

<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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>System clocks</b>					
<b>PROFIBUS cycle</b>	SIMOTION D: For integrated drives and drives on connected CX32-2: 0.5 ... 8 ms <sup>1)</sup> P320-4: With IsoPROFIBUS board option	1 ... 8 ms  (in 0.25 ms steps)	1 ... 8 ms  (in 0.125 ms steps)	1 ... 8 ms  (in 0.125 ms steps)	1 ... 8 ms  (in 0.125 ms steps)
<b>PROFINET cycle</b>	D455-2 DP/PN: min. 0.125 ms (only with SCOUT TIA) Please observe the notes about usage in the SIMOTION D4x5-2 manuals.	C240 PN: 0.5 ... 4 ms  (in 0.25 ms steps)	0.25 ... 4 ms  (in 0.125 ms steps)	D410-2 DP/PN: 0.25 ... 4 ms  (in 0.125 ms steps)	D4x5-2 DP/PN: 0.25 ... 4 ms <sup>4)</sup>  (in 0.125 ms steps)
<b>Position control and interpolation cycle</b>					
<ul style="list-style-type: none"> <li>● Minimum position control cycle</li> </ul>	The position control cycle (SERVO) includes the position controller, the actual-value and setpoint system and the axis monitoring functions.	0.5 ms	0.25 ms	1/0.5 ms <sup>3)</sup>	0.5 ms  As of D435-2 (DP/PN only): 0.25 ms <sup>4)</sup>
<ul style="list-style-type: none"> <li>● Position control cycle to PROFIBUS cycle</li> <li>● Position control cycle to PROFINET cycle</li> </ul>		1:1, 2:1  1:1 ... 16:1	1:1, 2:1  1:1 ... 16:1	1:1 ... 8:1  1:1 ... 16:1	1:1 ... 8:1  1:1 ... 16:1 (1:1) <sup>2)</sup>
<ul style="list-style-type: none"> <li>● Interpolation cycle 1 (IPO) to Position control cycle</li> </ul>	The axis motion control functions are performed in the interpolation cycle. The position control cycle and the interpolation cycle are a multiple of the PROFINET/PROFIBUS cycle. The transformation ratios are adjustable.	1:1 ... 6:1	1:1 ... 6:1	1:1 ... 6:1	1:1 ... 6:1 (1:1 ... 4:1) <sup>2)</sup>
<ul style="list-style-type: none"> <li>● Interpolation cycle 2 (IPO2) to interpolation cycle 1 (IPO1)</li> </ul>		2:1 ... 64:1	2:1 ... 64:1	2:1 ... 64:1	2:1 ... 64:1
<ul style="list-style-type: none"> <li>● Fast position control cycle (SERVO<sub>Fast</sub>) to PROFINET cycle</li> <li>● Fast interpolation cycle (IPO<sub>Fast</sub>) to fast position control cycle (SERVO<sub>Fast</sub>)</li> </ul>	Values with SERVO <sub>Fast</sub> and IPO <sub>Fast</sub> activated for D435-2 DP/PN, D445-2 DP/PN and D455-2 DP/PN (for details, see SIMOTION D4x5-2 manuals)	–  –	–  –	–  –	1:1  1:1 ... 4:1

Notes:**Communication via PROFINET and PROFIBUS**

The availability of a PROFINET or PROFIBUS interface depends on the controller variant implemented. The SIMOTION controllers are equipped with PROFINET and/or PROFIBUS as standard. This must be considered for connection options and functions via PROFINET and PROFIBUS.

**SIZER for Siemens Drives engineering tool**

The performance requirements for a SIMOTION application can be estimated using the engineering tool SIZER for Siemens Drives. For more information about SIZER for Siemens Drives, refer to section Drive Technology/Selection and engineering tools/SIZER for Siemens Drives engineering tool in the Industry Mall, and chapter Lifecycle Services in Catalog PM 21.

<sup>1)</sup> D435-2 DP/PN, D445-2 DP/PN, D455-2 DP/PN: from 0.25 ms onwards

<sup>2)</sup> Values in brackets with SERVO<sub>Fast</sub> and IPO<sub>Fast</sub> activated (for details, see SIMOTION D4x5-2 manuals).

<sup>3)</sup> 1 ms when using the TO axis and the integrated drive control

<sup>4)</sup> D435-2 DP/PN, D445-2 DP/PN, D455-2 DP/PN: 0.25 ms; D455-2 DP/PN: 0.125 ms (only with ET 200SP, SCOUT TIA and SERVO<sub>Fast</sub>)  
You will find detailed information on the cycle clock settings, particularly for cycle clocks ≤ 0.25 ms, in the SIMOTION D4x5-2 manuals.

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### Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>Dynamic Servo Control (DSC)</b>					
<ul style="list-style-type: none"> <li>● With Dynamic Servo Control (DSC) the control loop of the position controller is located in the drive (with cycles of 125 µs or higher).</li> </ul>	With SINAMICS S120 drives	●	●	●	●
<b>Memory for system data</b>					
<ul style="list-style-type: none"> <li>● Storage media (externally pluggable)</li> </ul>	MMC: Micro Memory Card CF: CompactFlash card CFast: CFast card SSD: Solid State Drive P320-4, internal: P320-4 E: CFast, 8 GB P320-4 S: SSD, 160 GB	MMC 64 MB	CFast 4 GB	CF 1 GB	CF 1 GB
<ul style="list-style-type: none"> <li>● Retentive memory (for retentive user data/ retain variables)</li> </ul>		107 KB	364 KB	108 KB	D425-2/ D435-2: 364 KB D445-2/ D455-2: 512 KB
<ul style="list-style-type: none"> <li>● Persistent memory (for user data/data storage on exchangeable memory medium)</li> </ul>		48 MB	3.7 GB	300 MB	300 MB
<ul style="list-style-type: none"> <li>● RAM disk (Load memory for user data/ for download of the configuration and programs)</li> </ul>	Memory sizes can be configured with SIMOTION P	29 MB production version ≥ G and V4.4 and above	76 MB	47 MB	D425-2: 31 MB D435-2: 41 MB D445-2: 56 MB D455-2: 76 MB
<ul style="list-style-type: none"> <li>● RAM (user memory for code and data)</li> </ul>	D410-2 and D4x5-2: additional 20 MB for Java applications	67 MB production version ≥ G and V4.4 and above	256 MB	96 MB	D425-2: 64 MB D435-2: 86 MB D445-2: 160 MB D455-2: 320 MB
<b>Address ranges</b>					
<ul style="list-style-type: none"> <li>● Logical I/O address space in KB</li> </ul>		4	4	16	16
<ul style="list-style-type: none"> <li>● Physical I/O address space in KB <ul style="list-style-type: none"> <li>- PROFIBUS: max. per ext. subnet each for inputs and outputs</li> <li>- PROFINET: max. for inputs and outputs (each)</li> </ul> </li> </ul>	When PROFIBUS and PROFINET are used, the total address space applies  D4x5-2 DP/PN: If CBE30-2 is used as a second PROFINET interface, 2 × 6 KB physical address space is available.	1	1	1	1
		4	4	6	6
<ul style="list-style-type: none"> <li>● Permanent process image for BackgroundTask (I/O variables) in bytes</li> </ul>		64	64	64	64
<ul style="list-style-type: none"> <li>● Additional configurable process image for each cyclic task (I/O variables)</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● Address space for each PROFIBUS DP station</li> </ul>		244 bytes	244 bytes	244 bytes	244 bytes
<ul style="list-style-type: none"> <li>● Address space for each PROFINET device</li> </ul>	1400 bytes	1400 bytes	1400 bytes	1400 bytes	

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<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>					
<b>Drives on SIMOTION</b>					
<b>Maximum number of axes</b>	Higher number of axes possible using multiple synchronized devices	32 axes	128 axes	8 axes (typ. 2 to 3 axes)	D425-2: 16 axes D435-2: 32 axes D445-2: 64 axes D455-2: 128 axes
<b>Integrated drive control</b> The drive control integrated in SIMOTION D is based on SINAMICS S120 Control Units: <ul style="list-style-type: none"> <li>● With SIMOTION D410-2 on the CU310-2 Control Unit, firmware version V4.x</li> <li>● With SIMOTION D4x5-2/CX32-2 on the CU320-2 Control Unit, firmware version V4.x</li> </ul> The BOP20 Basic Operator Panel and the basic positioner EPos are not supported by the integrated drive control.	SIMOTION D4x5-2: CX32-2 Controller Extension can be used to provide additional drive controls: D425-2: max. 3 CX32-2 <sup>1)</sup> D435-2: max. 5 CX32-2 <sup>1)</sup> D445-2: max. 5 CX32-2 <sup>1)</sup> D455-2: max. 5 CX32-2 <sup>1)</sup>  Per CX32-2: Servo: 1..6 Vector: 1..6 V/f: 1..12 (alternatively)	–	–	Servo: 1 Vector: 1 V/f: 1 (alternatively)	Servo: 1..6 Vector: 1..6 V/f: 1..12 (alternatively)
<b>Speed-controlled axis over PROFIBUS DP</b> <ul style="list-style-type: none"> <li>● SINAMICS S/SINAMICS G (servo/vector control)</li> <li>● Drives with speed profile in accordance with standard message frames (PROFdrive profile 1-6)</li> </ul>	SIMOTION D: SINAMICS as the standard drive technology	●	○	●	●
<b>Position-controlled axis over PROFIBUS DP with PROFdrive</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>● Certified servo/vector/stepper drives in acc. with standard message frames (PROFdrive profile 1-6)</li> </ul>	SIMOTION D: SINAMICS as the standard drive technology  Also linear motor <sup>2)</sup>  With external encoder (limited dynamic response)	●	○	●	●

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<sup>1)</sup> In principle, a 4th or 6th CX32-2 Controller Extension can also be connected, e.g. for implementing modular machine concepts. In this case, no drives/drive components can be connected any longer to the integrated drive control of the SIMOTION D4x5-2. All drives must then be operated via the Controller Extensions.

<sup>2)</sup> See chapter SIMOTICS linear and torque motors in Catalog D 21.4 and Motors for Motion Control/SIMOTICS L linear motors and .../SIMOTICS T torque motors in the Industry Mall.

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<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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Drives on SIMOTION (continued)</b>					
<b>Speed and position-controlled axis over PROFINET IO with IRT (PROFdrive)</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>● Certified servo/vector/stepper drives in acc. with standard message frames (PROFdrive profile 1-6)</li> </ul>	SIMOTION D: SINAMICS as the standard drive technology  Also linear motor <sup>1)</sup> With external encoder (limited dynamic response)	– (C240) ● (C240 PN)	●	– D410-2 DP ● D410-2 DP/PN	– D4x5-2 DP ● D4x5-2 DP/PN
<b>Distributed servo drive (SINAMICS S120M)</b>	SIMOTION C/P/D: Via CU320-2 D4x5-2: On integrated drive control	●	●	●	●
<b>Drives with analog ±10 V setpoint interface</b> <ul style="list-style-type: none"> <li>● Via onboard drive interface</li> <li>● Via ADI 4 (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  See <a href="#">SIMOTION system components</a> → I/O components in <a href="#">Catalog PM 21</a> .	4 (C240) – (C240 PN)	–	–	–
<b>Hydraulic drives over ±10 V setpoint interface</b> <ul style="list-style-type: none"> <li>● Via onboard drive interface</li> <li>● Via ADI 4 (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>		4 (C240) – (C240 PN)	–	–	–
		●	○	●	●
		●	○	●	●
		●	●	●	●
		●	●	●	●
<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	4 (C240) – (C240 PN)	–	–	–
		●	○	●	●

<sup>1)</sup> See chapter SIMOTICS linear and torque motors in Catalog D 21.4 and Motors for Motion Control/SIMOTICS L linear motors and .../SIMOTICS T torque motors in the Industry Mall.

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>Encoders on SIMOTION</b>					
<b>Measuring systems that can be connected over integrated interface</b>					
• Qty.	See Measuring systems in Catalog D 21.4.				
• Absolute encoder with SSI interface	SIMOTION D/ CX32-2: Encoder connection via DRIVE-CLiQ	4 (C240) – (C240 PN)	–	1	–
• Incremental measuring systems	C240: TTL D410-2: TTL/HTL	● (C240) – (C240 PN)	–	●	–
<b>Measuring systems that can be connected over bus</b>					
• Resolver, absolute encoder (SSI and EnDat), incremental encoder (TTL and sin/cos), etc.	Motor encoder on drive or encoder on ADI 4/IM 174 or PROFINET and PROFIBUS encoder	●	●	●	●
<b>Connection options for direct measuring systems (2nd to 8th encoders and external encoder)</b>					
• Via onboard interfaces		● (C240) – (C240 PN)	–	●	–
• Via SINAMICS S110/S120	SIMOTION D/ CX32-2: Encoder connection via DRIVE-CLiQ	●	●	●	●
• Isochronous PROFIBUS encoder	See Measuring systems in Catalog D 21.4.	●	○	●	●
• PROFINET encoder with IRT	See Measuring systems in Catalog D 21.4.	– (C240) ● (C240 PN)	●	– D410-2 DP ● D410-2 DP/PN	– D4x5-2 DP ● D4x5-2 DP/PN
• 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.	●	○	●	●
• Encoder on IM 174 (Interface Module for 4 Axes)		●	○	●	●
<b>Measuring inputs</b>					
<b>Onboard measuring inputs</b>					
• Qty.		C240: 2+4 C240 PN:4	–	8	16
• Reproducibility		6 μs	–	Typ. 5 μs	5 μs
<b>Measuring inputs on the drives</b>					
• SINAMICS S110 (CU305)		2/closed-loop control	2/closed-loop control	2/closed-loop control	2/closed-loop control
• SINAMICS S120 (CU310-2)		8/closed-loop control	8/closed-loop control	8/closed-loop control	8/closed-loop control
• SINAMICS S120 (CU320-2)		8/closed-loop control	8/closed-loop control	8/closed-loop control	8/closed-loop control
• SIMOTION CX32-2	D425-2: max. 3 CX32-2 <sup>1)</sup> D435-2: max. 5 CX32-2 <sup>1)</sup> D445-2: max. 5 CX32-2 <sup>1)</sup> D455-2: max. 5 CX32-2 <sup>1)</sup>	–	–	–	4/closed-loop control

<sup>1)</sup> In principle, a 4th or 6th CX32-2 Controller Extension can also be connected, e.g. for implementing modular machine concepts. In this case, no drives/drive components can be connected any longer to the integrated drive control of the SIMOTION D4x5-2. All drives must then be operated via the Controller Extensions.

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### Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>Measuring inputs (continued)</b>					
<b>Measuring inputs on the drives (continued)</b>					
<ul style="list-style-type: none"> <li>● Over TM15 Terminal Module on SINAMICS S120 or SIMOTION D/CX32-2</li> </ul>	See SIMOTION system components→ I/O components in Catalog PM 21.	24	24	24	24
<ul style="list-style-type: none"> <li>- Number of measuring inputs per Terminal Module, max.</li> <li>- Reproducibility</li> </ul>		125 μs	125 μs	125 μs	125 μs
<ul style="list-style-type: none"> <li>● Via ET 200MP TM Timer DIDQ 16×24V</li> </ul>	Can only be used with SCOUT TIA; Standard or High Feature interface module required.	8	8	8	8
<ul style="list-style-type: none"> <li>- Number of measuring inputs per Technology Module, max.</li> <li>- Reproducibility</li> </ul>		2 μs	2 μs	2 μs	2 μs
<ul style="list-style-type: none"> <li>● Via ET 200SP TM Timer DIDQ 10×24V</li> </ul>	Can be used with SCOUT and SCOUT TIA; High Feature interface module required.	4	4	4	4
<ul style="list-style-type: none"> <li>- Number of measuring inputs per Technology Module, max.</li> <li>- Reproducibility</li> </ul>		5 μs	5 μs	5 μs	5 μs
<b>Cam outputs</b>					
<b>High-speed output cams (hardware-supported output cams with higher resolution)</b>					
<ul style="list-style-type: none"> <li>● Onboard cam outputs</li> </ul>		●	–	●	●
<ul style="list-style-type: none"> <li>- Number of cam outputs, max.</li> <li>- Reproducibility</li> </ul>		8	–	8	8
<ul style="list-style-type: none"> <li>- Reproducibility</li> </ul>		70 μs	–	Typ. 125 μs	10 μs
<ul style="list-style-type: none"> <li>● Over TM15 Terminal Module to SINAMICS S120 or SIMOTION D/CX32-2</li> </ul>	See SIMOTION system components→ I/O components in Catalog PM 21.	24	24	24	24
<ul style="list-style-type: none"> <li>- Number of cam outputs per Terminal Module, max.</li> <li>- Reproducibility</li> </ul>		125 μs	125 μs	125 μs	125 μs
<ul style="list-style-type: none"> <li>● Via ET 200MP TM Timer DIDQ 16×24 V</li> </ul>	Can only be used with SCOUT TIA; Standard or High Feature interface module required.	16	16	16	16
<ul style="list-style-type: none"> <li>- Number of cam outputs per Technology Module, max.</li> <li>- Reproducibility</li> </ul>		2 μs	2 μs	2 μs	2 μs
<ul style="list-style-type: none"> <li>● Via ET 200SP TM Timer DIDQ 10×24V</li> </ul>	Can be used with SCOUT and SCOUT TIA; High Feature interface module required.	6	6	6	6
<ul style="list-style-type: none"> <li>- Number of cam outputs per Technology Module, max.</li> <li>- Reproducibility</li> </ul>		5 μs	5 μs	5 μs	5 μs

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### Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>Cam outputs (continued)</b>					
<b>Standard output cams</b> (updated in position controller cycle or IPO cycle, reproducibility of the output cam depends on the implemented I/O)					
<ul style="list-style-type: none"> <li>● Onboard cam outputs</li> </ul>		●	–	●	●
<ul style="list-style-type: none"> <li>● Over TM15 Terminal Module to SINAMICS S120 or SIMOTION D/CX32-2</li> </ul>	See SIMOTION system components → I/O components in Catalog PM 21.	●	●	●	●
<ul style="list-style-type: none"> <li>● Over S7-300 backplane bus of SIMOTION C</li> </ul>		●	–	–	–
<ul style="list-style-type: none"> <li>● Over PROFIBUS DP</li> </ul>	P320-4: IsoPROFIBUS board option	●	○	●	●
<ul style="list-style-type: none"> <li>● Over PROFINET IO</li> </ul>		– C240 ● C240 PN	●	– D410-2 DP ● D410-2 DP/PN	– D4x5-2 DP ● D4x5-2 DP/PN
<ul style="list-style-type: none"> <li>● Output to internal system variable</li> </ul>		●	●	●	●
<b>Integrated I/O interfaces</b>					
<b>Programmable digital inputs/outputs</b> (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 and ET 200SP/MP TM Timer DIDQ.	–	–	8	16
		–	–	8	8
		–	–	8	16
<b>Digital inputs</b> (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> </ul> </li> <li>- External zero mark signal for referencing, max.</li> <li>- Fail-safe digital inputs (F-DI)</li> </ul>	D410-2: The 3 F-DI can also be used as 6 DI.	18	–	5 + 6 (3 F-DI)	12
		2+4 (C240) 4 (C240 PN)	–	–	–
		4 (C240)	–	–	–
		–	–	3	–
<b>Digital outputs</b> (fixed outputs, cannot be parameterized)					
<ul style="list-style-type: none"> <li>● of which for outputs with specific functions <ul style="list-style-type: none"> <li>- High-speed cam outputs, max.</li> <li>- Fail-safe digital outputs (F-DO)</li> </ul> </li> </ul>	D410-2: The F-DO can also be used as DO.	8	–	1 (1 F-DO)	–
		8	–	–	–
		–	–	1	–
<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 inputs</b>					
SIMOTION D: D410-2: Also over TM31 D4x5-2: Over TM31 or TB30	TM31 see Catalog D 21.4	–	–	1 (onboard) ○ (TM31)	○

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## Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>Integrated I/O interfaces (continued)</b>					
<b>Analog outputs</b> SIMOTION C240: Can be used as drive interface or standard analog outputs. SIMOTION D: D410-2: Over TM31 D4x5-2: Over TM31 or TB30	TM31 see Catalog D 21.4	4 (C240)	–	○	○
<b>Pulse direction interface for stepper drives</b>	SIMOTION C240: Configuration either as analog or stepper drive.	4 (C240)	–	–	–
<b>Centralized I/O modules with SIMOTION C</b>					
<ul style="list-style-type: none"> <li>● Centralized I/O modules per system, max.</li> </ul>		16	–	–	–
<ul style="list-style-type: none"> <li>● Central/expansion rack, max.</li> </ul>	SIMOTION C: 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>	See SIMOTION system components→ I/O components in Catalog PM 21.	●	–	–	–
<b>Connectable distributed I/O modules</b>					
<b>Distributed I/Os (over PROFIBUS DP)</b>  <ul style="list-style-type: none"> <li>● SIMATIC ET 200S, ET 200SP</li> <li>● SIMATIC ET 200pro</li> <li>● SIMATIC ET 200M, ET 200MP <sup>1)</sup></li> <li>● SIMATIC ET 200eco</li> <li>● SIMATIC ET 200AL</li> <li>● ADI 4 (Analog Drive Interface for 4 Axes)</li> <li>● IM 174 (Interface Module for 4 Axes)</li> <li>● All certified standard slaves (DP-V0, DP-V1, DP-V2)</li> </ul>	See SIMOTION system components→ I/O components in Catalog PM 21.  Isochronous: SIMATIC ET 200S SIMATIC ET 200M ADI 4 IM 174	●	○	●	●
<b>Distributed I/Os (over PROFINET IO)</b>  <ul style="list-style-type: none"> <li>● SIMATIC ET 200S, ET 200SP</li> <li>● SIMATIC ET 200M, ET 200MP <sup>1)</sup></li> <li>● SIMATIC ET 200pro</li> <li>● SIMATIC ET 200eco PN</li> <li>● SIMATIC ET 200AL</li> <li>● All certified PROFINET devices</li> </ul>	Isochronous: SIMATIC ET 200S, SIMATIC ET 200SP, SIMATIC ET 200MP	– (C240) ● (C240 PN)	●	– D410-2 DP ● D410-2 DP/PN	– D4x5-2 DP ● D4x5-2 DP/PN

<sup>1)</sup> ET 200MP only with SCOUT TIA.

## 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Connectable distributed I/O modules</b> (continued)					
<b>SINAMICS drive I/O (over DRIVE-CLiQ)</b>					
<ul style="list-style-type: none"> <li>● Over TM15, TM31, TM41, TM54F Terminal Modules</li> </ul>	For connection to SIMOTION C and P over SINAMICS S120	●	●	●	●
<ul style="list-style-type: none"> <li>● Via TB30 Terminal Board</li> </ul>	Plug-in card for SIMOTION D4x5-2 and SINAMICS CU320-2	●	●	●	●
<b>SIMATIC HMI devices</b>					
<b>Configuration with TIA WinCC Basic/Comfort/Advanced</b>					
<ul style="list-style-type: none"> <li>● SIMATIC HMI Comfort Panels <ul style="list-style-type: none"> <li>- Touch panels TP</li> <li>- Key panels KP</li> <li>- Key and Touch Panels KTP</li> </ul> </li> <li>● SIMATIC HMI Basic Panels (2nd generation)</li> <li>● SIMATIC HMI Mobile Panels (2nd generation)</li> </ul>		●	●	●	●
<b>HMI software for SIMOTION</b>					
<ul style="list-style-type: none"> <li>● WinCC (SCADA system, V7.0 and higher)</li> <li>● TIA WinCC Basic/Comfort/Advanced/Professional</li> </ul>		○	○	○	○
<b>Software for extended communication with SIMOTION</b>					
<ul style="list-style-type: none"> <li>● SIMATIC NET OPC server</li> <li>● SIMOTION IT OPC XML-DA (via 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, etc.)</li> <li>- According to OPC Foundation standard OPC XML-DA V1.01</li> </ul> </li> <li>● SIMOTION OPC UA (Unified Architecture) <ul style="list-style-type: none"> <li>- Open communication via Ethernet TCP/IP</li> <li>- OPC UA server in SIMOTION runtime according to specification of OPC Foundation</li> <li>- Support for Data Access</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> </ul>	See SIMOTION runtime software in Catalog PM 21.	○ ● <sup>1)</sup>	○ ●	○ ●	○ ●
		●	●	●	●
		○	○	○	○

<sup>1)</sup> Subject to license for SIMOTION Kernel versions earlier than V4.2.

# SIMOTION Motion Control System

## Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>Communication</b>					
<b>Ethernet interfaces</b>					
<ul style="list-style-type: none"> <li>• Number and transmission rates</li> </ul>		1 × 10/100 Mbit/s	1 × 10/100/1000 Mbit/s	1 × 10/100 Mbit/s	D4x5-2 DP: 3 × 10/100/1000 Mbit/s D4x5-2 DP/PN: 2 × 10/100/1000 Mbit/s
<b>PROFIBUS DP interfaces</b>					
<ul style="list-style-type: none"> <li>• Onboard/support isochronous communication</li> </ul>	P320-4: IsoPROFIBUS board option	2/2	2/2	D410-2 DP: 2/2 D410-2 DP/PN: 1/1	2/2
<ul style="list-style-type: none"> <li>• Onboard CP5621</li> </ul>	For PG/PC and HMI	–	–	–	–
<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	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	64
<b>PROFINET interfaces</b>					
<ul style="list-style-type: none"> <li>• Onboard ports</li> </ul>		C240: – C240 PN: 3	3	D410-2 DP: – D410-2 DP/PN: 2	D4x5-2 DP: – D4x5-2 DP/PN: 3
<ul style="list-style-type: none"> <li>• Number of PROFINET devices (provided that PROFINET interface is onboard or optionally retrofitted)</li> </ul>	D4x5-2: CBE30-2 can be implemented as second PROFINET interface for D4x5-2 DP/PN. Per PROFINET interface	64	64	64	64
<ul style="list-style-type: none"> <li>• Media redundancy (MRP and MRPD)</li> </ul>		●	●	●	●
<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>	D4x5-2: for upgrading from D4x5-2 Control Units using a USB memory stick	–	4 × USB 3.0	–	2
<ul style="list-style-type: none"> <li>• DRIVE-CLiQ interfaces</li> </ul>		–	–	1	D425-2: 4 D435-2: 6 D445-2: 6 D455-2: 6
<b>Connections over PROFIBUS DP and Ethernet/PROFINET</b>					
<ul style="list-style-type: none"> <li>• PROFIBUS DP</li> <li>• Ethernet/PROFINET</li> </ul>	SIMOTION C: PROFINET with C240 PN only P320-4: PROFIBUS only with IsoPROFIBUS board (optional)	● C240: ●/– C240 PN: ●/●	○ ●	● D410-2 DP: ●/– D410-2 DP/PN: ●/●	● D4x5-2 DP: ●/– D4x5-2 DP/PN: ●/●

## 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Communication (continued)</b>					
<b>Online connections, max.</b>	The connection resources can be assigned as required, over PROFIBUS DP or Ethernet.	16	16	16	16
<ul style="list-style-type: none"> <li>● SIMOTION SCOUT engineering system (SCOUT occupies up to 3 online connections)</li> </ul>		2	2	2	2
<ul style="list-style-type: none"> <li>● HMI</li> </ul>		5	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	5
<ul style="list-style-type: none"> <li>● Standard TCP/IP connections</li> </ul>		45	75	45	75
<ul style="list-style-type: none"> <li>● SIMOTION IT</li> </ul>		●	●	●	●
<b>Communication functions over PROFIBUS between:</b>	Basic version from SIMOTION viewpoint	●	●	●	●
<ul style="list-style-type: none"> <li>● SIMOTION – SIMATIC HMI/WinCC <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> </ul>					
<ul style="list-style-type: none"> <li>● SIMOTION – SIMOTION <ul style="list-style-type: none"> <li>- Distributed I/O mechanisms</li> <li>Process image, e.g. (% I1.3)</li> <li>I/O variables (symbolic)</li> <li>- XSND/XRCV, max. 200 bytes</li> </ul> </li> </ul>					
<ul style="list-style-type: none"> <li>● SIMOTION – SIMATIC S7 <ul style="list-style-type: none"> <li>- Distributed I/O mechanisms</li> <li>Process image, e.g. (% I1.3)</li> <li>I/O variables</li> <li>- XSND/XRCV, max. 76 bytes</li> </ul> </li> </ul>					
<ul style="list-style-type: none"> <li>● SIMOTION – SIMATIC NET OPC</li> </ul>					
<ul style="list-style-type: none"> <li>● SIMOTION – PG/PCs with STEP 7 and SCOUT</li> </ul>					
<ul style="list-style-type: none"> <li>● PROFIBUS DP slave-to-slave communication<sup>1)</sup></li> </ul>					

<sup>1)</sup> For SIMOTION in the TIA Portal (SCOUT TIA) only "I-Slave to DP-Slave" or "I-Slave to I-Slave".

# 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Communication (continued)</b>					
<b>Communication functions over PROFINET IO between:</b>		Basic version with regard to SIMOTION			
<ul style="list-style-type: none"> <li>● SIMOTION – SIMOTION               <ul style="list-style-type: none"> <li>- Distributed I/O mechanisms</li> <li>Process image, e.g. (% I1.3)</li> <li>I/O variables (symbolic)</li> </ul> </li> </ul>	PROFINET standard feature on C240 PN, P320-4, D410-2 DP/PN and D4x5-2 DP/PN	●	●	●	●
<ul style="list-style-type: none"> <li>● SIMOTION – SIMATIC S7               <ul style="list-style-type: none"> <li>- Distributed I/O mechanisms</li> <li>Process image, e.g. (% I1.3)</li> <li>I/O variables</li> <li>- For SIMATIC – SIMOTION: SIMOTION as I-Device</li> <li>- For SIMOTION – SIMATIC: SIMATIC as I-Device</li> </ul> </li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● Slave-to-slave communication between SIMOTION controllers</li> </ul>		●	●	●	●
<b>Communication functions over Ethernet/PROFINET between:</b>					
<ul style="list-style-type: none"> <li>● SIMOTION – SIMATIC HMI/WinCC               <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> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● SIMOTION – SIMATIC NET OPC</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● SIMOTION OPC UA (Unified Architecture)               <ul style="list-style-type: none"> <li>- Open communication via Ethernet TCP/IP</li> <li>- OPC UA server in SIMOTION runtime according to specification of OPC Foundation</li> <li>- Support for Data Access</li> </ul> </li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● SIMOTION IT OPC XML-DA               <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, etc.)</li> <li>- According to OPC Foundation standard OPC XML-DA V1.01</li> </ul> </li> </ul>		● <sup>1)</sup>	●	●	●
<ul style="list-style-type: none"> <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> </ul>		○	○	○	○
<ul style="list-style-type: none"> <li>● SIMOTION – PG/PCs with STEP 7 and SCOUT</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● S7 routing Ethernet/PROFIBUS DP</li> </ul>		●	●	●	●

<sup>1)</sup> Subject to license for SIMOTION Kernel versions earlier than V4.2.

## 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Communication (continued)</b>					
<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>		●	●	●	●
<b>Serial communication over point-to-point link</b> <ul style="list-style-type: none"> <li>● CP 340, CP 341 communication modules</li> <li>● 1SI communication module (connected over ET 200S)</li> </ul>	Basic version from SIMOTION viewpoint	●	●	●	●
<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 from SIMOTION viewpoint	●	●	●	●
<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 from SIMOTION viewpoint	●	●	●	●
<b>PROFIsafe drives on SIMOTION</b>					
<b>Max. number of PROFIsafe drives on SIMOTION with SINAMICS S120 drive system:</b> <ul style="list-style-type: none"> <li>● Via PROFIBUS with PROFIsafe <ul style="list-style-type: none"> <li>- with 1 PROFIBUS interface</li> <li>- with 2 PROFIBUS interfaces</li> </ul> </li> <li>● Via PROFINET with PROFIsafe <ul style="list-style-type: none"> <li>- SIMOTION as Shared I-Device over PROFIsafe on PROFINET</li> </ul> </li> </ul>	SIMOTION as I-Slave on SIMATIC F-CPU over PROFIBUS <sup>1)</sup> P320-4: IsoPROFIBUS board option SIMOTION as I-Device on SIMATIC F-CPU over PROFINET Configuration: A higher-level SIMATIC F-CPU controls the safety functions of the SINAMICS S120 drives that are assigned to SIMOTION via the I-Slave/I-Device interface of the SIMOTION controller. SIMOTION routes the safety message frames through to the drives.	16	16	8	16
		32	32	8	32
		32	128	D410-2 DP: – D410-2: DP/PN: 8	D425-2: 16 axes D435-2: 32 axes D445-2: 64 axes D455-2: 128 axes
		●	●	●	●

<sup>1)</sup> Not for SIMOTION in the TIA Portal (SCOUT TIA).

# SIMOTION Motion Control System

## Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>SIMOTION Kernel</b>					
<b>Execution system</b>					
<ul style="list-style-type: none"> <li>● System tasks for Motion Control               <ul style="list-style-type: none"> <li>- SERVO (position control cycle)</li> <li>- IPO (interpolation cycle)</li> <li>- SERVO<sub>Fast</sub></li> <li>- IPO<sub>Fast</sub></li> </ul> </li> </ul>		●	●	●	●
	SERVO <sub>Fast</sub> and IPO <sub>Fast</sub> allow axes with differing dynamic responses to be assigned to a slow bus system and a fast bus system, as well as especially fast I/O processing. High-speed PROFINET I/O modules are used for this purpose.	–	–	–	D425-2 DP: – D425-2 DP/PN: – D435-2 DP: – D435-2 DP/PN: ● D445-2 DP/PN: ● D455-2 DP/PN: ●
<ul style="list-style-type: none"> <li>- MotionTasks (sequential)</li> <li>- ServoSynchronousTask (cyclic, synchronous with the position control cycle)</li> </ul>		20	32	32	32
		1	1	1	1 (2) <sup>1)</sup>
<ul style="list-style-type: none"> <li>● 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-controlled)</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> </li> </ul>	Adjustable monitoring time	1	1	1	1
		5	5	5	5
		2	2	2	2 (3) <sup>1)</sup>
		2	2	2	2
		5	5	5	5
		1	1	1	1
		1	1	1	1
<ul style="list-style-type: none"> <li>● Task structure/error processing (SystemInterruptTasks)               <ul style="list-style-type: none"> <li>- ExecutionFaultTask (starts in the event of an error when executing a program)</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> </li> </ul>	Central troubleshooting is possible				
		1	1	1	1
		1	1	1	1
		1	1	1	1
		1	1	1	1
		1	1	1	1

<sup>1)</sup> Values in brackets with SERVO<sub>Fast</sub> and IPO<sub>Fast</sub> activated for D435-2 DP/PN, D445-2 DP/PN and D455-2 DP/PN

## 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>SIMOTION Kernel</b> (continued)					
<b>Execution system</b> (continued)					
<ul style="list-style-type: none"> <li>● 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>- Classes</li> <li>- Methods</li> <li>- System functions (SFs)</li> <li>- Libraries</li> </ul> </li> </ul>		●	●	●	●
<b>PLC command set</b>					
(according to IEC 61131-3; optionally expandable by technology functions)					
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 from and to an exchangeable memory medium</li> <li>● DPV1 communication to DP slaves/PROFINET devices</li> <li>● Read/write drive parameters</li> <li>● DP slaves/PROFINET devices can be connected to and disconnected from application</li> <li>● DP slave, IP address and NameOfStation can be adjusted via 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> <li>● Text files on memory card</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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Motion Control technology package</b>					
<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> <p>The technology package functions are accessed via language commands, system variables and through function blocks in accordance with PLCopen.</p>	<p>No license required</p> <p>Use of the functions during runtime is subject to license. SIMOTION D410-2 already contains the technology functions for precisely one axis.</p>	●	●	●	●
		● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
		● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
		● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
		● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
<b>Axis types</b>					
<ul style="list-style-type: none"> <li>● Electrical/hydraulic/stepper motor axes</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● Drive axis</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● Positioning axis <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> </ul>	Included with POS license or higher	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
<ul style="list-style-type: none"> <li>● Synchronous axis</li> </ul>	Included with GEAR license or higher	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
<ul style="list-style-type: none"> <li>● Path axis</li> </ul>	Included with GEAR license or higher	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
<ul style="list-style-type: none"> <li>● Synchronous axis with curve synchronization</li> </ul>	Included with CAM license or higher	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
<ul style="list-style-type: none"> <li>● Virtual axis</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● Simulation axis</li> </ul>		●	●	●	●
<b>Systems of units</b>					
<ul style="list-style-type: none"> <li>● Metric (mm, m, Nm, Pa, ...)</li> </ul>		●	●	●	●
<ul style="list-style-type: none"> <li>● US (inch, feet, PSI, lb, ...)</li> </ul>		●	●	●	●
<b>Axis monitoring functions</b>					
<p>The activated monitoring functions are executed cyclically.</p> <ul style="list-style-type: none"> <li>● Watchdog</li> <li>● Hardware and software limit switches</li> <li>● Position/zero-speed monitoring</li> <li>● Dynamic following error monitoring</li> <li>● Encoder monitoring, cable break</li> <li>● Force/pressure monitoring</li> <li>● Setpoint</li> <li>● Data exchange plausibility</li> </ul>		●	●	●	●

<sup>1)</sup> Use of the functions during runtime is subject to license. Exception: SIMOTION D410-2 already contains the Motion Control technology functions for just one 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Other technology packages</b>					
<b>TControl technology package</b> <ul style="list-style-type: none"> <li>• With technology functions for temperature control</li> </ul>	Technology package integrated in SCOUT	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>	● <sup>1)</sup>
<b>Drive Control Chart (DCC) technology package <sup>3)</sup></b> <ul style="list-style-type: none"> <li>• With technology functions for Drive Control Chart</li> </ul>	Technology package integrated in SCOUT <sup>3)</sup>	●	●	●	●
<b>Multipurpose Information Interface (MIIF) technology package</b> <ul style="list-style-type: none"> <li>• With multi-functional communication functions</li> </ul>	Technology package can be purchased via your Siemens contact	○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>
<b>Vibration Extinction (VIBX) technology package</b> <ul style="list-style-type: none"> <li>• Vibration damping of axes</li> </ul>		○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>
<b>OACAMGEN technology package</b> <ul style="list-style-type: none"> <li>• Motion profiles for servo presses</li> </ul>		○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>
<b>SIMOTION IT</b>					
<b>SIMOTION IT DIAG</b> <p>Integrated web server on the SIMOTION controller</p> <ul style="list-style-type: none"> <li>• Service and diagnostic functions provided via commonly used standard web browsers with extensive information functions (hardware/software version display, process utilization, memory usage, diagnostic buffer, task runtimes, user logbook, operating state, time of day, etc.)</li> <li>• Access to all variables on the control system using variable browser functions</li> <li>• Watch tables (control variable diagnostics in freely configurable status and control tables. Variables of multiple SIMOTION controllers can be accessed simultaneously in a combined watch table)</li> <li>• Trace (control variable tracing for one controller or several synchronously)</li> <li>• Generation of diagnostic data (diagnostic buffer, alarms, states of variables, ...)</li> <li>• Project update</li> <li>• Firmware update</li> <li>• Password-protected access</li> <li>• Remote access to SIMOTION file system</li> <li>• User-defined service and diagnostic pages</li> </ul>		● <sup>2)</sup>	●	●	●

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

<sup>2)</sup> Subject to license for SIMOTION Kernel versions earlier than V4.2.

<sup>3)</sup> Not for SIMOTION in the TIA Portal (SCOUT TIA).

## 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>SIMOTION IT (continued)</b>					
<b>SIMOTION IT OPC XML-DA</b> 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>		● <sup>1)</sup>	●	●	●
<b>SIMOTION OPC UA</b> Integrated on the SIMOTION controller <ul style="list-style-type: none"> <li>• Read/write variables</li> <li>• Browse variables</li> <li>• User authentication and encryption</li> </ul>		●	●	●	●
<b>SIMOTION IT Virtual Machine</b> (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 technology objects)</li> <li>• Use of standard Java classes in the device (file access, network functions, string functions, etc.)</li> <li>• Creation of servlets for the purpose of integrating user-specific web server functions</li> </ul>	Licensing through SIMOTION IT Virtual Machine  Note: For SIMOTION Kernel < V4.2, can be used as combined license for SIMOTION IT DIAG, OPC XML-DA and Virtual Machine.	●	●	●	●
<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/ Parameter assignment</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 Diagram (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>		●	●	●	●

<sup>1)</sup> Subject to license for SIMOTION Kernel versions earlier than V4.2.

## SIMOTION Motion Control System

### Overview of SIMOTION functions

	Notes	SIMOTION C240/C240 PN	SIMOTION P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<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>					
<b>SIMOTION SCOUT engineering system</b> (continued)					
<b>SIMOTION SCOUT optional packages</b>					
<ul style="list-style-type: none"> <li>● CamTool (graphical cam editor)</li> </ul>		○	○	○	○
<ul style="list-style-type: none"> <li>● DCC Editor (graphical editor for Drive Control Chart)</li> </ul>		○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>	○ <sup>1)</sup>
<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 state</li> <li>● Time</li> </ul>		●	●	●	●
<b>Comparison functions 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> <li>● Tracer for MCC (for fast program sequences)</li> <li>● Trace technology object (recording of all technology object commands)</li> </ul>		●	●	●	●

<sup>1)</sup> Not for SIMOTION in the TIA Portal (SCOUT TIA).

## 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 P320-4	SIMOTION D410-2	SIMOTION D4x5-2
<b>Testing and diagnostics with SIMOTION SCOUT (continued)</b>					
<b>Trace</b>					
<ul style="list-style-type: none"> <li>● Recording of I/O, system and program variables (on one controller as well as over several synchronously)</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> <li>● Parameterization and trace data in non-volatile memory on memory card (optional)</li> </ul>		●	●	●	●
<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 200)</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, P320-4, D410-2 DP/PN and D4x5-2 DP/PN	●	●	●	●
<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	2 × 100	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>		●	●	●	●
<b>Engineering drives</b>					
<b>STARTER (integrated in SCOUT)</b> Drive/commissioning software for SINAMICS S/SINAMICS G	With SIMOTION in the TIA Portal (SCOUT TIA), only "SIMOTION Drives" are supported. These are SINAMICS S120 drives of versions V4.5, V4.7 and V4.8, which are networked with the SIMOTION CPU on the basis of PROFIBUS or PROFINET.	●	●	●	●