

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>  | Notes  | SIMOTION C240/C240 PN                                   | SIMOTION P320-3/P350-3                                       | SIMOTION D4xx   |
|--|--|---|--|---|
| <b>System cycles</b>   |  |   |  |   |
| <b>PROFIBUS DP cycle</b>   | For integrated drives with D445-1:<br>0.5 ... 8 ms   | in 0.25 ms steps:<br>1 ... 8 ms                         | in 0.125 ms steps:<br>P350-3 DP:<br>1 ... 8 ms               | in 0.125 ms steps:<br>D410 DP:<br>2 ... 8 ms<br>D425:<br>2 ... 8 ms<br>D435/D445-1:<br>1 ... 8 ms |
| <b>PROFINET cycle</b>  |  | in 0.25 ms steps:<br>C240 PN:<br>0.5 ... 4 ms           | in 0.125 ms steps:<br>P320-3,<br>P350-3 PN:<br>0.25 ... 4 ms | in 0.125 ms steps:<br>D410 PN:<br>0.5 ... 4 ms<br><br>D4x5 with CBE30:<br>0.5 ... 4 ms            |
| <b>Position control and interpolation cycle</b><br>System cycles for motion control:<br>The position control cycle (SERVO) includes the position controller, the actual-value and setpoint system and the axis monitoring functions. The axis motion control functions are performed in the interpolation cycle. | The position control cycle and interpolation cycle are a multiple of the PROFIBUS/PROFINET cycle |   |  |   |
| <ul style="list-style-type: none"> <li>• Minimum position control cycle</li> </ul>   |  | 0.5 ms  | 0.25 ms  | D410: 2 ms<br>D425: 2 ms<br>D435: 1 ms<br>D445-1: 0.5 ms  |
| <ul style="list-style-type: none"> <li>• Position control cycle to PROFIBUS cycle</li> <li>• Position control cycle to PROFINET cycle</li> <li>• Interpolation cycle 1 (IPO1) to position control cycle</li> <li>• Interpolation cycle 2 (IPO2) to interpolation cycle 1 (IPO1)</li> </ul>                       | Adjustable transformation ratio  | 1:1, 2:1<br>1:1 ... 16:1<br>1:1 ... 6:1<br>2:1 ... 64:1 | 1:1, 2:1<br>1:1 ... 16:1<br>1:1 ... 6:1<br>2:1 ... 64:1      | 1:1 ... 8:1<br>1:1 ... 16:1<br>1:1 ... 6:1<br>2:1 ... 64:1  |
| <b>Dynamic Servo Control (DSC)</b><br>With Dynamic Servo Control (DSC), the control loop of the position controller is located in the drive (with cycles of 125 µs or higher)  | With drives SINAMICS S120, SIMODRIVE and MASTERDRIVES MC   | ●   | ●  | ●   |

### Notes:

With SIMOTION P and SIMOTION D, the availability of a PROFIBUS or PROFINET interface depends on the version used (e.g. D410 DP or D410 PN) or on the communication modules used (e.g. MCI-PN Communication Board with P350-3 or CBE30 Communication Board with D4x5). SIMOTION P320-3 is available as a PROFINET version only.

This information is not explicitly provided for every connection option or function.

The performance requirements for a SIMOTION application can be estimated using the SIZER configuring tool.

For more information about SIZER, refer to chapter System description – Dimensioning.

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|--|--|--------------------------|--|---|
| Memory   |  |                          |  |   |
| • Exchangeable memory media  | MMC:<br>Micro Memory card<br>CF:<br>CompactFlash card<br>HDD:<br>Hard Disk Drive | MMC<br>64 MB             | P320-3: CF<br>4 GB<br><br>P350-3: HDD<br>40 GB       | CF<br>1 GB  |
| • Remanent user variable (retain variable)   | SIMOTION P:<br>with UPS up to 256 KB   | 107 KB                   | 15 KB  | D410:<br>9 KB<br><br>D4x5:<br>364 KB                              |
| • Permanent memory for user data<br>(data storage on exchangeable memory medium)   |  | 52 MB                    | Optional,<br>dependent on<br>memory<br>configuration | 300 MB  |
| • Load memory (RAM disk) for user data<br>(for downloading the configuration and programs)   | Memory sizes can be<br>configured with<br>SIMOTION P                             | 23 MB                    | 18 MB  | D410:<br>17 MB<br><br>D425/D435:<br>23 MB<br><br>D445-1:<br>47 MB |
| • User memory (user RAM)<br>(for code and data)  | D4xx:<br>additional 20 MB<br>for Java applications                               | 35 MB                    | 24 MB<br><br>Adjustable to a<br>maximum of<br>100 MB | D410:<br>26 MB<br><br>D425/D435:<br>35 MB<br><br>D445-1:<br>70 MB |
| Address ranges   |  |                          |  |   |
| • Logical I/O address space in KB  |  | 4                        | 4  | 16  |
| • Physical I/O address space in KB<br>- PROFIBUS: max. per ext. subnet each for<br>inputs and outputs<br>- PROFINET: max. for inputs and outputs (each):   | When PROFIBUS and<br>PROFINET are used, the<br>total address space applies       | 1<br><br>4               | 1<br><br>4   | 1<br><br>4  |
| • Permanent process image for<br>background task (I/O variables) in bytes  |  | 64                       | 64   | 64  |
| • Additional configurable process image for<br>each cyclic task (I/O variables)  |  | ●                        | ●  | ●   |
| • Address space per PROFIBUS DP station in bytes   |  | 244                      | 244  | 244   |
| • Address space per PROFINET device in bytes   |  | 1400                     | 1400   | 1400  |

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|--|---|--------------------------|--|--|
| Drives on SIMOTION   |   |                          |  |  |
| Maximum number of axes   | Higher number of axes possible using multiple synchronized devices<br>D410: max. 1 real axis; additional virtual axes can be created  | 32 axes                  | 64 axes  | D410: 1 axis<br>D425: 16 axes<br>D435: 32 axes<br>D445-1: 64 axes                                |
| Integrated drive control<br>The drive control integrated in SIMOTION D is based on SINAMICS S120 Control Units:<br><ul style="list-style-type: none"><li>With SIMOTION D410 on the CU310 Control Unit, firmware version 2.x</li><li>With SIMOTION D4x5/CX32 on the CU320 Control Unit, firmware version 2.x</li></ul> The BOP20 Basic Operator Panel and the EPos basic positioner are not supported by the integrated drive control.  | CX32 can be used to provide additional drive controls for SIMOTION D435 and D445-1:<br>D435: max. 2 CX32<br>D445-1: max. 4 CX32<br>Per CX32:<br>Servo: 1 ... 6<br>Vector: 1 ... 4<br>V/f: 1 ... 8 | –                        | –  | D410: Servo: 1<br>Vector: 1<br>V/f: 1<br>D4x5: Servo: 1 ... 6<br>Vector: 1 ... 4<br>V/f: 1 ... 8 |
| Speed-controlled axis over PROFIBUS DP<br><br><ul style="list-style-type: none"><li>SINAMICS S / SINAMICS G (servo, vector control)</li><li>SIMODRIVE 611 universal</li><li>SIMODRIVE POSMO CA</li><li>SIMODRIVE POSMO CD</li><li>SIMODRIVE POSMO SI</li><li>SIMOVERT MASTERDRIVES MC</li><li>SIMOVERT MASTERDRIVES VC</li><li>MICROMASTER/MICROMASTER Vector</li><li>MIDIMASTER Vector</li><li>COMBIMASTER/MICROMASTER Integrated</li><li>Drives with speed profile in accordance with standard message frames (PROFIdrive profile 1-6)</li></ul> | SIMOTION D: SINAMICS as the standard drive technology   | <div><div></div></div>   | – (P320-3)<br><div><div></div></div> (P350-3 DP)<br><div><div></div></div> (P350-3 PN) | – (D410)<br><div><div></div></div> (D4x5)  |
| Intelligent positioning motor over PROFIBUS DP<br><br><ul style="list-style-type: none"><li>SIMODRIVE POSMO A</li></ul>  | Standard functions available in SCOUT command library   | <div><div></div></div>   | – (P320-3)<br><div><div></div></div> (P350-3 DP)<br><div><div></div></div> (P350-3 PN) | <div><div></div></div> (D410 DP)<br>– (D410 PN)<br><div><div></div></div> (D4x5)                 |

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|---|--|---|--|--|
| <b>Drives on SIMOTION (continued)</b>   |  |   |  |  |
| <b>Position-controlled axis over PROFIBUS DP with PROFIdrive</b> <ul style="list-style-type: none"> <li>• SINAMICS S110 (blocksize format) <ul style="list-style-type: none"> <li>- Servo control</li> </ul> </li> <li>• SINAMICS S120 (blocksize, booksize and chassis formats) <ul style="list-style-type: none"> <li>- Servo control</li> <li>- Vector control</li> </ul> </li> <li>• SIMODRIVE 611 universal</li> <li>• SIMODRIVE POSMO CA</li> <li>• SIMODRIVE POSMO CD</li> <li>• SIMODRIVE POSMO SI</li> <li>• SIMOVERT MASTERDRIVES MC</li> <li>• SIMOVERT MASTERDRIVES VC</li> <li>• MICROMASTER MM4</li> <li>• Certified servo/vector/stepper drives in acc. with standard message frames (PROFIdrive profile 1-6)</li> </ul> | SIMOTION D:<br>SINAMICS as the standard drive technology<br><br>Also linear motor <sup>1)</sup><br>With external encoder (limited dynam. response)<br>Also linear motor <sup>1)</sup><br><br>With external encoder (limited dynam. response) | <ul style="list-style-type: none"> <li>● (C240)</li> <li>● (C240 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (P320-3)</li> <li>● (P350-3 DP)</li> <li>○ (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>● (D4x5)</li> </ul> |
| <b>Speed and position-controlled axis over PROFINET IO with IRT (PROFIdrive)</b> <ul style="list-style-type: none"> <li>• SINAMICS S120 (blocksize, booksize and chassis formats) <ul style="list-style-type: none"> <li>- Servo control</li> <li>- Vector control</li> </ul> </li> </ul>   | Also linear motor <sup>1)</sup><br>With external encoder (limited dynam. response)   | <ul style="list-style-type: none"> <li>– (C240)</li> <li>● (C240 PN)</li> </ul> | <ul style="list-style-type: none"> <li>● (P320-3)</li> <li>○ (P350-3 DP)</li> <li>● (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>○ (D4x5)</li> </ul> |
| <b>Drives with analog ±10 V setpoint interface</b> <ul style="list-style-type: none"> <li>• Via onboard drive interface</li> <li>• Via ADI4 (Analog Drive Interface for 4 Axes)</li> <li>• Via IM 174 (Interface Module for 4 Axes)</li> </ul>  | Configuration either as analog or stepper drive<br><br>See <a href="#">SIMOTION I/O components</a>   | <ul style="list-style-type: none"> <li>4 (C240)</li> <li>– (C240 PN)</li> </ul> | <ul style="list-style-type: none"> <li>–</li> </ul>  | <ul style="list-style-type: none"> <li>–</li> </ul>                          |
|   |  | ●   | <ul style="list-style-type: none"> <li>– (P320-3)</li> <li>● (P350-3 DP)</li> <li>○ (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>● (D4x5)</li> </ul> |
|   |  | ●   | <ul style="list-style-type: none"> <li>– (P320-3)</li> <li>● (P350-3 DP)</li> <li>○ (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>● (D4x5)</li> </ul> |
| <b>Hydraulic drives over ±10 V setpoint interface</b> <ul style="list-style-type: none"> <li>• Via onboard drive interface</li> <li>• Via ADI4 (Analog Drive Interface for 4 Axes)</li> <li>• Via IM 174 (Interface Module for 4 Axes)</li> <li>• Analog outputs through I/O</li> <li>• Encoders through I/O</li> </ul>   | Note: With D410, the max. number of real axes is 1.  | <ul style="list-style-type: none"> <li>4 (C240)</li> <li>– (C240 PN)</li> </ul> | <ul style="list-style-type: none"> <li>–</li> </ul>  | <ul style="list-style-type: none"> <li>–</li> </ul>                          |
|   |  | ●   | <ul style="list-style-type: none"> <li>– (P320-3)</li> <li>● (P350-3 DP)</li> <li>○ (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>● (D4x5)</li> </ul> |
|   |  | ●   | <ul style="list-style-type: none"> <li>– (P320-3)</li> <li>● (P350-3 DP)</li> <li>○ (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>● (D4x5)</li> </ul> |
|   |  | ●   | ●  | ●  |
|   |  | ●   | ●  | ●  |
| <b>Stepper drives</b> <ul style="list-style-type: none"> <li>• Onboard pulse direction interface for stepper drives</li> <li>• Via IM 174 (Interface Module for 4 Axes)</li> </ul>  | Configuration either as analog or stepper drive  | <ul style="list-style-type: none"> <li>4 (C240)</li> <li>– (C240 PN)</li> </ul> | <ul style="list-style-type: none"> <li>–</li> </ul>  | <ul style="list-style-type: none"> <li>–</li> </ul>                          |
|   |  | ●   | <ul style="list-style-type: none"> <li>– (P320-3)</li> <li>● (P350-3 DP)</li> <li>○ (P350-3 PN)</li> </ul> | <ul style="list-style-type: none"> <li>– (D410)</li> <li>● (D4x5)</li> </ul> |

<sup>1)</sup> See chapter [Direct drives](#).

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|---|---|-------------------------|--|----------------------|
| <b>Encoders on SIMOTION</b>   |   |                         |  |                      |
| <b>Measuring systems that can be connected over the integrated interface</b>  | <a href="#">See Measuring systems</a>   |                         |  |                      |
| • Number  | SIMOTION D/CX32: Encoder connection via DRIVE-CLiQ  | 4 (C240)<br>– (C240 PN) | –  | 1 (D410)<br>– (D4x5) |
| • Absolute encoder with SSI interface   |   | ● (C240)<br>– (C240 PN) | –  | ● (D410)<br>– (D4x5) |
| • Incremental measuring systems   | C240: TTL<br>D410: TTL/HTL  | ● (C240)<br>– (C240 PN) | –  | ● (D410)<br>– (D4x5) |
| <b>Measuring systems that can be connected over the bus</b>   |   |                         |  |                      |
| • Resolver, absolute encoder (SSI and EnDat), incremental encoder (TTL and sin/cos)   | Connected through drive or ADI 4/IM 174 (ADI 4/IM 174 for SSI absolute encoder and TTL incremental encoder) | ●                       | ●  | ●                    |
| <b>Connection options for 2nd encoder (external encoder)</b>  |   |                         |  |                      |
| • Via onboard interfaces  |   | ● (C240)<br>– (C240 PN) | –  | ● (D410)<br>– (D4x5) |
| • SINAMICS S110/S120  | SIMOTION D/CX32: Encoder connection via DRIVE-CLiQ  | ●                       | ●  | ●                    |
| • 2nd encoder sensing in SIMOVERT MASTERDRIVES MC   | Option for SIMOVERT MASTERDRIVES MC   | ●                       | ●  | ●                    |
| • SIMODRIVE 611 universal over 2nd axis control (2-axis module)   | Option for SIMODRIVE 611 universal  | ●                       | ●  | ●                    |
| • Isochronous PROFIBUS encoder  | <a href="#">See Measuring systems</a>   | ●                       | ●  | ●                    |
| • Encoder on ADI 4 (Analog Drive Interface for 4 Axes)  | At least one electric or hydraulic axis must be configured on ADI 4/IM 174.                                 | ●                       | – (P320-3)<br>● (P350-3 DP)<br>○ (P350-3 PN) | – (D410)<br>● (D4x5) |
| • Encoder on IM 174 (Interface Module for 4 Axes)   |   | ●                       | – (P320-3)<br>● (P350-3 DP)<br>○ (P350-3 PN) | – (D410)<br>● (D4x5) |

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|---|--|-------------------------|--|--|
| <b>Measuring inputs</b>   |  |                         |  |  |
| <b>Integrated measuring inputs</b>  |  |                         |  |  |
| • Number  |  | C240: 2+4<br>C240 PN: 4 | –  | D410: 3<br>D4x5: 6                     |
| • Accuracy (reproducibility)  |  | 6 µs                    |  | 5 µs                                   |
| <b>Measuring inputs on the drives</b>   |  |                         |  |  |
| • SIMODRIVE 611 universal, SIMOVERT MASTERDRIVES MC   |  | 1/axis                  | 1/axis                                       | –                                      |
| • SINAMICS S110 (CU305)   |  | 2/closed-loop control   | 2/closed-loop control                        | 2/closed-loop control                  |
| • SINAMICS S120 (CU310)   |  | 3/closed-loop control   | 3/closed-loop control                        | 3/closed-loop control                  |
| • SINAMICS S120 (CU320)   |  | 6/closed-loop control   | 6/closed-loop control                        | 6/closed-loop control                  |
| • SINAMICS S120 (CU320-2)   |  | 8/closed-loop control   | 8/closed-loop control                        | 8/closed-loop control                  |
| • SIMOTION CX32   | D435: max. 2 CX32<br>D445-1: max. 4 CX32 | –                       | –  | 3/closed-loop control                  |
| • Over TM15 Terminal Module on SINAMICS S120 or SIMOTION D/CX32   | See SIMOTION I/O components              | 24                      | 24   | 24                                     |
| - Number of measuring inputs per Terminal Module, max.  |  | 125 µs                  | 125 µs                                       | 125 µs                                 |
| - Accuracy (reproducibility)  |  | 16                      | 16   | 16                                     |
| • Over TM17 High Feature Terminal Module on SINAMICS S120 or SIMOTION D/CX32  |  | ≤ 1 µs                  | ≤ 1 µs                                       | ≤ 1 µs                                 |
| - Number of measur. inputs per Terminal Module, max.  |  |                         |  |  |
| - Accuracy (reproducibility)  |  |                         |  |  |
| <b>Output cams</b>  |  |                         |  |  |
| <b>High-speed output cams</b>   |  |                         |  |  |
| (hardware-supported outputs cams with higher resolution)  |  |                         |  |  |
| • Integrated output cams  |  | ●                       | –  | ●                                      |
| - Accuracy (reproducibility)  |  | 70 µs                   | –  | D410: 200 µs<br>D4x5: 125 µs           |
| • Over TM15 Terminal Module on SINAMICS S120 or SIMOTION D/CX32   | See SIMOTION I/O components              | 125 µs                  | 125 µs                                       | 125 µs                                 |
| - Accuracy (reproducibility)  |  | ≤ 10 µs                 | ≤ 10 µs                                      | ≤ 10 µs                                |
| • Over TM17 High Feature Terminal Module on SINAMICS S120 or SIMOTION D/CX32  |  |                         |  |  |
| - Accuracy (reproducibility)  |  |                         |  |  |
| <b>Standard output cams</b>   |  |                         |  |  |
| (update in position controller or interpolation cycle, switching accuracy depends on the output accuracy of the I/O)  |  |                         |  |  |
| • Integrated output cams  |  | ●                       | –  | ●                                      |
| • Over TM15/TM17 High Feature Terminal Module on SINAMICS S120 or SIMOTION D/CX32   | See SIMOTION I/O components              | ●                       | ●  | ●                                      |
| • Over S7-300 backplane bus of SIMOTION C   |  | ●                       | –  | –                                      |
| • Over PROFIBUSDP   |  | ●                       | – (P320-3)<br>● (P350-3 DP)<br>○ (P350-3 PN) | ● (D410 DP)<br>– (D410 PN)<br>● (D4x5) |
| • Over PROFINET IO  |  | – (C240)<br>● (C240 PN) | ● (P320-3)<br>○ (P350-3 DP)<br>● (P350-3 PN) | – (D410 DP)<br>● (D410 PN)<br>○ (D4x5) |
| • Output to internal system variable  |  | ●                       | ●  | ●                                      |

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|---|--|---------------------------|------------------------|--------------------|
| <b>Integrated I/O interfaces</b>  |  |                           |                        |                    |
| <b>Programmable digital inputs/outputs</b><br>(can be parameterized individually as either input or output) <ul style="list-style-type: none"> <li>• of which for output cam, max.</li> <li>• of which as measuring inputs, max.</li> </ul>   | Further inputs/outputs can be implemented for output cam or measuring inputs via the TM15 or TM17 High Feature Terminal Modules.   | –                         | –                      | D410: 4<br>D4x5: 8 |
|   |  | –                         | –                      | D410: 4<br>D4x5: 8 |
|   |  | –                         | –                      | D410: 3<br>D4x5: 6 |
| <b>Digital inputs</b><br>(fixed inputs, cannot be parameterized) <ul style="list-style-type: none"> <li>• of which inputs with specific functions               <ul style="list-style-type: none"> <li>- Measuring inputs, max.</li> <li>- External zero mark signal for referencing, max.</li> </ul> </li> </ul> |  | 18                        | –                      | D410: 4<br>D4x5: 8 |
|   |  | 2+4 (C240)<br>4 (C240 PN) | –                      | –                  |
|   |  | 4 (C240)                  | –                      | –                  |
| <b>Digital outputs</b><br>(fixed outputs, cannot be parameterized) <ul style="list-style-type: none"> <li>• of which for fast output cam, max.</li> </ul>   |  | 8                         | –                      | –                  |
|   |  | 8                         | –                      | –                  |
| <b>Relay outputs with specific functions</b> <ul style="list-style-type: none"> <li>• Controller enable</li> <li>• Ready</li> </ul>   |  | 4 (C240)                  | –                      | –                  |
|   |  | 1                         | –                      | –                  |
| <b>Analog outputs</b>   | SIMOTION C240:<br>Can be used as drive interface or standard analog outputs.<br>SIMOTION D:<br>D410: Over TM<br>D4x5: Over TM or TB<br><a href="#">See SIMOTION I/O components</a> | 4 (C240)                  | –                      | ○                  |
| <b>Pulse direction interface for stepper drives</b>   | SIMOTION C240:<br>Configuration either as analog or stepper drive  | 4 (C240)                  | –                      | –                  |
| <b>SIMOTION C centralized I/O modules</b>   |  |                           |                        |                    |
| <ul style="list-style-type: none"> <li>• Centralized I/O modules per system, max.</li> <li>• Central/expansion rack, max.</li> </ul>  |  | 16                        | –                      | –                  |
|   | SIMOTION C:<br>max. two-tier configuration with IM 365 interface module  | ○                         | –                      | –                  |
| <ul style="list-style-type: none"> <li>• Connectable central SIMATIC S7-300 I/Os</li> </ul>   | For suitable modules, <a href="#">see SIMOTION I/O components</a>  | ●                         | –                      | –                  |

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <div><div><div>● Basic version<br/>(function or license is purchased with the device or SCOUT)</div><div>○ Option<br/>(must be acquired as software/hardware)</div><div>– Not possible</div></div></div>   | Notes  | SIMOTION<br>C240/C240 PN            | SIMOTION<br>P320-3/P350-3                                 | SIMOTION<br>D4xx                                    |
|--|--|-------------------------------------|---|---|
| Connectable distributed I/O modules  |  |                                     |   |   |
| <b>SINAMICS drive I/O (over DRIVE-CLiQ)</b> <div><div>● Via Terminal Modules TM15, TM17 High Feature, TM31, TM41, TM54F</div><div>● Via TB30 Terminal Board</div></div>  | <div>For connection to SIMOTION C and P over SINAMICS S120</div> <div>Plug-in card for SIMOTION D4x5 and SINAMICS CU320/CU320-2</div>                                | <div>●</div> <div>●</div>           | <div>●</div> <div>●</div>                                 | <div>●</div> <div>– (D410)<br/>● (D4x5)</div>       |
| <b>Distributed I/O (over PROFIBUS DP)</b> <div><div>● SIMATIC ET 200S</div><div>● SIMATIC ET 200pro</div><div>● SIMATIC ET 200M</div><div>● SIMATIC ET 200eco</div><div>● ADI 4 (Analog Drive Interface for 4 Axes)</div><div>● IM 174 (Interface Module for 4 Axes)</div><div>● All certified standard slaves (DP-V0, DP-V1, DP-V2)</div></div> | <div>For suitable modules, see <a href="#">SIMOTION I/O components</a></div> <div>Isosynchronous:<br/>SIMATIC ET 200S<br/>SIMATIC ET 200M<br/>ADI 4<br/>IM 174</div> | <div>●</div>                        | <div>– (P320-3)<br/>● (P350-3 DP)<br/>○ (P350-3 PN)</div> | <div>● (D410 DP)<br/>– (D410 PN)<br/>● (D4x5)</div> |
| <b>Distributed I/O (over PROFINET IO)</b> <div><div>● SIMATIC ET 200S</div><div>● SIMATIC ET 200M</div><div>● SIMATIC ET 200pro</div><div>● SIMATIC ET 200eco PN</div><div>● All certified PROFINET devices</div></div>  | <div>Isosynchronous:<br/>SIMATIC ET 200S</div>   | <div>– (C240)<br/>● (C240 PN)</div> | <div>● (P320-3)<br/>○ (P350-3 DP)<br/>● (P350-3 PN)</div> | <div>– (D410 DP)<br/>● (D410 PN)<br/>○ (D4x5)</div> |



# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>   | Notes                         | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3                       | SIMOTION D4xx                          |
|---|-------------------------------|-----------------------|--|--|
| <b>SIMOTION HMI devices</b>   |                               |                       |  |  |
| <b>Connection over PROFIBUS DP</b> <ul style="list-style-type: none"> <li>• SIMATIC MP 170 Mobile Panel</li> <li>• SIMATIC MP 177 DP Mobile Panel</li> <li>• SIMATIC MP 277 Mobile Panel</li> <li>• SIMATIC TP 170B and TP 270 Touch Panel</li> <li>• SIMATIC TP 177B and TP 277 Touch Panel</li> <li>• SIMATIC OP 170B and OP 270 Operator Panel</li> <li>• SIMATIC OP 177B and OP 277 Operator Panel</li> <li>• SIMATIC MP 270B and MP 370 Multi Panel</li> <li>• SIMATIC MP 277 and MP 377 Multi Panel</li> <li>• SIMATIC Panel PC 477, PC 670, PC 677, PC 877</li> </ul>  |                               | ●                     | – (P320-3)<br>● (P350-3 DP)<br>○ (P350-3 PN) | ● (D410 DP)<br>– (D410 PN)<br>● (D4x5) |
| <b>Connection over Ethernet (when configured using ProTool/Pro)</b> <ul style="list-style-type: none"> <li>• SIMATIC Panel PC 477, PC 670, PC 677, PC 877</li> </ul>  |                               | ●                     | ●  | – (D410 DP)<br>● (D410 PN)<br>● (D4x5) |
| <b>Connection over Ethernet/PROFINET (when configured using WinCC flexible)</b> <ul style="list-style-type: none"> <li>• SIMATIC MP 177 PN Mobile Panel <sup>1)</sup></li> <li>• SIMATIC MP 277 Mobile Panel <sup>1)</sup></li> <li>• SIMATIC TP 277 Touch Panel <sup>1)</sup></li> <li>• SIMATIC TP 177B Touch Panel Color <sup>1)</sup></li> <li>• SIMATIC OP 177B Operator Panel Color <sup>1)</sup></li> <li>• SIMATIC MP 177</li> <li>• SIMATIC TP 270 Touch Panel</li> <li>• SIMATIC OP 270 Operator Panel</li> <li>• SIMATIC OP 277 Operator Panel <sup>1)</sup></li> <li>• SIMATIC MP 270B and MP 370 Multi Panel</li> <li>• SIMATIC MP 277 <sup>1)</sup> and MP 377 Multi Panel <sup>1)</sup></li> <li>• SIMATIC Panel PC 477, PC 577, PC 670, PC 677, PC 877</li> </ul> |                               | ●                     | ●  | – (D410 DP)<br>● (D410 PN)<br>● (D4x5) |
| <b>HMI software for SIMOTION</b>  |                               |                       |  |  |
| • WinCCflexible   |                               | ○                     | ○  | ○                                      |
| • ProTool/Pro   |                               | ○                     | ○  | ○                                      |
| <b>Software for extended communication with SIMOTION</b>  |                               |                       |  |  |
| • SIMATIC NET OPC server  | See SIMOTION runtime software | ○                     | ● <sup>2)</sup>                              | – (D410 DP)<br>○ (D410 PN)<br>○ (D4x5) |
| • SIMOTION IT OPC XML-DA (over Ethernet) <ul style="list-style-type: none"> <li>- Open communication over TCP/IP and SOAP standard protocols</li> <li>- Clients on any hardware with various operating systems (Windows, Linux, ...)</li> <li>- According to OPC Foundation standard OPC XML-DA V1.01</li> </ul>  |                               | ● <sup>2)</sup>       | ● <sup>2)</sup>                              | ● <sup>2)</sup>                        |
| • SIMOTION MIIF: Multipurpose Information Interface <ul style="list-style-type: none"> <li>- Symbolic access to SIMOTION data via Ethernet</li> <li>- SIMOTION as server, e.g. operator panels as clients</li> </ul>  |                               | ○                     | ○  | – (D410)<br>○ (D4x5)                   |

<sup>1)</sup> PROFINET IO-capable

<sup>2)</sup> Subject to license

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul> | Notes  | SIMOTION C240/C240 PN     | SIMOTION P320-3/P350-3  | SIMOTION D4xx                            |
|---|--|---------------------------|---|--|
| <b>Communication</b>  |  |                           |   |  |
| <b>PROFIBUS DP interfaces</b>   |  |                           |   |  |
| <ul style="list-style-type: none"> <li>Integrated/support isochronous communication</li> </ul>  | One interface can be used as an MPI.<br>SIMOTION P350-3: The PROFIBUS version can be optionally retrofitted with PROFINET. | 2/2                       | P320-3: –/<br>P350-3 DP: 2/2<br>P350-3 PN: –/–                    | D410 DP: 1/1<br>D410 PN: –/<br>D4x5: 2/2 |
| <ul style="list-style-type: none"> <li>Integrated CP5611</li> </ul>   | For PG/PC and HMI  | –                         | P350-3: 1   | –  |
| <ul style="list-style-type: none"> <li>Transmission rates in Mbit/s</li> </ul>  |  | 1.5/3/6/12                | 1.5/3/6/12  | 1.5/3/6/12                               |
| <ul style="list-style-type: none"> <li>Number of PROFIBUS DP slaves</li> </ul>  | Per PROFIBUS DP subnet   | 64                        | 64  | 64                                       |
| <b>PROFINET interfaces</b>  |  |                           |   |  |
| <ul style="list-style-type: none"> <li>Integrated ports</li> </ul>  | SIMOTION P350-3 DP, D4x5: PROFINET can be optionally retrofitted by means of MCI-PN, CBE30 Communication Boards            | C240: –<br>C240 PN: 3     | P320-3: 3<br>P350-3 DP: 4, ○<br>P350-3 PN: 4                      | D410 DP: –<br>D410 PN: 2<br>D4x5: 4, ○   |
| <ul style="list-style-type: none"> <li>Number of PROFINET devices (provided that PROFINET interface is onboard or optionally retrofitted)</li> </ul>  |  | 64                        | 64  | 64                                       |
| <b>Ethernet interfaces</b>  |  |                           |   |  |
| <ul style="list-style-type: none"> <li>Number and transmission rates</li> </ul>   |  | 1 x<br>10/100 Mbit/s      | P320-3: 1 x<br>10/100/1000 Mbit/s<br>P350-3: 2 x<br>10/100 Mbit/s | D410: –<br>D4x5: 2 x<br>10/100Mbit/s     |
| <b>Further communication interfaces</b>   |  |                           |   |  |
| <ul style="list-style-type: none"> <li>Serial interfaces</li> </ul>   |  | –                         | 1   | –  |
| <ul style="list-style-type: none"> <li>USB interfaces</li> </ul>  | P350-3: e.g. for mouse and keyboard<br>D4x5: for upgrading D4x5 Control Units using a USB memory stick                     | –                         | P320-3: 4 x USB 2.0<br>P350-3: 4 x USB 2.0                        | D410: –<br>D4x5: 2                       |
| <ul style="list-style-type: none"> <li>DRIVE-CLiQ interfaces</li> </ul>   |  | –                         | –   | D410: 1<br>D425/D435: 4<br>D445-1: 6     |
| <b>Connections over PROFIBUS DP and Ethernet/PROFINET</b>   |  |                           |   |  |
| The connection resources can be assigned as required, over PROFIBUS DP or Ethernet.   | PROFINET on SIMOTION C requires C240 PN  |                           |   |  |
| <ul style="list-style-type: none"> <li>PROFIBUS DP</li> </ul>   |  | C240: ●<br>C240 PN: ●     | P320-3: –<br>P350-3 DP: ●<br>P350-3 PN: ○                         | D410 DP: ●<br>D410 PN: –<br>D4x5: ●      |
| <ul style="list-style-type: none"> <li>Ethernet/PROFINET</li> </ul>   |  | C240: ●/–<br>C240 PN: ●/● | P320-3: ●/●<br>P350-3 DP: ●/○<br>P350-3 PN: ●/●                   | D410 DP: –/<br>D410 PN: –/<br>D4x5: ●/○  |
| <b>Online connections, max.</b>   |  |                           |   |  |
| <ul style="list-style-type: none"> <li>SIMOTION SCOUT engineering system (SCOUT occupies up to 3 online connections)</li> </ul>   |  | 16<br>2                   | 16<br>2   | 16<br>2                                  |
| <ul style="list-style-type: none"> <li>HMI</li> </ul>   |  | 5                         | 5   | 5  |
| <ul style="list-style-type: none"> <li>OPC</li> </ul>   |  | ●                         | ●   | ●  |
| <ul style="list-style-type: none"> <li>Basic communication Xsend / Xreceive (not via Ethernet)</li> </ul>   |  | 5                         | 5   | 5  |
| <ul style="list-style-type: none"> <li>Standard TCP/IP connections</li> </ul>   |  | 45                        | 40  | D410: 45<br>D4x5: 75                     |
| <ul style="list-style-type: none"> <li>SIMOTION IT</li> </ul>   |  | ●                         | ●   | ●  |

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <div><div><div><div><div></div><div>Basic version<br/>(function or license is purchased with the device or SCOUT)</div></div><div><div></div><div>Option<br/>(must be acquired as software/hardware)</div></div><div><div></div><div>Not possible</div></div></div></div></div>   | Notes   | SIMOTION<br>C240/C240 PN            | SIMOTION<br>P320-3/P350-3           | SIMOTION<br>D4xx                    |
|---|---|-------------------------------------|-------------------------------------|-------------------------------------|
| Communication (continued)   |   |                                     |                                     |                                     |
| <div>Communication functions over PROFIBUS between:</div> <div><div><div><div></div><div>SIMOTION – SIMATIC HMI/WinCC flexible</div><div><div>- HMI data exchange: Support from the SIMOTION operating system</div><div>- Plant-wide access to process data and displays</div><div>- Interrupt mechanism: Alarms are event-driven</div></div></div><div><div><div></div><div>SIMOTION – SIMATIC HMI/ProToolPro</div><div><div>- HMI data exchange: Support from the SIMOTION operating system</div><div>- Interrupt mechanism: Alarms are event-driven</div></div></div><div><div><div></div><div>SIMOTION – SIMOTION</div><div><div>- Distributed I/O mechanisms</div><div>Process image, e.g. (% I1.3)</div><div>I/O variables (symbolic)</div><div>- XSND/XRCV, max. 200 bytes</div></div></div><div><div><div></div><div>SIMOTION – SIMATIC S7</div><div><div>- Distributed I/O mechanisms</div><div>Process image, e.g. (% I1.3)</div><div>I/O variables</div><div>- XSND/XRCV, max. 76 bytes</div></div></div><div><div><div></div><div>SIMOTION – SIMATIC NET OPC</div></div><div><div><div></div><div>SIMOTION – PG/PCs with STEP 7 and SCOUT</div></div><div><div><div></div><div>PROFIBUS DP slave-to-slave communication</div></div></div></div></div></div></div></div></div></div> | Basic version with regard to SIMOTION   | <div></div>                         | <div></div>                         | <div></div>                         |
| <div>Communication functions over PROFINET IO between:</div> <div><div><div><div></div><div>SIMOTION – SIMOTION</div><div><div>- Distributed I/O mechanisms</div><div>Process image, e.g. (% I1.3)</div><div>I/O variables (symbolic)</div></div></div><div><div><div></div><div>SIMOTION – SIMATIC S7</div><div><div>- Distributed I/O mechanisms</div><div>Process image, e.g. (% I1.3)</div><div>I/O variables</div><div>- For SIMATIC – SIMOTION: SIMOTION as I-Device</div><div>- For SIMOTION – SIMATIC: over SIMATIC CP</div></div></div><div><div><div></div><div>Slave-to-slave communication between SIMOTION controllers</div></div></div></div></div></div>   | <div>Basic version with regard to SIMOTION</div> <div>PROFINET standard-feature on C240 PN, P320-3, P350-3 PN, D410 PN.</div> <div>On P350-3 DP and D4x5 optionally by means of PROFINET board.</div> | <div></div> <div></div> <div></div> | <div></div> <div></div> <div></div> | <div></div> <div></div> <div></div> |

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>  | Notes                                 | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3 | SIMOTION D4xx        |
|--|---------------------------------------|-----------------------|------------------------|----------------------|
| <b>Communication (continued)</b>   |                                       |                       |                        |                      |
| <b>Communication functions over Ethernet/PROFINET between:</b> <ul style="list-style-type: none"> <li>• SIMOTION – SIMATIC HMI/WinCC flexible <ul style="list-style-type: none"> <li>- HMI data exchange: Support from the SIMOTION operating system</li> <li>- Plant-wide access to process data and displays</li> <li>- Interrupt mechanism: Alarms are event-driven</li> </ul> </li> <li>• SIMOTION – SIMATIC HMI/ProToolPro <ul style="list-style-type: none"> <li>- HMI data exchange: Support from the SIMOTION operating system</li> <li>- Interrupt mechanism: Alarms are event-driven</li> </ul> </li> <li>• SIMOTION – SIMATIC NET OPC</li> <li>• SIMOTION IT OPC XML-DA (over Ethernet) <ul style="list-style-type: none"> <li>- Open communication over TCP/IP and SOAP standard protocols</li> <li>- Clients on any hardware with various operating systems (Windows, Linux, ...)</li> <li>- According to OPC Foundation standard OPC XML-DA V1.01</li> </ul> </li> <li>• SIMOTION MIIF: Multipurpose Information Interface <ul style="list-style-type: none"> <li>- Symbolic access to SIMOTION data via Ethernet</li> <li>- SIMOTION as server, e.g. operator panels as clients</li> </ul> </li> <li>• SIMOTION – PG/PCs with STEP 7 and SCOUT</li> <li>• Ethernet/PROFIBUS DP routing</li> </ul> | Not for D410 DP                       | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |
|  |                                       | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>1)</sup>      |
|  |                                       | ○                     | ○                      | – (D410)<br>○ (D4x5) |
|  |                                       | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |
| <b>UDP and TCP/IP communication functions over Ethernet/PROFINET between:</b> <ul style="list-style-type: none"> <li>• SIMOTION – SIMOTION</li> <li>• SIMOTION – SIMATIC</li> <li>• SIMOTION – PC</li> </ul>   | Not for D410 DP                       | ●                     | ●                      | ●                    |
| <b>Serial communication via a point-to-point connection</b> <ul style="list-style-type: none"> <li>• CP 340 and CP 341 communication modules</li> <li>• 1SI communication module (connected over ET 200S)</li> </ul>   | Basic version with regard to SIMOTION | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |
| <b>Communication via AS-Interface</b> <ul style="list-style-type: none"> <li>• CP 343-2 P communication module</li> <li>• DP/AS Interface Link 20E/Link Advanced</li> <li>• IE/AS-Interface link PN IO</li> </ul>  | Basic version with regard to SIMOTION | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |
| <b>Connectable network couplers</b> <ul style="list-style-type: none"> <li>• DP/DP coupler for connecting two PROFIBUS DP networks</li> <li>• PN/PN coupler for connecting two PROFINET IO networks</li> </ul>   | Basic version with regard to SIMOTION | ●                     | ●                      | ●                    |
|  |                                       | ●                     | ●                      | ●                    |

<sup>1)</sup> Subject to license

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <div><div><div>● Basic version<br/>(function or license is purchased with the device or SCOUT)</div><div>○ Option<br/>(must be acquired as software/hardware)</div><div>– Not possible</div></div></div>  | Notes                               | SIMOTION<br>C240/C240 PN | SIMOTION<br>P320-3/P350-3 | SIMOTION<br>D4xx |
|---|-------------------------------------|--------------------------|---------------------------|------------------|
| SIMOTION Kernel   |                                     |                          |                           |                  |
| <b>Execution system</b>   |                                     |                          |                           |                  |
| <div>● System tasks for motion control<ul style="list-style-type: none"><li>- SERVO (position control cycle)</li><li>- IPO (interpolation cycle)</li><li>- MotionTasks (sequential)</li><li>- ServoSynchronousTask (cyclic, synchronous with the position control cycle)</li></ul></div>  |                                     | ●                        | ●                         | ●                |
|   |                                     | 20                       | 32                        | 32               |
|   |                                     | 1                        | 1                         | 1                |
| <div>● Task structure/program execution<ul style="list-style-type: none"><li>- BackgroundTask (cyclic)</li><li>- TimerInterruptTasks (time-controlled down to 1 ms)</li><li>- IPOSynchronousTask (cyclic, synchronous with the interpolation cycle)</li><li>- InterruptTasks (for user) (event-driven)</li><li>- TControlTasks (temperature control)</li><li>- StartupTask (for transition from STOP to RUN)</li><li>- ShutdownTask (for transition from RUN to STOP)</li></ul></div>   | Adjustable monitoring time          | 1                        | 1                         | 1                |
|   |                                     | 5                        | 5                         | 5                |
|   |                                     | 2                        | 2                         | 2                |
|   |                                     | 2                        | 2                         | 2                |
|   |                                     | 5                        | 5                         | 5                |
|   |                                     | 1                        | 1                         | 1                |
|   |                                     | 1                        | 1                         | 1                |
| <div>● Task structure/error processing (SystemInterruptTasks)<ul style="list-style-type: none"><li>- ExecutionFaultTask (starts in the event of an error during program execution)</li><li>- TechnologicalFaultTask (starts in the event of an error on a technology object)</li><li>- PeripheralFaultTask (starts in the event of an error on the I/O)</li><li>- TimeFaultTask (starts in the event of a TimerInterruptTask timeout)</li><li>- TimeFaultBackgroundTask (starts in the event of a BackgroundTask timeout)</li></ul></div> | Central troubleshooting is possible |                          |                           |                  |
|   |                                     | 1                        | 1                         | 1                |
|   |                                     | 1                        | 1                         | 1                |
|   |                                     | 1                        | 1                         | 1                |
|   |                                     | 1                        | 1                         | 1                |
|   |                                     | 1                        | 1                         | 1                |
| <div>● Program organization<ul style="list-style-type: none"><li>- Units (source program)</li><li>- Programs</li><li>- Function blocks (FBs)</li><li>- Functions (FCs)</li><li>- System functions (SFs)</li><li>- Libraries</li></ul></div>   |                                     | ●                        | ●                         | ●                |

# SIMOTION Motion Control System

## Overview of SIMOTION functions

|  |  |                       |                        |                 |
|--|--|-----------------------|------------------------|-----------------|
| <ul style="list-style-type: none"><li>● Basic version (function or license is purchased with the device or SCOUT)</li><li>○ Option (must be acquired as software/hardware)</li><li>– Not possible</li></ul>  | Notes  | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3 | SIMOTION D4xx   |
| SIMOTION Kernel (continued)  |  |                       |                        |                 |
| <b>PLC command set</b><br>(according to IEC 61131-3; optionally expandable by technology functions)<br>System functions, e.g. for <ul style="list-style-type: none"><li>• Interrupt and error handling</li><li>• Copying data</li><li>• Clock functions</li><li>• Diagnostic functions</li><li>• Module parameterization</li><li>• Operating mode transitions, Run/Stop</li><li>• Reading and writing of data blocks from the user program to an exchangeable memory medium</li><li>• DPV1 communication to DP slaves</li><li>• Read/write drive parameters</li><li>• DP slaves/PROFINET devices can be connected and disconnected from application</li><li>• DP slave and IP address can be set in user program</li><li>• DP station diagnostics</li><li>• Activate/deactivate technology objects</li><li>• Counter (IEC commands)</li><li>• Timer (IEC commands)</li><li>• Real-time clock, format [DATE_AND_TIME]</li></ul> |  | ●                     | ●                      | ●               |
|  |  | ●                     | ●                      | ●               |
| Motion Control technology package  |  |                       |                        |                 |
| <b>Technology functions</b> <ul style="list-style-type: none"><li>• Motion Control Basic</li><li>• POS – Positioning</li><li>• GEAR – Synchronous operation</li><li>• CAM – Cam</li><li>• PATH – Path interpolation</li></ul> The technology package functions are accessed via language commands, system variables and through function blocks in accordance with PLCopen.  | No license required  | ●                     | ●                      | ●               |
|  | Use of the functions during runtime is subject to license.<br><br>SIMOTION D410 already contains the technology functions for precisely one real axis.<br>(D410 no PATH) | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  |  | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  |  | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  |  | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  |  |                       |                        |                 |
| <b>Axis types</b> <ul style="list-style-type: none"><li>• Electrical/hydraulic/stepper motor axes</li><li>• Speed-controlled axis</li><li>• Positioning axes<ul style="list-style-type: none"><li>- Rotary axis</li><li>- Linear axis</li><li>- Modulo for linear and rotary axes</li><li>- Force/pressure-controlled axis</li><li>- Force/pressure-limited axis</li></ul></li><li>• Synchronous axis</li><li>• Path axis</li><li>• Cam axis</li><li>• Virtual axis</li><li>• Simulation axis</li></ul>  |  | ●                     | ●                      | ●               |
|  |  | ●                     | ●                      | ●               |
|  | Included with POS license or higher  | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  |  |                       |                        |                 |
|  |  |                       |                        |                 |
|  | Included with GEAR license or higher   | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  | Included with GEAR license or higher   | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  | Included with CAM license or higher  | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>2)</sup> |
|  | ●  | ●                     | ●                      |                 |
|  | ●  | ●                     | ●                      |                 |

<sup>1)</sup> Use of the functions during runtime is subject to license.

<sup>2)</sup> Subject to license only with SIMOTION D4x5. SIMOTION D410 already contains the technology functions for precisely one real axis.

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>  | Notes  | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3 | SIMOTION D4xx                  |
|--|--|-----------------------|------------------------|--------------------------------|
| <b>Motion Control technology package</b> (continued)   |  |                       |                        |                                |
| <b>Systems of units</b>  |  |                       |                        |                                |
| • Metric (mm, m, Nm, Pa, ...)  |  | ●                     | ●                      | ●                              |
| • US (inch, feet, PSI, lb, ...)  |  | ●                     | ●                      | ●                              |
| <b>Axis monitoring functions</b>   |  |                       |                        |                                |
| The activated monitoring functions are executed cyclically.  |  | ●                     | ●                      | ●                              |
| • Watchdog   |  |                       |                        |                                |
| • Hardware and software limit switches   |  |                       |                        |                                |
| • Position/zero-speed monitoring   |  |                       |                        |                                |
| • Dynamic following error monitoring   |  |                       |                        |                                |
| • Encoder monitoring, cable break  |  |                       |                        |                                |
| • Force/pressure monitoring  |  |                       |                        |                                |
| • Setpoint   |  |                       |                        |                                |
| • Plausibility in data exchange  |  |                       |                        |                                |
| <b>Other technology packages</b>   |  |                       |                        |                                |
| <b>TCControl technology package</b>  |  |                       |                        |                                |
| • With technology functions for temperature control  |  | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>1)</sup>                |
| <b>Drive Control Chart (DCC) technology package</b>  |  |                       |                        |                                |
| • With technology functions for Drive Control Chart  |  | ●                     | ●                      | ●                              |
| <b>Direct Product Motion (DPM) technology package</b>  |  |                       |                        |                                |
| • With technology functions for intelligent, contact-free product synchronization  |  | ○ <sup>1)</sup>       | ○ <sup>1)</sup>        | ○ <sup>1)</sup> (D435, D445-1) |
| <b>Multipurpose Information Interface (MIIF) technology package</b>  |  |                       |                        |                                |
| • With multi-functional communication functions  |  | ○ <sup>1)</sup>       | ○ <sup>1)</sup>        | ○ <sup>1)</sup> (D4x5)         |
| <b>SIMOTION IT</b>   |  |                       |                        |                                |
| <b>SIMOTION IT DIAG</b>  |  |                       |                        |                                |
| Integrated web server on the SIMOTION controller   |  |                       |                        |                                |
| • Service and diagnostic functions provided via Internet browser with extensive information functions (hardware/software version display, processor utilization, memory usage, diagnostic buffer, task runtimes, user logbook, operating state, time of day, etc.) | Licensed through the SIMOTION IT DIAG software option or by the SIMOTION IT combined license | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>1)</sup>                |
| • Access to all variables on the control system using variable browser functions (watch tables, trace)   |  |                       |                        |                                |
| • Generation of diagnostic data (diagnostic buffer, alarms, states of variables, ...)  |  |                       |                        |                                |
| • Project update   |  |                       |                        |                                |
| • Firmware update  |  |                       |                        |                                |
| • Password-protected access  |  |                       |                        |                                |
| • Remote access to SIMOTION file system  |  |                       |                        |                                |
| • User-defined service and diagnostic pages  |  |                       |                        |                                |

<sup>1)</sup> Subject to license

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>   | Notes  | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3 | SIMOTION D4xx   |
|---|--|-----------------------|------------------------|-----------------|
| <b>SIMOTION IT (continued)</b>  |  |                       |                        |                 |
| <b>SIMOTION IT OPC XML-DA</b><br>Integrated OPC XML-DA server on the SIMOTION controller <ul style="list-style-type: none"> <li>• Read/write variables</li> <li>• Browse variables</li> <li>• Trace interface via SOAP</li> <li>• Password-protected access</li> </ul>  | Licensed by the SIMOTION IT combined license | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>1)</sup> |
| <b>SIMOTION IT Virtual Machine</b><br>Integrated Java runtime environment on the SIMOTION controller <ul style="list-style-type: none"> <li>• Read and write access to the SIMOTION variables</li> <li>• Read and write access to the non-volatile memory (NVRAM)</li> <li>• Use of system functions (functions of the technology objects)</li> <li>• Use of standard Java classes in the device (file access, network functions, string functions, ...)</li> <li>• Creation of servlets, for the purpose of enhancing the display of menu interfaces in HTML pages</li> </ul>  | Licensed by the SIMOTION IT combined license | ● <sup>1)</sup>       | ● <sup>1)</sup>        | ● <sup>1)</sup> |
| <b>SIMOTION SCOUT engineering system</b>  |  |                       |                        |                 |
| <b>SIMOTION SCOUT basic functions</b> <ul style="list-style-type: none"> <li>• SCOUT Workbench</li> <li>• STARTER Drive commissioning/parameterization</li> <li>• Hardware and network configuration</li> <li>• Diagnostics for testing and commissioning</li> <li>• Axis control panel</li> <li>• Program editors/programming languages (command set in accordance with IEC 61131-3)               <ul style="list-style-type: none"> <li>- Structured Text (ST)</li> <li>- Ladder Logic (LAD)</li> <li>- Function Block Diagram (FBD)</li> <li>- Motion Control Chart (MCC)</li> </ul> </li> <li>• Creation of cams (basic)</li> <li>• Creation of technology objects</li> <li>• Technology tools (function generator)</li> <li>• Operator interface, online help and documentation in English, French, German and Italian</li> </ul> |  | ●                     | ●                      | ●               |
| <b>SIMOTION SCOUT optional packages</b> <ul style="list-style-type: none"> <li>• CamTool (graphical cam editor)</li> <li>• DCC editor (graphical editor for Drive Control Chart)</li> </ul>   |  | ○                     | ○                      | ○               |

<sup>1)</sup> Subject to license



# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>   | Notes | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3 | SIMOTION D4xx |
|---|-------|-----------------------|------------------------|---------------|
| <b>Testing and diagnostics with SIMOTION SCOUT</b>  |       |                       |                        |               |
| <b>Information functions</b> <ul style="list-style-type: none"> <li>• Hardware/software version</li> <li>• Processor utilization</li> <li>• Memory utilization</li> <li>• Diagnostic buffer</li> <li>• Task runtimes</li> <li>• User logbook</li> <li>• Operating status</li> <li>• Time</li> </ul>   |       | ●                     | ●                      | ●             |
| <b>Comparison function for projects</b> <ul style="list-style-type: none"> <li>• Comparison of objects in projects: <ul style="list-style-type: none"> <li>- Between offline projects</li> <li>- Between online and offline projects</li> </ul> </li> <li>• Detailed comparison: Shows differences between objects in detail</li> <li>• Matching: Projects and objects can be merged</li> </ul>   |       | ●                     | ●                      | ●             |
| <b>Program test functions</b> <ul style="list-style-type: none"> <li>• Control/status variables</li> <li>• Watch tables</li> <li>• Status program/FB/FC (with specification of the call point)</li> <li>• Single-step MCC</li> <li>• Breakpoints in all languages (ST, MCC, LAD/FBD)</li> </ul>   |       | ●                     | ●                      | ●             |
| <b>Trace</b> <ul style="list-style-type: none"> <li>• Recording of I/O, system and program variables</li> <li>• Recording from position control cycle onwards (n × position control cycle)</li> <li>• Trigger: Instantaneous, rising/falling edge, at code point system variable</li> <li>• Measuring functions for optimizing the speed/position controller (step response, ramp, frequency curve)</li> <li>• Automatic setting of the speed controller/position controller</li> <li>• Bode diagram, FFT analysis, function generator, mathematical functions</li> <li>• Endless trace</li> <li>• Recording over defined measuring period</li> </ul> |       | ●                     | ●                      | ●             |

# SIMOTION Motion Control System

## Overview of SIMOTION functions

| <ul style="list-style-type: none"> <li>● Basic version (function or license is purchased with the device or SCOUT)</li> <li>○ Option (must be acquired as software/hardware)</li> <li>– Not possible</li> </ul>  | Notes  | SIMOTION C240/C240 PN | SIMOTION P320-3/P350-3 | SIMOTION D4xx                  |
|--|--|-----------------------|------------------------|--------------------------------|
| <b>Testing and diagnostics with SIMOTION SCOUT (continued)</b>   |  |                       |                        |                                |
| <b>Further diagnostic functions</b>  |  |                       |                        |                                |
| <ul style="list-style-type: none"> <li>• Module diagnostics               <ul style="list-style-type: none"> <li>- Centralized</li> <li>- Distributed (e.g. ET 200M)</li> </ul> </li> </ul>  |  | ●                     | ●                      | ●                              |
| <ul style="list-style-type: none"> <li>• PROFIBUS DP station diagnostics</li> <li>• PROFINET station diagnostics</li> </ul>  | PROFINET standard feature on C240 PN, P320-3, P350-3 PN, D410 PN. Optional on P350-3 DP and D4x5 by means of PROFINET board. | ●                     | ●                      | ●                              |
| <ul style="list-style-type: none"> <li>• Diagnostic buffer               <ul style="list-style-type: none"> <li>- No. of entries, max.</li> </ul> </li> </ul>  | On SIMOTION D, one diagnostic buffer is provided for SIMOTION and another for the integrated SINAMICS drive.                 | 200                   | 200                    | D410: 2 × 100<br>D4x5: 2 × 200 |
| <ul style="list-style-type: none"> <li>• Process fault diagnostics (Alarm_S)               <ul style="list-style-type: none"> <li>- Messages from user program</li> <li>- No. of entries, max.</li> </ul> </li> </ul>  |  | ●                     | ●                      | ●                              |
|  |  | 40                    | 40                     | 40                             |
| <b>Engineering drives</b>  |  |                       |                        |                                |
| <b>STARTER (integrated in SCOUT)</b>   |  | ●                     | ●                      | ●                              |
| Drive/commissioning software for:  |  |                       |                        |                                |
| <ul style="list-style-type: none"> <li>• MICROMASTER 410/420/430/440</li> <li>• COMBIMASTER 411</li> <li>• SINAMICS S / SINAMICS G</li> </ul>  |  |                       |                        |                                |
| <b>Drive ES BASIC</b>  |  | ●                     | ●                      | ●                              |
| Engineering tools and integrated data storage in SIMATIC S7/SIMOTION projects for:   | Drive ES BASIC is included complete with license in the SIMOTION SCOUT software package.                                     |                       |                        |                                |
| <ul style="list-style-type: none"> <li>• MICROMASTER 410/420/430/440 (STARTER)</li> <li>• COMBIMASTER 411 (STARTER)</li> <li>• SINAMICS S/SINAMICS G (STARTER)</li> <li>• SIMODRIVE (SimoCom U/SimoCom A)</li> <li>• SIMOVERT MASTERDRIVES (DriveMonitor)</li> </ul> |  |                       |                        |                                |

# SIMOTION Motion Control System

Notes

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