# SIEMENS

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**Product data sheet**                                       **6ES7313-5BF03-0AB0**

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**SIMATIC S7-300, CPU 313C, COMPACT CPU WITH MPI, 24 DI/16 DO, 4AI, 2AO 1 PT100, 3 FAST COUNTERS (30 KHZ), INTEGRATED 24V DC POWER SUPPLY, 64KBYTE WORKING MEMORY, FRONT CONNECTOR (2 X 40PIN) AND MICRO MEMORY CARD REQUIRED**

| | |
|---|---|
| Product version | |
| Hardware product version | 01 |
| Firmware version | V2.6 |
| associated programming package | STEP 7 V5.3 SP2 or higher with HW update |
| Supply voltages | |
| Rated value | |
| 24 V DC | Yes |
| permissible range, lower limit (DC) | 20.4 V |
| permissible range, upper limit (DC) | 28.8 V |
| external protection for supply cables (recommendation) | Miniature circuit breaker, type C; min. 2 A; miniature circuit breaker type B, min. 4 A |
| | |
| Load voltage L+ | |
| Rated value (DC) | 24 V |
| permissible range, lower limit (DC) | 20.4 V |
| permissible range, upper limit (DC) | 28.8 V |
| Current consumption | |
| Current consumption (rated value) | 700 mA |
| Current consumption (in no-load operation), typ. | 150 mA |
| Inrush current, typ. | 11 A |
| I²t | 0.7 A²·s |
| from supply voltage L+, max. | 700 mA |
| Power losses | |
| Power loss, typ. | 14 W |
| Memory | |
| Work memory | |
| integrated | 64 Kibyte ; For program and data |
| expandable | No |
| Load memory | |

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|---|---|
| pluggable (MMC) | Yes |
| pluggable (MMC), max. | 8 Mbyte |
| Data management on MMC (after last programming), min. | 10 a |
| Backup | |
| present | Yes ; guaranteed by MMC (maintenance-free) |
| without battery | Yes ; Program and data |
| CPU/ blocks | |
| Number of blocks (total) | 1024 ; (DBs, FCs, FBs) the maximum number of loadable blocks can be reduced by the MMC used. |
| DB | |
| Number, max. | 511 ; Number range: 1 to 511 |
| Size, max. | 16 Kibyte |
| FB | |
| Number, max. | 1024 ; Sequence of numbers:  0 to 2047 |
| Size, max. | 16 Kibyte |
| FC | |
| Number, max. | 1024 ; Sequence of numbers:  0 to 2047 |
| Size, max. | 16 Kibyte |
| OB | |
| Size, max. | 16 Kibyte |
| Number of free cycle OBs | 1 ; OB 1 |
| Number of time alarm OBs | 1 ; OB 10 |
| Number of delay alarm OBs | 1 ; OB 20 |
| Number of time alarm OBs | 1 ; OB 35 |
| Number of process alarm OBs | 1 ; OB 40 |
| Number of startup OBs | 1 ; OB 100 |
| Number of asynchronous error OBs | 4 ; OB 80, 82, 85, 87 |
| Number of synchronous error OBs | 2 ; OB 121, 122 |
| Nesting depth | |
| per priority class | 8 |
| additional within an error OB | 4 |
| CPU processing times | |
| for bit operations, min. | 0.1 µs |
| for bit operations, max. | 0.2 µs |
| for word operations, min. | 0.2 µs |

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| for fixed point arithmetic, min. | 2 µs |
| for floating point arithmetic, min. | 3 µs |
| Counters, timers and their retentivity | |
| S7 counter | |
| Number | 256 |
| of which retentive without battery | |
| can be set | Yes |
| lower limit | 0 |
| upper limit | 255 |
| preset | 8 |
| Retentivity | |
| can be set | Yes |
| lower limit | 0 |
| upper limit | 255 |
| preset | 8 |
| Counting range | |
| lower limit | 0 |
| upper limit | 999 |
| IEC counter | |
| present | Yes |
| Type | SFB |
| Number | Unlimited (limited only by RAM capacity) |
| S7 times | |
| Number | 256 |
| of which retentive without battery | |
| can be set | Yes |
| lower limit | 0 |
| upper limit | 255 |
| Retentivity | |
| can be set | Yes |
| lower limit | 0 |
| upper limit | 255 |
| preset | no retentivity |
| Time range | |
| lower limit | 10 ms |

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|---|---|
| upper limit | 9990 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 ; MB 0 to MB 255 |
| Retentivity preset | MB 0 to MB 15 |
| Number of clock memories | 8 ; 1 memory byte |
| Data blocks | |
| Number, max. | 511 ; from DB1 to DB511 |
| Size, max. | 16 Kibyte |
| Retentivity adjustable | Yes ; via non-retain property on DB |
| Retentivity preset | yes |
| Local data | |
| per priority class, max. | 510 byte |
| Address area | |
| I/O address area | |
| Inputs | 1 Kibyte |
| Outputs | 1 Kibyte |
| Process image | |
| Inputs | 128 byte |
| Outputs | 128 byte |
| Digital channels | |
| Inputs | 1016 |
| Outputs | 1008 |
| Inputs, of which central | 1016 |
| Outputs, of which central | 1008 |
| Analog channels | |
| Inputs | 253 |
| Outputs | 250 |
| Inputs, of which central | 253 |
| Outputs, of which central | 250 |

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|---|---|
| Hardware configuration | |
| Racks, max. | 4 |
| Modules per rack, max. | 8 ; in rack 3 max. 7 |
| Number of DP masters | |
| integrated | none |
| via CP | 4 |
| Number of operable FMs and CPs (recommended) | |
| FM | 8 |
| CP, point-to-point | 8 |
| CP, LAN | 6 |
| Time of day | |
| Clock | |
| Hardware clock (real-time clock) | Yes |
| battery-backed and synchronizable | Yes |
| Backup time | 6 wk ; at 40°C ambient temperature |
| Deviation per day, max. | 10 s |
| Runtime meter | |
| Number | 1 |
| Number/Number range | 0 |
| 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 |
| in AS, master | Yes |
| S7 message functions | |
| Number of login stations for message functions, max. | 8 ; Depending on the connections configured for PG/OP and S7 basic communication |
| Process diagnostic messages | Yes |
| simultaneously active Alarm-S blocks, max. | 20 |
| Test commissioning functions | |
| Status/control | |
| Status/control variable | Yes |

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|---|---|
| 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 |
| Status block | Yes |
| Single step | Yes |
| Number of breakpoints | 2 |
| Diagnostic buffer | |
| present | Yes |
| Number of entries, max. | 100 |
| Communication functions | |
| PG/OP communication | Yes |
| Routing | No |
| Global data communication | |
| supported | Yes |
| Number of GD loops, max. | 4 |
| Number of GD packets, max. | 4 |
| Number of GD packets, transmitter, max. | 4 |
| Number of GD packets, receiver, max. | 4 |
| 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 CP and loadable FB |
| User data per job, max. | 180 byte ; With PUT/GET |
| User data per job (of which consistent), max. | 64 byte |
| S5-compatible communication | |

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|---|---|
| supported | Yes ; via CP and loadable FC |
| Number of connections | |
| overall | 8 |
| usable for PG communication | 7 |
| reserved for PG communication | 1 |
| Adjustable for PG communication, max. | 7 |
| usable for OP communication | 7 |
| reserved for OP communication | 1 |
| adjustable for OP communication, max. | 7 |
| usable for S7 basic communication | 4 |
| Reserved for S7 basic communication | 0 |
| adjustable for S7 basic communication, max. | 4 |
| usable for routing | No |
| Connection method | |
| required front connector | 2x 40-pin |
| MPI | |
| Cable length, max. | 50 m ; without repeater |
| 1st interface | |
| Type of interface | Integrated RS 485 interface |
| Physics | RS 485 |
| Isolated | No |
| Power supply to interface (15 to 30 V DC), max. | 200 mA |
| Functionality | |
| MPI | Yes |
| DP master | No |
| DP slave | No |
| Point-to-point connection | No |
| MPI | |
| Number of connections | 8 |
| Services | |
| PG/OP communication | Yes |
| Routing | No |
| Global data communication | Yes |
| S7 basic communication | Yes |
| S7 communication | Yes |

| | |
|---|---|
| S7 communication, as client | No |
| S7 communication, as server | Yes |
| Transmission rate, max. | 187.5 kbit/s |
| CPU/ programming | |
| Programming language | |
| STEP 7 | Yes ; V5.3 SP2 with HW update |
| LAD | Yes |
| FBD | Yes |
| STL | Yes |
| SCL | Yes |
| GRAPH | Yes |
| HiGraph® | Yes |
| Command set | see instruction list |
| Nesting levels | 8 |
| Know-how protection | |
| User program protection/password protection | Yes |
| System functions (SFC) | see instruction list |
| System function blocks (SFB) | see instruction list |
| Digital inputs | |
| Number of inputs | 24 |
| of which, inputs usable for technological functions | 12 |
| Number of simultaneously controllable inputs | |
| horizontal installation | |
| up to 40 °C, max. | 24 |
| up to 60 °C, max. | 12 |
| vertical installation | |
| up to 40 °C, max. | 12 |
| Technological functions | |
| shielded, max. | 100 m |
| unshielded, max. | not allowed |
| Standard DI | |
| shielded, max. | 1000 m |
| unshielded, max. | 600 m |
| Input characteristic curve acc. to IEC 1131, Type 1 | Yes |
| Input voltage | |

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| Rated value, DC | 24 V |
| for signal "0" | -3 to +5 V |
| for signal "1" | 15 to 30 V |
| Input current | |
| for signal "1", typ. | 9 mA |
| Input delay (for rated value of input voltage) | |
| for standard inputs | |
| parameterizable | Yes ; 0.1 / 0.3 / 3 / 15 ms |
| Rated value | 3 ms |
| for counter/technological functions | |
| at "0" to "1", max. | 16 µs |
| Cable length | |
| Cable length, shielded, max. | 1000 m ; 100 m for technological functions |
| Cable length unshielded, max. | 600 m ; For technological functions: No |
| Digital outputs | |
| Number of digital outputs | 16 |
| of which high-speed outputs | 4 |
| Short-circuit protection of the output | Yes ; clocked electronically |
| Response threshold, typ. | 1 A |
| Limitation of inductive shutdown voltage to | L+ (-48 V) |
| Lamp load, max. | 5 W |
| Controlling a digital input | Yes |
| Output voltage | |
| for signal "1", min. | L+ (-0.8 V) |
| Output current | |
| for signal "1" rated value | 500 mA |
| for signal "1" permissible range, min. | 5 mA |
| for signal "1" permissible range, max. | 0.6 A |
| for signal "1" minimum load current | 5 mA |
| for signal "0" residual current, max. | 0.5 mA |
| Parallel switching of 2 outputs | |
| for increased power | No |
| for redundant control of a load | Yes |
| Switching frequency | |
| with resistive load, max. | 100 Hz |

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| with inductive load, max. | 0.5 Hz |
| on lamp load, max. | 100 Hz |
| of the pulse outputs, with resistive load, max. | 2.5 kHz |
| Aggregate current of outputs (per group) | |
| horizontal installation | |
| up to 40 °C, max. | 3 A |
| up to 60 °C, max. | 2 A |
| vertical installation | |
| up to 40 °C, max. | 2 A |
| Load resistance range | |
| lower limit | 48 $\Omega$ |
| upper limit | 4 k$\Omega$ |
| Cable length | |
| Cable length, shielded, max. | 1000 m |
| Cable length unshielded, max. | 600 m |
| Analog inputs | |
| Number of analog inputs for voltage/current measurement | 4 |
| Number of analog inputs for resistance/temperature measurement | 1 |
| Cable length, shielded, max. | 100 m |
| permissible input frequency for current input (destruction limit), max. | 5 V ; permanent |
| permissible input current for voltage input (destruction limit), max. | 0.5 mA ; permanent |
| Technical unit for temperature measurement adjustable | Yes ; Degrees Celsius / degrees Fahrenheit / Kelvin |
| Input ranges | |
| Current | Yes |
| Resistance thermometer | Yes |
| Resistance | Yes |
| Input ranges (rated values), voltages | |
| 0 to +10 V | Yes |
| Input resistance (0 to 10 V) | 100 k$\Omega$ |
| -10 V to +10 V | Yes |
| Input resistance (-10 V to +10 V) | 100 k$\Omega$ |

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|---|---|
| Input ranges (rated values), currents | |
| 0 to 20 mA | Yes |
| Input resistance (0 to 20 mA) | 100 Ω |
| -20 to +20 mA | Yes |
| Input resistance (-20 to +20 mA) | 100 Ω |
| 4 to 20 mA | Yes |
| Input resistance (4 to 20 mA) | 100 Ω |
| Input ranges (rated values), resistance thermometers | |
| Pt 100 | Yes |
| Input resistance (Pt 100) | 10 MΩ |
| Input ranges (rated values), resistors | |
| No-Load voltage, typ. | 2.5 V |
| Measured current, typ. | 1.8 to 3.3 mA |
| 0 to 600 ohms | Yes |
| Input resistance (0 to 600 ohms) | 10 MΩ |
| Voltage input | |
| permissible input voltage for voltage input (destruction limit), max. | 30 V ; permanent |
| Current input | |
| permissible input current for current input (destruction limit), max. | 50 mA ; Permanent |
| Characteristic linearization | |
| parameterizable | Yes ; by software |
| for resistance thermometer | Pt 100 |
| Temperature compensation | |
| parameterizable | No |
| Analog outputs | |
| Number of analog outputs | 2 |
| Cable length, shielded, max. | 200 m |
| Voltage output, short-circuit protection | Yes |
| Voltage output, short-circuit current, max. | 55 mA |
| Current output, no-load voltage, max. | 17 V |
| Output ranges, voltage | |
| 0 to 10 V | Yes |
| -10 to +10 V | Yes |
| Output ranges, current | |

| | |
|---|---|
| 0 to 20 mA | Yes |
| -20 to +20 mA | Yes |
| 4 to 20 mA | Yes |
| Connection of actuators | |
| for voltage output 2-conductor connection | Yes ; Without compensation of the line resistances |
| for voltage output 4-conductor connection | No |
| for current output 2-conductor connection | Yes |
| Load impedance (in rated range of output) | |
| with voltage outputs, min. | 1 kΩ |
| with voltage outputs, capacitive load, max. | 0.1 µF |
| with current outputs, max. | 300 Ω |
| with current outputs, inductive load, max. | 0.1 mH |
| Destruction limits against externally applied voltages and currents | |
| Voltages at the outputs towards MANA | 16 V ; permanent |
| Current, max. | 50 mA ; permanent |
| Analog value creation | |
| Measurement principle | Actual value encryption (successive approximation) |
| Integrations and conversion time/ resolution per channel | |
| Resolution with overrange (bit including sign), max. | 12 bit |
| Integration time, parameterizable | Yes ; 2.5 / 16.6 / 20 ms |
| permissible input frequency, max. | 400 Hz |
| Interference voltage suppression for interference frequency f1 in Hz | 400 / 60 / 50 Hz |
| Conversion time (per channel) | 1 ms |
| Time constant of the input filter | 0.38 ms |
| Basic execution time of the module (all channels released) | 1 ms |
| Settling time | |
| for resistive load | 0.6 ms |
| for capacitive load | 1 ms |
| Encoder | |
| Connection of signal encoders | |
| for voltage measurement | Yes |
| for current measurement as 2-wire transducer | Yes ; with external supply |

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|---|---|
| for current measurement as 4-wire transducer | Yes |
| for resistance measurement with 2-conductor connection | Yes ; without compensation of the line resistances |
| for resistance measurement with 3-conductor connection | No |
| for resistance measurement with 4-conductor connection | No |
| Connectable encoders | |
| 2-wire BEROS | Yes |
| permissible quiescent current (2-wire BEROS), max. | 1.5 mA |
| Errors/accuracies | |
| Temperature error (relative to input area) | +/- 0,006 %/K |
| Crosstalk between the inputs, min. | 60 dB |
| Repeat accuracy in settled status at 25 °C (relative to input area) | +/- 0,06 % |
| Output ripple (based on output area, bandwidth 0 to 50 kHz) | +/- 0,1 % |
| Linearity error (relative to output area) | +/- 0,15 % |
| Temperature error (relative to output area) | +/- 0,01 %/K |
| Crosstalk between the outputs, min. | 60 dB |
| Repeat accuracy in settled status at 25 °C (relative to output area) | +/- 0,06 % |
| Operational limit in overall temperature range | |
| Voltage, relative to input area | +/- 1 % |
| Current, relative to input area | +/- 1 % |
| Impedance, relative to input area | +/- 5 % |
| Voltage, relative to output area | +/- 1 % |
| Current, relative to output area | +/- 1 % |
| Basic error limit (operational limit at 25 °C) | |
| Voltage, relative to input area | +/- 0,7 % ; Linearity error +/- 0.06% |
| Current, relative to input area | +/- 0,7 % ; Linearity error +/- 0.06% |
| Impedance, relative to input area | +/- 3 % ; Linearity error +/- 0.2% |
| Resistance-type thermometer, relative to input area | +/- 3 % |
| Voltage, relative to output area | +/- 0,7 % |
| Current, relative to output area | +/- 0,7 % |
| Interference voltage suppression for f = n x (fl +/- 1%), fl = interference frequency | |

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| Series mode interference (peak value of interference < rated value of input range), min. | 30 dB |
| Common mode interference, min. | 40 dB |
| Integrated Functions | |
| Number of counters | 3 ; 3 channels (see "Technological Functions" manual) |
| Counter frequency (counter) max. | 30 kHz |
| Frequency measurement | Yes |
| controlled positioning | No |
| PID controller | Yes |
| Number of pulse outputs | 3 ; 3 channels pulse width modulation up to max. 2.5 kHz (see "Technological Functions" manual) |
| Limit frequency (pulse) | 2.5 kHz |
| Interrupts/diagnostics/status information | |
| Diagnostics indication LED | |
| Status indicator digital output (green) | Yes |
| Status indicator digital input (green) | Yes |
| Isolation | |
| Isolation checked with | 600 VDC |
| Galvanic isolation | |
| Galvanic isolation digital inputs | |
| Galvanic isolation digital inputs | Yes |
| between the channels | No |
| between the channels and the backplane bus | Yes |
| Galvanic isolation digital outputs | |
| Galvanic isolation digital outputs | Yes |
| between the channels | Yes |
| between the channels, in groups of | 8 |
| between the channels and the backplane bus | Yes |
| Galvanic isolation analog inputs | |
| Galvanic isolation analog inputs | Yes ; common for analog I/O |
| between the channels | No |
| between the channels and the backplane bus | Yes |
| Galvanic isolation analog outputs | |
| Galvanic isolation analog outputs | Yes ; common for analog I/O |
| between the channels | No |
| between the channels and the backplane bus | Yes |

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| Permissible potential difference between different circuits | 75 VDC / 60 VAC |
| Dimensions and weight | |
| Dimensions | |
| Width | 120 mm |
| Height | 125 mm |
| Depth | 130 mm |
| Weight | |
| Weight, approx. | 660 g |
| Status | Nov 22, 2010 |