure stored energy time | 5 ms |

| Input current | |
|---|---|
| Inrush current, max. | 1.8 A; Typical |
| I²t | 0.13 A²·s |
| from supply voltage 1L+, max. | 352 mA; 426 mA with DP master module |

## Output current

| | |
|---|---|
| for backplane bus (5 V DC), max. | 700 mA |

## Power loss

| | |
|---|---|
| Power loss, typ. | 5.5 W |

## Memory

### Work memory

| | |
|---|---|
| • integrated | 256 kbyte; For program and data |
| • expandable | No |
| • Size of retentive memory for retentive data blocks | 64 kbyte |

### Load memory

| | |
|---|---|
| • Plug-in (MMC) | Yes |
| • Plug-in (MMC), max. | 8 Mbyte |
| • Data management on MMC (after last programming), min. | 10 y |

### Backup

| | |
|---|---|
| • present | Yes; Ensured by SIMATIC Micro Memory Card (maintenance-free) |

## CPU processing times

| | |
|---|---|
| for bit operations, typ. | 0.06 µs |
| for word operations, typ. | 0.12 µs |
| for fixed point arithmetic, typ. | 0.16 µs |
| for floating point arithmetic, typ. | 0.59 µs |

## CPU-blocks

| | |
|---|---|
| Number of blocks (total) | 1 024; (DBs, FCs, FBs); the maximum number of loadable blocks can be reduced by the MMC used. |

### DB

| | |
|---|---|
| • Number, max. | 1 024; Number range: 1 to 16000 |
| • Size, max. | 64 kbyte |

### FB

| | |
|---|---|
| • Number, max. | 1 024; Number range: 0 to 7999 |
| • Size, max. | 64 kbyte |

### FC

| | |
|---|---|
| • Number, max. | 1 024; Number range: 0 to 7999 |
| • Size, max. | 64 kbyte |

### OB

| | |
|---|---|
| • Description | See S7-300 operation list |
| • 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 |

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| | |
|---|---|
| • Number of cyclic interrupt OBs | 4; OB 32, 33, 34, 35 |
| • 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; only for PROFINET |
| • Number of startup OBs | 1; OB 100 |
| • Number of asynchronous error OBs | 6; OB 80, 82, 83, 85, 86, 87 (OB83 only for centralized I/O and 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 | 256 |
| **Retentivity** | |
| — adjustable | Yes |
| — lower limit | 0 |
| — upper limit | 255 |
| — 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 | 256 |
| **Retentivity** | |
| — adjustable | Yes |
| — lower limit | 0 |
| — upper limit | 255 |
| — 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

### Flag

| | |
|---|---|
| ● Number, max. | 256 byte |
| ● Retentivity available | Yes |
| ● Retentivity preset | MB 0 to MB 15 |
| ● Number of clock memories | 8; 1 memory byte |

### Data blocks

| | |
|---|---|
| ● 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 | 2 048 byte |
| ● Outputs | 2 048 byte |

### of which distributed

| | |
|---|---|
| — Inputs | 2 048 byte |
| — Outputs | 2 048 byte |

### Process image

| | |
|---|---|
| ● Inputs, adjustable | 2 048 byte |
| ● Outputs, adjustable | 2 048 byte |
| ● Inputs, default | 128 byte |
| ● Outputs, default | 128 byte |

### 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 | 16 336 |
| — of which central | 496 |
| ● Outputs | 16 336 |
| — of which central | 496 |

### Analog channels

| | |
|---|---|
| ● Inputs | 1 021 |
| — of which central | 124 |
| ● Outputs | 1 021 |
| — of which central | 124 |

## Hardware configuration

| | |
|---|---|
| Number of modules per system, max. | 63; Centralized |

### Mounting rail

| | |
|---|---|
| ● Number of mounting rails that can be used | 1 |
| ● Length of mounting rail, max. | Station width: ≤ 1 m or < 2 m |

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## Time of day

### Clock

| | |
|---|---|
| ● Hardware clock (real-time) | Yes |
| ● retentive and synchronizable | Yes |
| ● Backup time | 6 wk; At 40 °C ambient temperature, typically |
| ● 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 | 1 |
| ● Number/Number range | 0 |
| ● Range of values | 0 to 2^31 hours (when using SFC 101) |
| ● Granularity | 1 h |
| ● retentive | Yes; Must be restarted at each restart |

### Clock synchronization

| | |
|---|---|
| ● supported | Yes |
| ● to MPI, master | No |
| ● to MPI, slave | No |
| ● to DP, master | Yes; With DP master module |
| ● to DP, slave | Yes; With DP master module |
| ● in AS, master | No |
| ● in AS, slave | No |
| ● on Ethernet via NTP | Yes; As client |

## Interfaces

| | |
|---|---|
| Number of industrial Ethernet interfaces | 1 |
| Number of PROFINET interfaces | 3 |
| Number of wireless interfaces | 0 |

## 1. Interface

| | |
|---|---|
| Interface type | PROFINET |
| Physics | Ethernet |
| Isolated | Yes |
| automatic detection of transmission rate | Yes |
| Autonegotiation | Yes |
| Autocrossing | Yes |
| Change of IP address at runtime, supported | Yes |

### Interface types

| | |
|---|---|
| ● Number of ports | 3; RJ45 |
| ● integrated switch | Yes |

### Protocols

| | |
|---|---|
| ● MPI | No |

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| | |
|---|---|
| • PROFINET IO Controller | Yes; Also simultaneously with IO-Device functionality |
| • PROFINET IO Device | Yes; Also simultaneously with IO Controller functionality |
| • PROFINET CBA | Yes |
| • PROFIBUS DP master | No |
| • PROFIBUS DP slave | No |
| • Open IE communication | Yes; Via TCP/IP, ISO on TCP, and UDP |
| • Web server | Yes |
| • Point-to-point connection | No |
| **PROFINET IO Controller** | |
| • Transmission rate, max. | 100 Mbit/s; full duplex |
| **Services** | |
| — PG/OP communication | Yes |
| — Routing | Yes; With DP master module |
| — S7 communication | Yes; with loadable FBs |
| — Isochronous mode | Yes; OB 61; only for PROFINET IO |
| — Open IE communication | Yes; Via TCP/IP, ISO on TCP, and UDP |
| — IRT | Yes |
| — MRP | Yes |
| — Shared device | Yes |
| — Prioritized startup | Yes |
| — Number of IO devices with prioritized startup, max. | 32 |
| — Number of connectable IO Devices, max. | 128 |
| — 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" | 128 |
| — of which in line, max. | 61 |
| — Number of connectable IO Devices for RT, max. | 128 |
| — of which in line, max. | 128 |
| — 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 µs, 500 µs,1 ms; 2 ms, 4 ms (not in the case of IRT with "high flexibility" option) |
| — Updating time | Minimum value depends on communication share set for PROFINET I/O, on the number of I/O devices, and on the number of configured user data items. |

| | |
|---|---|
| — Updating times | 250 µs to 512 ms (depends on operating mode; for more details, refer to Operating Instructions, "Interface Module IM151-8 PN/DP CPU") |
| **Address area** | |
| — Inputs, max. | 2 kbyte |
| — Outputs, max. | 2 kbyte |
| — User data consistency, max. | 1 024 byte; with PROFINET I/O |
| **PROFINET IO Device** | |
| **Services** | |
| — PG/OP communication | Yes |
| — Routing | Yes |
| — S7 communication | Yes; with loadable FBs |
| — Isochronous mode | No |
| — Open IE communication | Yes; Via TCP/IP, ISO on TCP, and UDP |
| — IRT | Yes |
| — MRP | Yes |
| — PROFIenergy | 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** | |
| • Number of connections, max. | 8 |
| • 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 |
| **2. Interface** | |
| Interface type | External interface via master module 6ES7138-4HA00-0AB0 |
| Physics | RS 485 |
| Isolated | Yes |
| Power supply to interface (15 to 30 V DC), max. | No |
| **Protocols** | |
| • MPI | No |
| • PROFINET IO Controller | No |

| | |
|---|---|
| • PROFINET IO Device | No |
| • PROFINET CBA | No |
| • PROFIBUS DP master | Yes |
| • PROFIBUS DP slave | No |
| • Open IE communication | No |
| • Web server | No |
| **PROFIBUS DP master** | |
| • Transmission rate, max. | 12 Mbit/s |
| • Number of DP slaves, max. | 32; Per station |
| **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 | 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 |
| — DPV1 | Yes |
| **Address area** | |
| — Inputs, max. | 2 048 byte |
| — Outputs, max. | 2 048 byte |
| **User data per DP slave** | |
| — Inputs, max. | 244 byte |
| — Outputs, max. | 244 byte |
| **Protocols** | |
| **Open IE communication** | |
| • TCP/IP | Yes; via integrated PROFINET interface and loadable FBs |
| — Number of connections, max. | 8 |
| — 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 |

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| | |
|---|---|
| — Number of connections, max. | 8 |
| — Data length, max. | 32 768 byte |
| • UDP | Yes; via integrated PROFINET interface and loadable FBs |
| — Number of connections, max. | 8 |
| — Data length, max. | 1 472 byte |

| Web server | |
|---|---|
| • supported | Yes |
| • User-defined websites | Yes |
| • Number of HTTP clients | 5 |

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

| Isochronous mode | |
|---|---|
| Isochronous operation (application synchronized up to terminal) | No |

| Communication functions | |
|---|---|
| PG/OP communication | Yes |
| Data record routing | Yes; With DP master module |

| Global data communication | |
|---|---|
| • supported | No |

| S7 basic communication | |
|---|---|
| • supported | Yes; I blocks |
| • User data per job, max. | 76 byte |
| • User data per job (of which consistent), max. | 76 byte |

| S7 communication | |
|---|---|
| • supported | Yes |
| • as server | Yes |
| • as client | Yes; via integrated PROFINET interface and loadable FBs |
| • 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) |

| PROFINET CBA (at set setpoint communication load) | |
|---|---|
| • Setpoint for the CPU communication load | 50 % |
| • Number of remote interconnection partners | 32 |
| • Number of functions, master/slave | 30 |
| • Total of all master/slave connections | 1 000 |
| • Data length of all incoming connections master/slave, max. | 4 000 byte |
| • Data length of all outgoing connections master/slave, max. | 4 000 byte |
| • Number of device-internal and PROFIBUS interconnections | 500 |

| | |
|---|---|
| ● Data length of device-internal und PROFIBUS interconnections, max. | 4 000 byte |
| ● Data length per connection, max. | 1 400 byte |
| **Remote interconnections with acyclic transmission** | |
| — Sampling frequency: Sampling time, min. | 500 ms |
| — Number of incoming interconnections | 100 |
| — Number of outgoing interconnections | 100 |
| — Data length of all incoming interconnections, max. | 2 000 byte |
| — Data length of all outgoing interconnections, max. | 2 000 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 | 200 |
| — Number of outgoing interconnections | 200 |
| — Data length of all incoming interconnections, max. | 2 000 byte |
| — Data length of all outgoing interconnections, max. | 2 000 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 | 200 |
| — Data length of all HMI variables, max. | 2 000 byte |
| **PROFIBUS proxy functionality** | |
| — supported | Yes |
| — Number of linked PROFIBUS devices | 16 |
| — Data length per connection, max. | 240 byte; Slave-dependent |
| **iPAR server** | |
| ● supported | Yes |
| **Number of connections** | |
| ● overall | 12 |
| ● usable for PG communication | 11 |
| — reserved for PG communication | 1 |
| — adjustable for PG communication, min. | 1 |
| — adjustable for PG communication, max. | 11 |
| ● usable for OP communication | 11 |
| — reserved for OP communication | 1 |

| | |
|---|---|
| — adjustable for OP communication, min. | 1 |
| — adjustable for OP communication, max. | 11 |
| • usable for S7 basic communication | 10 |
| — reserved for S7 basic communication | 0 |
| — adjustable for S7 basic communication, min. | 0 |
| — adjustable for S7 basic communication, max. | 10 |
| • usable for S7 communication | 10; with loadable FBs |
| — adjustable for S7 communication, max. | 10 |
| • total number of instances, max. | 32 |
| • usable for routing | 4; max. |

## S7 message functions

| | |
|---|---|
| Number of login stations for message functions, max. | 12; Depending on the configured connections for PG/OP and S7 basic communication |
| Process diagnostic messages | Yes; ALARM_S, ALARM_SC, ALARM_SQ, ALARM_D, ALARM_DQ |
| 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 |
| • Forcing, variables | I/O |
| • Number of variables, max. | 10 |
| Diagnostic buffer | |
| • present | Yes |
| • Number of entries, max. | 500 |
| — adjustable | No |
| — of which powerfail-proof | 100; Only the last 100 entries are retained |

## Interrupts/diagnostics/status information

| | |
|---|---|
| Alarms | Yes |
| Diagnostics function | Yes |
| Diagnostics indication LED | |

| | |
|---|---|
| • for maintenance | Yes; MT |
| • Bus fault BF (red) | Yes; BF-PN |
| • Group error SF (red) | Yes |
| • Monitoring 24 V voltage supply ON (green) | Yes |
| • Bus activity PROFINET (green) | Yes; P1-/P2-/P3-Link |

## Potential separation

| | |
|---|---|
| between PROFIBUS DP and all other circuit components | Yes |

## Permissible potential difference

| | |
|---|---|
| between different circuits | 75 V DC/60 V AC |

## Isolation

| | |
|---|---|
| Isolation tested with | 500 V DC |

## Degree and class of protection

| | |
|---|---|
| IP degree of protection | IP20 |

## 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; Optional |
| — CFC | Yes; Optional |
| — GRAPH | Yes; Optional |
| — HiGraph® | Yes; Optional |

### Know-how protection

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

### Cycle time monitoring

| | |
|---|---|
| • lower limit | 1 ms |
| • upper limit | 6 000 ms |
| • adjustable | Yes |
| • preset | 150 ms |

## Dimensions

| | |
|---|---|
| Width | 120 mm; DP master module: 35 mm |

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| | |
|---|---|
| Height | 119.5 mm |
| Depth | 75 mm |
| **Weights** | |
| Weight, approx. | 320 g; DP master module: Approx. 100 g |
| **last modified:** | 11/05/2018 |