

Overview of functions

2

Hardware platforms

- Basic model
(function or license is acquired with the device or SCOUT)
- Option
(must be acquired as a software license or as hardware)
- Not possible

	SIMOTION C	SIMOTION P	SIMOTION D
Note	C2xx	P350-3	D4x5

System clocks/performance

PROFIBUS DP cycle in 0.25 ms steps	for integrated drives with D445: 0,5...8	1.5...8	1...8	D425: 2...8 D435/ D445: 1...8
PROFINET cycle in 0.25 ms steps	with PROFINET board	–	1...4	D425: 2...4 D435: 1...4 D445: 0.5...4
Position-control cycle and interpolation cycle (IPO) are a multiple of the PROFIBUS DP cycle	Adjustable ratio			
• Position control cycle to PROFIBUS/PROFINET cycle		1:1, 2:1	1:1...4:1	1:1...4:1
• Interpolation cycle 1 (IPO1) to position control cycle		1:1...6:1	1:1...6:1	1:1...6:1
• Interpolation cycle 2 (IPO2) to interpolation cycle 1 (IPO1)		2:1...64:1	2:1...64:1	2:1...64:1
With Dynamic Servo Control (DSC), the dynamically acting component of the position controller is located in the drive (with cycles of up to 125 µs)	with SINAMICS S120, SIMODRIVE and MASTERDRIVE MC	●	●	●
BackgroundTask (OB1) coasting	Adjustable monitoring time	●	●	●
Interval in ms	TimerInterruptTasks	10...5000	10...5000	10...5000

Memory

• Exchangeable memory media	MMC: Micro Memory Card CF: CompactFlash card	MMC 32 MB	File(s) on hard disk	CF 512 MB
• Retentive user variable (retain variable) in KB	SIMOTION P: with UPS up to 256 KB	C230-2: 12 C240: 100	15	320
• Permanent memory for user data in MB (data storage on exchangeable memory medium)		26	Any	300
• Load memory (RAM disk) for user data in MB (for downloading the configuration and programs)	Memory size can be configured with SIMOTION P	C230-2: 16 C240: 20	16	D425/ D435: 11 D445: 23
• User memory (user RAM) in MB (for code and data)		C230-2: 16 C240: 21	14	D425/ D435: 15 D445: 30

Drives

	See "System components"			
• Maximum number of axes	Higher number of axes possible using multiple synchronized devices	32	64	D425: 16 D435: 32 D445: 64
• Integrated drive control (in combination with SINAMICS S120)	SIMOTION D: with D435 and D445 more are possible via CX32	–	–	1..6
Speed-controlled axis over PROFIBUS DP	SIMOTION D: SINAMICS as standard drive system	●	●	●
• SINAMICS S/SINAMICS G (Servo, Vector)				
• SIMODRIVE 611 universal				
• SIMODRIVE POSMO CA				
• SIMODRIVE POSMO CD				
• SIMODRIVE POSMO SI				

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- SIMOVERT MASTERDRIVES MC
- SIMOVERT MASTERDRIVES VC
- MICROMASTER/MICROMASTER Vector
- MIDIMASTER Vector
- COMBIMASTER/MICROMASTER Integrated
- Standard drives with speed profile in accordance with standard message frames (PROFIdrive profile 1-6)

Closed-loop position-controlled axis over PROFIBUS DP with PROFIdrive

- SINAMICS S120
 - S120 Servo (booksize, chassis, blocksize)
 - S120 Vector (booksize, chassis, blocksize)

- SIMODRIVE 611 universal
- SIMODRIVE POSMO CA
- SIMODRIVE POSMO CD
- SIMODRIVE POSMO SI
- SIMOVERT MASTERDRIVES MC
- SIMOVERT MASTERDRIVES VC
- MICROMASTER MM4

	SIMOTION C	SIMOTION P	SIMOTION D
Note	C2xx	P350-3	D4x5
SINAMICS S120 as standard drive system	●	●	●
Also linear motor with external encoder (limited dynamic response)			
Also linear motor			
With external encoder (limited dynamic response)			
Closed-loop speed- and position-controlled axis over PROFINET IO with IRT (PROFIdrive)	○	○	○
Also linear motor with external encoder (limited dynamic response)			
Standard drive via PROFIBUS DP	●	●	●
• SIMODRIVE POSMO A			
Drives with analog ±10 V setpoint interface	4	–	–
• On board I/O			
• ADI 4 (Analog Drive Interface for 4 axes)	●	●	●
• IM 174 (Interface Module for 4 axes)	●	●	●
Hydraulic drives over ±10 V setpoint interface	4	–	–
• On board I/O	●	●	●
• Analog outputs in the I/O area	●	●	●
• ADI 4 (Analog Drive Interface for 4 axes)	●	●	●
• IM 174 (Interface Module for 4 axes)	●	●	●
• Encoder over I/O area	●	●	●

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Stepper drives

- On board I/O with pulse direction interface
- IM 174 (Interface Module for 4 axes)

Connectable measuring systems on board

Quantity

Absolute value encoder connection with SSI interface

Incremental rotary measuring systems with TTL

Revolver, absolute value encoder (SSI and EnDat),
incremental encoder (TTL and sin/cos)

		SIMOTION C	SIMOTION P	SIMOTION D
	Note	C2xx	P350-3	D4x5
		4	–	–
	See "System components"			
	SIMOTION D: Encoder connection via Motor Modules (DRIVE-CLiQ)	4	–	●
		●	–	–
		●	–	–
	connection via drive or ADI 4/IM 174 (ADI 4/ IM 174 for absolute value encoder SSI and incre- mental encoder TTL)	●	●	●

Typical connections for second encoder (external encoder)

On board interfaces

Second encoder acquisition in SIMOVERT MASTERDRIVES MC

SIMODRIVE 611 universal over second axis control
(dual-axis module)

SINAMICS S120

Isochronous PROFIBUS encoder

Encoder on ADI 4 (Analog Drive Interface for 4 axes)

Encoder on IM 174 (Interface Module for 4 axes)

		●	–	–
	Option for SIMOVERT MASTERDRIVES MC	●	●	–
	Option for SIMODRIVE 611 universal	●	●	–
	SIMOTION D: Encoder connection via Motor Modules (DRIVE-CLiQ)	●	●	●
	See "System components"	●	●	●
	at least one electrical or hy- draulic axis must be con- figured on ADI 4/IM 174	●	●	●
		●	●	●

Probe

High-speed measuring input

Probe on the drives

- SIMODRIVE 611 universal, SIMOVERT MASTERDRIVES MC
- SINAMICS S120

- TM15 Terminal Module on SINAMICS S120
or SIMOTION D

- Accuracy in μ s
- Number of probes per Terminal Module, max.

- TM17 High Feature Terminal Module on SINAMICS S120
or SIMOTION D

- Accuracy in μ s
- Number of probes per Terminal Module, max.

	SIMOTION C: Measurement on on board encoder SIMOTION D: On board probe (for integrated drives)	C230-2: 2 C240: 2+4	–	6
		1/axis	1/axis	–
		6/closed- loop control	6/closed- loop control	6/closed- loop control
	See "System components"			
		125	125	125
		24	24	24
	See "System components"			
		≤ 1	≤ 1	≤ 1
		16	16	16

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		SIMOTION C	SIMOTION P	SIMOTION D
	Note	C2xx	P350-3	D4x5
Analog outputs	SIMOTION C: Can only be used as a drive interface. SIMOTION D: Via TB or TM, see "SIMOTION D - Drive-based" or "System components"	4	–	○
Pulse direction interface for stepper drives	SIMOTION C: Each, as alternative to analog drive.	4	–	–

I/O

Centralized I/O – modules per system, max.
Central/expansion rack, max.

		16	–	–
	SIMOTION C: Max. two-tier configuration with IM 365 Interface Module	○	–	–
Connectable central SIMATIC S7-300 I/O	For modules that can be implemented, see "System components"	●	–	–
Connectable drive system overview	For connection to SIMOTION C and P via SINAMICS S120, see "System components".	●	●	●
Connectable distributed I/O (PROFIBUS DP)	For modules that can be implemented, see "System components"	●	●	●
<ul style="list-style-type: none"> • ET 200S • ET 200X • ET 200pro • ET 200M • ET 200eco • DP/AS-Interface Link 20E • ADI 4 (Analog Drive Interface for 4 axes) • IM 174 (Interface Module for 4 axes) • All certified standard slaves (DP-V0, DP-V1, DP-V2) 				
Connectable distributed I/O (PROFINET IO)		–	○	○
<ul style="list-style-type: none"> • ET 200S • ET 200pro 				

Connectable HMI devices

See
"System components"

Connection via PROFIBUS DP		●	●	●
<ul style="list-style-type: none"> • SIMATIC Touch Panel TP 170B and TP 270 • SIMATIC Operator Panel OP 170B and OP 270 • SIMATIC Multi Panel MP 270B and MP 370 • SIMATIC Panel PC 577, PC 677 and PC 877 				
Connection over Ethernet		●	●	●
<ul style="list-style-type: none"> • SIMATIC Touch Panel TP 170B and TP 270 • SIMATIC Operator Panel OP 170B and OP 270 • SIMATIC Multi Panel MP 270B and MP 370 • SIMATIC Panel PC 577, PC 677 and PC 877 	Only in combination with WinCC flexible			
	SIMATIC Net is required			

Hardware platforms

<ul style="list-style-type: none"> ● Basic model (function or license is acquired with the device or SCOUT) ○ Option (must be acquired as a software license or as hardware) – Not possible 		SIMOTION C	SIMOTION P	SIMOTION D
	Note	C2xx	P350-3	D4x5
HMI software				
• WinCC flexible (stand-alone)	See "System components"	○	○	○
• ProTool/Pro		○	○	○
• SIMATIC NET OPC server	See "Communication"	○	○	○
• SIMOTION IT OPC XML-DA (via Ethernet) <ul style="list-style-type: none"> - Open communication via TCP/IP and SOAP standard protocols - Clients on any hardware with various operating systems (Windows, Linux, etc.) - In accordance with OPC Foundation standard OPC XML-DA V1.0 		○	○	○
Address area				
• Logical address space in KB		C230-2: 2 C240: 4	4	16
• Physical address space in KB <ul style="list-style-type: none"> - PROFIBUS: max. per ext. line for inputs/outputs - PROFINET: max. for inputs/outputs 	for PROFIBUS and PROFINET additionally	1 –	1 4	1 4
• Permanent process image for background task (I/O variables) in bytes		64	64	64
• Additional configurable process images for cyclic tasks (I/O variables)		●	●	●
• Address space per PROFIBUS DP station in bytes		244	244	244
• Address space per PROFINET device in bytes		–	1400	1400
Communication				
PROFIBUS DP interfaces				
• On board/of which isochronous as option	One interface can be used as MPI. SIMOTION P: On IsoPROFIBUS board	2/2	2/2	2/2
• Onboard CP5611	For PG/PC and HMI	–	1	–
• Baud rates in Mbaud (transfer rates in Mbit/s)		1.5; 3; 6; 12	1.5; 3; 6; 12	1.5; 3; 6; 12
• Number of PROFIBUS DP slaves	Per PROFIBUS DP line	64	64	64
PROFINET interfaces				
• MCI-PN-Board		–	○, 4	–
• CBE30		–	–	○, 4
On board interfaces				
• Ethernet		1 10/100 Mbit/s ●	2 10/100 Mbit/s ●	2 10/100 Mbit/s ●
• serial interface		–	1	–
• parallel interface		–	–	–
• USB interface	E. g. for mouse and keyboard	–	4x USB 2.0	–

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- Connections via PROFIBUS DP and Ethernet
The connection resources can be assigned either via PROFIBUS DP or Ethernet.

- Connection end points (online connections), max.

- SCOUT engineering system

- Communication functions via PROFIBUS between:

- ## Basic version with regard to SIMOTION

Basic version with regard to SIMOTION

- | | | |
|---|---|---|
| ● | ● | ● |
| ● | ● | ● |
| ● | ● | ● |
| ○ | ○ | ○ |
| ● | ● | ● |
| ● | ● | ● |

	SIMOTION C	SIMOTION P	SIMOTION D
Note	C2xx	P350-3	D4x5
	–	–	D425/ D435: 4 D445: 6
	●	●	●
	●	●	●
	16	16	16
	5	5	5
	1	1	1
	5	5	5
Basic version with regard to SIMOTION	●	●	●
Basic version with regard to SIMOTION	●	●	●
	●	●	●
	●	●	●
	○	○	○
	●	●	●
	●	●	●

Hardware platforms

<ul style="list-style-type: none"> ● Basic model (function or license is acquired with the device or SCOUT) ○ Option (must be acquired as a software license or as hardware) – Not possible 				
	Note	SIMOTION C	SIMOTION P	SIMOTION D
UDP and TCP/IP communication functions via Ethernet between:		●	●	●
<ul style="list-style-type: none"> • SIMOTION - SIMOTION • SIMOTION - SIMATIC CP • SIMOTION - PC 				
Serial communication via point-to-point connection	Basic version with regard to SIMOTION			
<ul style="list-style-type: none"> • CP 340 and CP 341 Communication Modules • 1SI Communication Module (connected via ET 200S) 		●	●	●
Communication via AS-Interface	Basic version with regard to SIMOTION			
<ul style="list-style-type: none"> • CP 343-2 P Communication Module • DP/AS-Interface Link 20E 		●	●	●
Service and diagnostic functions without SCOUT (via Ethernet)	See "communications"			
SIMOTION IT DIAG				
<ul style="list-style-type: none"> • Service/diagnostic functions via Internet browsers • Project and firmware update • Password-protected access • Remote access to SIMOTION file system • User-defined service and diagnostics pages 		○	○	○
SIMOTION IT OPC XML-DA Server (via Ethernet)	See "communications"	○	○	○
<ul style="list-style-type: none"> • Read/write variables • Browse variables • Trace-Interface via SOAP • Password-protected access 				
Runtime functionality				
SIMOTION Kernel	See "SIMOTION software"			
Runtime system				
<ul style="list-style-type: none"> • Task structure/program execution <ul style="list-style-type: none"> - BackgroundTask 	Adjustable monitoring time	1	1	1
<ul style="list-style-type: none"> - TimerInterruptTasks - MotionTasks - ServoSynchronousTask (synchronous to position control cycle) - IPOSynchronousTasks (synchronous to interpolation cycle) - InterruptTasks (for user) - TControlTasks - StartupTask - ShutdownTask 		5	5	5
		20	32	32
		1	1	1
		2	2	2
		2	2	2
		5	5	5
		1	1	1
		1	1	1

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- Task structure/error processing
(SystemInterruptTasks)
 - ExecutionFaultTask
 - TechnologicalFaultTask
 - PeripheralFaultTask
 - TimeFaultTask
 - TimeFaultBackgroundTask

Program organization

- Units (ST program)
- Programs
- Function blocks (FB)
- Functions (FC)
- System functions (SF)
- Libraries

PLC operation set (IEC 61131-3; optionally expandable with technology packages)

System functions, e. g. for

- Interrupt and error handling
- Copying data
- Clock functions
- Diagnostics functions
- Module parameterization
- Operating mode transitions, Run/Stop
- Reading and writing of data blocks from the user program from and to an exchangeable memory medium
- DPV1 communication to DP slaves
- Read and write drive parameters
- DP slave of application connectable and disconnectable
- Adjustable DP-slave- and IP-address via user programm
- DP diagnostics of the station
- Activate/deactivate technology objects
- Counter (IEC commands)
- Timer (IEC commands)
- Real-time clock, format [DATE_AND_TIME]

	SIMOTION C	SIMOTION P	SIMOTION D
Note	C2xx	P350-3	D4x5
Central troubleshooting is possible			
	1	1	1
	1	1	1
	1	1	1
	1	1	1
	1	1	1
	●	●	●
	●	●	●
	●	●	●

Hardware platforms

<ul style="list-style-type: none"> ● Basic model (function or license is acquired with the device or SCOUT) ○ Option (must be acquired as a software license or as hardware) – Not possible 		SIMOTION C	SIMOTION P	SIMOTION D
	Note	C2xx	P350-3	D4x5
Ethernet communication package	See "SIMOTION software"			
		●	●	●
Motion Control technology package	See "SIMOTION software"			
with the technology functions: (as system functions and PLCopen modules)				
• Motion Control Basic		●	●	●
• Positioning - POS		○	○	○
• Synchronous operation - GEAR		○	○	○
• Output cam - CAM		○	○	○
Axis types				
• Electrical / hydraulic / stepper motor axis		●	●	●
• Speed axis		●	●	●
• Positioning axis	Included from technology function POS positioning and above	○	○	○
- Rotary axis				
- Linear axis				
- Modulo for linear and rotary axis				
- Force/pressure-controlled axis				
- Force/pressure-limited axis				
• Synchronous axis	included from technology function GEAR and above	○	○	○
• Output cam axis	included from technology function CAM and above	○	○	○
• Virtual axis		●	●	●
• Simulation axis		●	●	●
Unit system				
• Metric (mm, m, Nm, Pa, ...)		●	●	●
• US (inch, feed, PSIm lb, ...)		●	●	●
Axis monitoring functions				
The monitoring functions set to active will be executed cyclically.		●	●	●
• Watchdog				
• Hardware and software limit switches				
• Position/downtimes monitoring				
• Dynamic following error monitoring				
• Encoder monitoring, cable break				
• Force/pressure monitoring				
• Setpoint				
• Plausibility in data exchange				

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Note		C2xx	P350-3	D4x5

TControl technology package
(temperature control)

See
"SIMOTION software"

○	○	○
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Engineering functionality

Engineering - Drives Start-up/parameterization STARTER (integrated in SCOUT) for		●	●	●
<ul style="list-style-type: none"> • MICROMASTER 410/420/430/440 • COMBIMASTER 411 • SINAMICS S / SINAMICS G 				
SimoCom U/SimoCom A (stand-alone) for	Not included in scope of supply of SIMOTION SCOUT	●	●	●
<ul style="list-style-type: none"> • SIMODRIVE 				
DriveMonitor (stand-alone) for		●	●	●
<ul style="list-style-type: none"> • SIMOVERT MASTERDRIVES 				
Drive ES BASIC engineering tools and integrated data storage in SIMATIC S7/SIMOTION projects for:		●	●	●
<ul style="list-style-type: none"> • MICROMASTER 410/420/430/440 (STARTER) • COMBIMASTER 411 (STARTER) • SINAMICS S / SINAMICS G (STARTER) • SIMODRIVE (SimoCom U/SimoCom A) • SIMOVERT MASTERDRIVES (DriveMonitor) 				
Engineering – SIMOTION SCOUT engineering system Basic tools integrated into SCOUT:	See "SIMOTION software"	●	●	●
<ul style="list-style-type: none"> • Workbench • STARTER Drive commissioning/parameterization • Hardware and network configuration • Diagnostics for testing and commissioning • Axis control panel • Program editors/programming languages (instruction set in accordance with IEC 61131-3) <ul style="list-style-type: none"> - Structured Text (ST) - Ladder Diagram (LAD) - Function Block Diagram (FBD) - Motion Control Chart (MCC) • Creation of output cams (basic) • Creation of technology objects • Technology tools (function generator) • User interface, online help and documentation in English, German, French and Italian 				

Hardware platforms

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Note		C2xx	P350-3	D4x5
Options integrated in SCOUT:				
• CamTool (graphic cam editor)		○	○	○
Test and diagnostics				
• Information functions		●	●	●
- Hardware/software version indication				
- Processor utilization				
- Memory utilization				
- Operating status				
- Time				
• Program test functions		●	●	●
- Control/status variables				
- Status program / FB / FC (with specification of the call point)				
- Single-step MCC				
- Breakpoints in all languages (ST, MCC, KOP/FUP)				
• Trace		●	●	●
- Recording I/O, system and program variables				
- Recording from LR cycle onwards (n × LR cycle)				
- Trigger: Instantaneous, rising/falling edge system variable, function generator				
- Arithmetic functions (jump, ramp, frequency response)				
- Bode's diagram, FFT analysis, functions generator, mathematical functions				
- Endless trace				
- Recording over defined measuring period				
• Module diagnostics		●	●	●
- Central				
- Distributed (e. g. ET 200M)				
• PROFIBUS DP station diagnostics via system functions		●	●	●
• Diagnostics buffer		200	200	200
- No. of entries, max.				
• Process fault diagnostics (Alarm_S)		●	●	●
- Messages from user program				
- No. of entries, max.		40	40	40