



SIMATIC S7-300, CPU 315-2DP Central processing unit with MPI Integr. power supply 24 V DC Work memory 256 KB 2nd interface DP master/slave Micro Memory Card required

| General information                                         |                                                                         |
|-------------------------------------------------------------|-------------------------------------------------------------------------|
| Product type designation                                    | CPU 315-2 DP                                                            |
| HW functional status                                        | 01                                                                      |
| Firmware version                                            | V3.3                                                                    |
| Product function                                            |                                                                         |
| • Isochronous mode                                          | Yes                                                                     |
| Engineering with                                            |                                                                         |
| • Programming package                                       | STEP 7 V5.5 + SP1 or higher or STEP 7 V5.2 + SP1 or higher with HSP 218 |
| Supply voltage                                              |                                                                         |
| Rated value (DC)                                            | 24 V                                                                    |
| 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                                             |                                                                         |
| • Mains/voltage failure stored energy time                  | 5 ms                                                                    |
| • Repeat rate, min.                                         | 1 s                                                                     |
| Input current                                               |                                                                         |
| Current consumption (rated value)                           | 850 mA                                                                  |
| Current consumption (in no-load operation), typ.            | 150 mA                                                                  |
| Inrush current, typ.                                        | 3.5 A                                                                   |
| $I^2t$                                                      | 1 A <sup>2</sup> s                                                      |
| Power loss                                                  |                                                                         |
| Power loss, typ.                                            | 4.5 W                                                                   |
| Memory                                                      |                                                                         |
| Work memory                                                 |                                                                         |
| • integrated                                                | 256 kbyte                                                               |
| • expandable                                                | No                                                                      |
| Load memory                                                 |                                                                         |
| • Plug-in (MMC)                                             | Yes                                                                     |
| • Plug-in (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 processing times                                        |                                                                         |
| for bit operations, typ.                                    | 0.05 µs                                                                 |
| for word operations, typ.                                   | 0.09 µs                                                                 |
| for fixed point arithmetic, typ.                            | 0.12 µs                                                                 |
| for floating point arithmetic, typ.                         | 0.45 µs                                                                 |

|                                                           |                                                                                               |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>CPU-blocks</b>                                         |                                                                                               |
| Number of blocks (total)                                  | 1 024; (DBs, FCs, FBs); the maximum number of loadable blocks can be reduced by the MMC used. |
| <b>DB</b>                                                 |                                                                                               |
| • Number, max.                                            | 1 024; Number range: 1 to 16000                                                               |
| • Size, max.                                              | 64 kbyte                                                                                      |
| <b>FB</b>                                                 |                                                                                               |
| • Number, max.                                            | 1 024; Number range: 0 to 7999                                                                |
| • Size, max.                                              | 64 kbyte                                                                                      |
| <b>FC</b>                                                 |                                                                                               |
| • Number, max.                                            | 1 024; Number range: 0 to 7999                                                                |
| • Size, max.                                              | 64 kbyte                                                                                      |
| <b>OB</b>                                                 |                                                                                               |
| • Number, max.                                            | see instruction 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                                                                                  |
| • 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                                                                                      |
| • Number of startup OBs                                   | 1; OB 100                                                                                     |
| • Number of asynchronous error OBs                        | 5; OB 80, 82, 85, 86, 87                                                                      |
| • Number of synchronous error OBs                         | 2; OB 121, 122                                                                                |
| <b>Nesting depth</b>                                      |                                                                                               |
| • per priority class                                      | 16                                                                                            |
| • additional within an error OB                           | 4                                                                                             |
| <b>Counters, timers and their retentivity</b>             |                                                                                               |
| <b>S7 counter</b>                                         |                                                                                               |
| • Number                                                  | 256                                                                                           |
| <b>Retentivity</b>                                        |                                                                                               |
| — adjustable                                              | Yes                                                                                           |
| — preset                                                  | Z 0 to Z 7                                                                                    |
| <b>Counting range</b>                                     |                                                                                               |
| — lower limit                                             | 0                                                                                             |
| — upper limit                                             | 999                                                                                           |
| <b>IEC counter</b>                                        |                                                                                               |
| • present                                                 | Yes                                                                                           |
| • Type                                                    | SFB                                                                                           |
| • Number                                                  | Unlimited (limited only by RAM capacity)                                                      |
| <b>S7 times</b>                                           |                                                                                               |
| • Number                                                  | 256                                                                                           |
| <b>Retentivity</b>                                        |                                                                                               |
| — adjustable                                              | Yes                                                                                           |
| — preset                                                  | No retentivity                                                                                |
| <b>Time range</b>                                         |                                                                                               |
| — lower limit                                             | 10 ms                                                                                         |
| — upper limit                                             | 9 990 s                                                                                       |
| <b>IEC timer</b>                                          |                                                                                               |
| • present                                                 | Yes                                                                                           |
| • Type                                                    | SFB                                                                                           |
| • Number                                                  | Unlimited (limited only by RAM capacity)                                                      |
| <b>Data areas and their retentivity</b>                   |                                                                                               |
| Retentive data area (incl. timers, counters, flags), max. | 128 kbyte                                                                                     |
| <b>Flag</b>                                               |                                                                                               |
| • Size, max.                                              | 2 048 byte                                                                                    |
| • Retentivity available                                   | Yes; MB 0 to MB 2 047                                                                         |
| • 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>Local data</b>                                         |                                                                           |
| • per priority class, max.                                | 32 kbyte; Max. 2 KB per block                                             |
| <b>Address area</b>                                       |                                                                           |
| <b>I/O address area</b>                                   |                                                                           |
| • Inputs                                                  | 2 048 byte                                                                |
| • Outputs                                                 | 2 048 byte                                                                |
| of which distributed                                      |                                                                           |
| — Inputs                                                  | 2 048 byte                                                                |
| — Outputs                                                 | 2 048 byte                                                                |
| <b>Process image</b>                                      |                                                                           |
| • Inputs                                                  | 2 048 byte                                                                |
| • Outputs                                                 | 2 048 byte                                                                |
| • Inputs, adjustable                                      | 2 048 byte                                                                |
| • Outputs, adjustable                                     | 2 048 byte                                                                |
| • Inputs, default                                         | 128 byte                                                                  |
| • Outputs, default                                        | 128 byte                                                                  |
| <b>Subprocess images</b>                                  |                                                                           |
| • Number of subprocess images, max.                       | 1                                                                         |
| <b>Digital channels</b>                                   |                                                                           |
| • Inputs                                                  | 16 384                                                                    |
| — of which central                                        | 1 024                                                                     |
| • Outputs                                                 | 16 384                                                                    |
| — of which central                                        | 1 024                                                                     |
| <b>Analog channels</b>                                    |                                                                           |
| • Inputs                                                  | 1 024                                                                     |
| — of which central                                        | 256                                                                       |
| • Outputs                                                 | 1 024                                                                     |
| — of which central                                        | 256                                                                       |
| <b>Hardware configuration</b>                             |                                                                           |
| Number of expansion units, max.                           | 3                                                                         |
| <b>Number of DP masters</b>                               |                                                                           |
| • integrated                                              | 1                                                                         |
| • via CP                                                  | 4                                                                         |
| <b>Number of operable FMs and CPs (recommended)</b>       |                                                                           |
| • FM                                                      | 8                                                                         |
| • CP, PtP                                                 | 8                                                                         |
| • CP, LAN                                                 | 10                                                                        |
| <b>Rack</b>                                               |                                                                           |
| • Racks, max.                                             | 4                                                                         |
| • Modules per rack, max.                                  | 8                                                                         |
| <b>Time of day</b>                                        |                                                                           |
| <b>Clock</b>                                              |                                                                           |
| • 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 | the clock continues at the time of day it had when power was switched off |
| <b>Operating hours counter</b>                            |                                                                           |
| • Number                                                  | 1                                                                         |
| • Number/Number range                                     | 0                                                                         |
| • 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                                    |
| <b>Clock synchronization</b>                              |                                                                           |
| • supported                                               | Yes                                                                       |
| • to MPI, master                                          | Yes                                                                       |
| • on MPI, device                                          | Yes                                                                       |

|                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• to DP, master</li> <li>• on DP, device</li> <li>• in AS, master</li> <li>• in AS, device</li> </ul>                                                                                                                                                                                                           | Yes; With DP slave only slave clock<br>Yes<br>Yes<br>No                                                                     |
| <b>Digital inputs</b>                                                                                                                                                                                                                                                                                                                                  |                                                                                                                             |
| Number of digital inputs                                                                                                                                                                                                                                                                                                                               | 0                                                                                                                           |
| <b>Digital outputs</b>                                                                                                                                                                                                                                                                                                                                 |                                                                                                                             |
| Number of digital outputs                                                                                                                                                                                                                                                                                                                              | 0                                                                                                                           |
| <b>Analog inputs</b>                                                                                                                                                                                                                                                                                                                                   |                                                                                                                             |
| Number of analog inputs                                                                                                                                                                                                                                                                                                                                | 0                                                                                                                           |
| <b>Interfaces</b>                                                                                                                                                                                                                                                                                                                                      |                                                                                                                             |
| Number of PROFINET interfaces                                                                                                                                                                                                                                                                                                                          | 0                                                                                                                           |
| Number of RS 485 interfaces                                                                                                                                                                                                                                                                                                                            | 2; MPI and PROFIBUS DP                                                                                                      |
| Number of RS 422 interfaces                                                                                                                                                                                                                                                                                                                            | 0                                                                                                                           |
| <b>1. Interface</b>                                                                                                                                                                                                                                                                                                                                    |                                                                                                                             |
| Interface type                                                                                                                                                                                                                                                                                                                                         | Integrated RS 485 interface                                                                                                 |
| Isolated                                                                                                                                                                                                                                                                                                                                               | No                                                                                                                          |
| <b>Interface types</b>                                                                                                                                                                                                                                                                                                                                 |                                                                                                                             |
| <ul style="list-style-type: none"> <li>• RS 485</li> <li>• Output current of the interface, max.</li> </ul>                                                                                                                                                                                                                                            | Yes<br>200 mA                                                                                                               |
| <b>Protocols</b>                                                                                                                                                                                                                                                                                                                                       |                                                                                                                             |
| <ul style="list-style-type: none"> <li>• MPI</li> <li>• PROFIBUS DP master</li> <li>• PROFIBUS DP device</li> <li>• Point-to-point connection</li> </ul>                                                                                                                                                                                               | Yes<br>No<br>No<br>No                                                                                                       |
| <b>MPI</b>                                                                                                                                                                                                                                                                                                                                             |                                                                                                                             |
| <ul style="list-style-type: none"> <li>• Transmission rate, max.</li> </ul>                                                                                                                                                                                                                                                                            | 187.5 kbit/s                                                                                                                |
| <b>Services</b>                                                                                                                                                                                                                                                                                                                                        |                                                                                                                             |
| <ul style="list-style-type: none"> <li>— PG/OP communication</li> <li>— Routing</li> <li>— Global data communication</li> <li>— S7 basic communication</li> <li>— S7 communication</li> <li>— S7 communication, as client</li> <li>— S7 communication, as server</li> </ul>                                                                            | Yes<br>Yes<br>Yes<br>Yes<br>Yes; Only server, configured on one side<br>No<br>Yes                                           |
| <b>2. Interface</b>                                                                                                                                                                                                                                                                                                                                    |                                                                                                                             |
| Interface type                                                                                                                                                                                                                                                                                                                                         | Integrated RS 485 interface                                                                                                 |
| Isolated                                                                                                                                                                                                                                                                                                                                               | Yes                                                                                                                         |
| <b>Interface types</b>                                                                                                                                                                                                                                                                                                                                 |                                                                                                                             |
| <ul style="list-style-type: none"> <li>• RS 485</li> <li>• Output current of the interface, max.</li> </ul>                                                                                                                                                                                                                                            | Yes<br>200 mA                                                                                                               |
| <b>Protocols</b>                                                                                                                                                                                                                                                                                                                                       |                                                                                                                             |
| <ul style="list-style-type: none"> <li>• MPI</li> <li>• PROFIBUS DP master</li> <li>• PROFIBUS DP device</li> <li>• Point-to-point connection</li> </ul>                                                                                                                                                                                               | No<br>Yes<br>Yes<br>No                                                                                                      |
| <b>PROFIBUS DP master</b>                                                                                                                                                                                                                                                                                                                              |                                                                                                                             |
| <ul style="list-style-type: none"> <li>• Transmission rate, max.</li> <li>• max. number of DP devices</li> </ul>                                                                                                                                                                                                                                       | 12 Mbit/s<br>124; Per station                                                                                               |
| <b>Services</b>                                                                                                                                                                                                                                                                                                                                        |                                                                                                                             |
| <ul style="list-style-type: none"> <li>— PG/OP communication</li> <li>— Routing</li> <li>— Global data communication</li> <li>— S7 basic communication</li> <li>— S7 communication</li> <li>— S7 communication, as client</li> <li>— S7 communication, as server</li> <li>— Equidistance</li> <li>— Isochronous mode</li> <li>— SYNC/FREEZE</li> </ul> | Yes<br>Yes<br>No<br>Yes; I blocks only<br>Yes; Only server, configured on one side<br>No<br>Yes<br>Yes<br>Yes; OB 61<br>Yes |

|                                                                                |                                                                                                                            |
|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| — activation/deactivation of DP devices                                        | Yes                                                                                                                        |
| — max. number of DP devices that can be activated/deactivated at the same time | 8                                                                                                                          |
| — DPV1                                                                         | Yes                                                                                                                        |
| <b>Address area</b>                                                            |                                                                                                                            |
| — Inputs, max.                                                                 | 2 048 byte                                                                                                                 |
| — Outputs, max.                                                                | 2 048 byte                                                                                                                 |
| <b>User data per DP device</b>                                                 |                                                                                                                            |
| — Inputs, max.                                                                 | 244 byte                                                                                                                   |
| — Outputs, max.                                                                | 244 byte                                                                                                                   |
| <b>2nd interface / PROFIBUS DP device / header</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; Only with active interface                                                                                            |
| — Global data communication                                                    | No                                                                                                                         |
| — S7 basic communication                                                       | No                                                                                                                         |
| — S7 communication                                                             | Yes; Only server, configured on one side                                                                                   |
| — S7 communication, as client                                                  | No                                                                                                                         |
| — S7 communication, as server                                                  | Yes                                                                                                                        |
| — Direct data exchange (slave-to-slave communication)                          | Yes                                                                                                                        |
| — DPV1                                                                         | No                                                                                                                         |
| <b>Transfer memory</b>                                                         |                                                                                                                            |
| — Inputs                                                                       | 244 byte                                                                                                                   |
| — Outputs                                                                      | 244 byte                                                                                                                   |
| <b>Protocols</b>                                                               |                                                                                                                            |
| PROFIsafe                                                                      | No                                                                                                                         |
| <b>communication functions / header</b>                                        |                                                                                                                            |
| PG/OP communication                                                            | Yes                                                                                                                        |
| Data record routing                                                            | Yes                                                                                                                        |
| <b>Global data communication</b>                                               |                                                                                                                            |
| • 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                                                                                                                    |
| <b>S7 basic communication</b>                                                  |                                                                                                                            |
| • 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)                                         |
| <b>S7 communication</b>                                                        |                                                                                                                            |
| • 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.                                | 240 byte; as server                                                                                                        |
| <b>S5 compatible communication</b>                                             |                                                                                                                            |
| • supported                                                                    | Yes; via CP and loadable FC                                                                                                |
| <b>Number of connections</b>                                                   |                                                                                                                            |
| • overall                                                                      | 16                                                                                                                         |
| • usable for PG communication                                                  | 15                                                                                                                         |
| — reserved for PG communication                                                | 1                                                                                                                          |
| — adjustable for PG communication, min.                                        | 1                                                                                                                          |

|                                                      |                                                                                  |
|------------------------------------------------------|----------------------------------------------------------------------------------|
| — adjustable for PG communication, max.              | 15                                                                               |
| • usable for OP communication                        | 15                                                                               |
| — reserved for OP communication                      | 1                                                                                |
| — adjustable for OP communication, min.              | 1                                                                                |
| — adjustable for OP communication, max.              | 15                                                                               |
| • usable for S7 basic communication                  | 12                                                                               |
| — reserved for S7 basic communication                | 0                                                                                |
| — adjustable for S7 basic communication, min.        | 0                                                                                |
| — adjustable for S7 basic communication, max.        | 12                                                                               |
| <b>S7 message functions</b>                          |                                                                                  |
| Number of login stations for message functions, max. | 16; 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                                                                                |
| <b>Status/control</b>                                |                                                                                  |
| • 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                                                                               |
| <b>Forcing</b>                                       |                                                                                  |
| • Forcing                                            | Yes                                                                              |
| • Forcing, variables                                 | Inputs, outputs                                                                  |
| • Number of variables, max.                          | 10                                                                               |
| <b>Diagnostic buffer</b>                             |                                                                                  |
| • present                                            | Yes                                                                              |
| • Number of entries, max.                            | 500                                                                              |
| — adjustable                                         | No                                                                               |
| — of which powerfail-proof                           | 100; Only the last 100 entries are retained                                      |
| • Number of entries readable in RUN, max.            |                                                                                  |
| — adjustable                                         | Yes; From 10 to 499                                                              |
| — preset                                             | 10                                                                               |
| <b>Service data</b>                                  |                                                                                  |
| • can be read out                                    | Yes                                                                              |
| <b>Ambient conditions</b>                            |                                                                                  |
| <b>Ambient temperature during operation</b>          |                                                                                  |
| • min.                                               | 0 °C                                                                             |
| • max.                                               | 60 °C                                                                            |
| <b>configuration / header</b>                        |                                                                                  |
| <b>Configuration software</b>                        |                                                                                  |
| • STEP 7                                             | Yes; V5.2 SP1 or higher with HW update                                           |
| <b>configuration / programming / header</b>          |                                                                                  |
| • Command set                                        | see instruction list                                                             |
| • Nesting levels                                     | 8                                                                                |
| • System functions (SFC)                             | see instruction list                                                             |
| • System function blocks (SFB)                       | see instruction list                                                             |
| <b>Programming language</b>                          |                                                                                  |
| — LAD                                                | Yes                                                                              |
| — FBD                                                | Yes                                                                              |
| — STL                                                | Yes                                                                              |
| — SCL                                                | Yes                                                                              |
| — CFC                                                | Yes                                                                              |
| — GRAPH                                              | Yes                                                                              |
| — HiGraph®                                           | Yes                                                                              |
| <b>Know-how protection</b>                           |                                                                                  |
| • User program protection/password protection        | Yes                                                                              |
| • Block encryption                                   | Yes; With S7 block Privacy                                                       |

| Dimensions      |        |
|-----------------|--------|
| Width           | 40 mm  |
| Height          | 125 mm |
| Depth           | 130 mm |
| Weights         |        |
| Weight, approx. | 290 g  |
| Classifications |        |

|        | Version | Classification |
|--------|---------|----------------|
| eClass | 14      | 27-24-22-07    |
| eClass | 12      | 27-24-22-07    |
| eClass | 9.1     | 27-24-22-07    |
| eClass | 9       | 27-24-22-07    |
| eClass | 8       | 27-24-22-07    |
| eClass | 7.1     | 27-24-22-07    |
| eClass | 6       | 27-24-22-07    |
| ETIM   | 9       | EC000236       |
| ETIM   | 8       | EC000236       |
| ETIM   | 7       | EC000236       |
| IDEA   | 4       | 3565           |
| UNSPSC | 15      | 32-15-17-05    |

| Approvals / Certificates |     |
|--------------------------|-----|
| General Product Approval | EMV |

[Manufacturer Declaration](#)






For use in hazardous locations


[FM](#)



[Miscellaneous](#)

For use in hazardous locations
Marine / Shipping

[CCC-Ex](#)




[NK / Nippon Kaiji Kyokai](#)

Marine / Shipping
Industrial Communication



[CCS \(China Classification Society\)](#)


last modified:

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