



simotion



Motion Control System
SIMOTION



SIEMENS

Related catalogs

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0.12 kW to 1200 kW

D 21.1

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Inverters
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Motion Control

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ST 70

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SIMATIC HMI

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News

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ITC

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CD-ROM: E86060-D6850-A100-C4-7400
(German/English)



Catalog CA 01

The Offline Mall of
Automation and Drives

CA 01

Order No.:
CD-ROM: E86060-D4001-A110-C5-7600
DVD: E86060-D4001-A510-C5-7600



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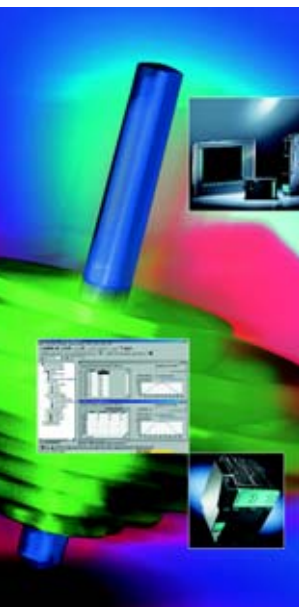
SIMOTION Motion Control System

Catalog News
PM 10 N
November 2006

The products in this catalog are also included in the electronic catalog CA01.

Contact your local Siemens representative for further information

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Introduction	Welcome to Automation and Drives SIMOTION – News in 2006	Page 2 3
SIMOTION at a glance	The SIMOTION System Hardware platforms The Runtime system The Engineering system	4 5 6 7
SIMOTION C Controller-based	SIMOTION C230-2/C240	9
SIMOTION P PC-based	SIMOTION P350-3 Panels Thin Client Unit (TCU) MCI-PN Communication Board	12 14 15 16
SIMOTION D Drive-based	SIMOTION D425/D435/D445 CBE30 Communication Board	17 20
SIMOTION Software	Runtime Software Ordering example Runtime Software Engineering Software	21 23 24
Communication	SIMOTION IT	26
System components	I/O Modules SIMATIC HMI	27 27
Training	SIMOTION Training Courses	28
Appendix	Siemens Contacts Worldwide Customer Support Notes on Software Metal surcharges Conditions of sale and delivery, Export regulations	30 31 32 34 36

Siemens Automation and Drives. Welcome.

More than 60,000 people aiming for the same goal: increasing your competitiveness. That's Siemens Automation and Drives.

We offer you a comprehensive portfolio for sustained success in your sector, whether you're talking automation engineering, drives or electrical installation systems. Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) form the core of our offering. TIA and TIP are the basis of our integrated range of products and systems for the manufacturing and process industries as well as building automation. This portfolio is rounded off by innovative services over the entire life cycle of your plants.

Learn for yourself the potential our products and systems offer. And discover how you can permanently increase your productivity with us.

Your regional Siemens contact can provide more information. He or she will be glad to help.



SIMOTION – News in 2006

This additional catalog contains products in the complete range of the SIMOTION Motion Control System that have been launched on the market since the main Catalog PM 10 • 2005 was published. It supplements Catalog PM 10 • 2005 which remains valid. We would like to draw your attention in particular to the following new items:

New Hardware

- SIMOTION C240 with double performance
- SIMOTION P350-3 with double performance controls machines with more than 40 axes in 2-ms cycles
- Thin Client Unit (TCU) for distributed configuration in combination with SIMOTION P
- SIMATIC HMI Human Machine Interface Systems
- IM 174 Interface Module
- TM41 Terminal Module

SIMOTION and PROFINET IO

- 2 new Communication Boards for connecting SIMOTION to a PROFINET IO network
 - Communication Board CBE30 for SIMOTION D
 - Communication Board MCI-PN for SIMOTION P
- Distributed synchronous operation via PROFINET IO with IRT (Isochronous Real Time)

Higher dynamic response

- User task possible in position control cycle
- 0.5 ms minimum position control cycle/IPO cycle on SIMOTION D445

More user-friendliness with SIMOTION SCOUT

- Simple test and diagnostics functions, program tracing using sequence tracking and stop points in all SIMOTION programming languages

Other innovations in SIMOTION V4.0

- Connection of SINAMICS S120 AC Drive (See Catalog D 21.1 • 2006, SINAMICS S120 Drive System)
- PLC open for Motion Control as system functions (e.g. string processing)
- Optimized Usability:
 - Sensor data transfer from STARTER
 - Structured command library
 - User-definable expert list
- Engineering project (with source code) can be stored on the controller

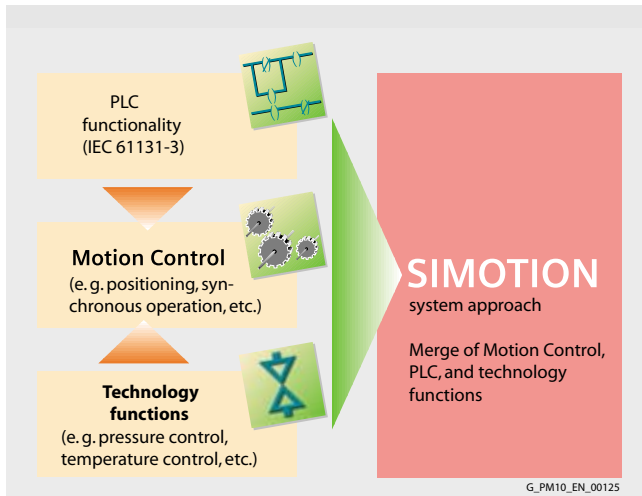
SIMOTION Training Courses

- New training course: SINAMICS S120 on SIMOTION and T-CPU

The SIMOTION system

Overview

The system approach



SIMOTION is available for all machines carrying out Motion Control tasks – from simple machines to the high-performance variety. The focus is on a simple and flexible solution to a huge variety of Motion Control tasks. In order to achieve this in the best way possible, a new system approach has been introduced:

Motion Control has been combined with two other open-loop control functions found in most machines, namely, PLC and technology functions.

This approach enables the Motion Control of axes and machine control within the same system. The same applies to technology functions, such as pressure control of a hydraulic axis. A seamless switch can be made from position-controlled positioning mode to pressure control.

Combining the three open-loop control functions of Motion Control, PLC and technology functions has the following benefits:

- Reduced engineering overhead and increased machine performance
- Time-critical interfaces between the individual components are no longer required
- Simple, uniform and transparent programming and diagnostics of the entire machine

The SIMOTION system comprises three components:

Engineering system

Motion Control, PLC and technology tasks can all be performed within an integrated system. The engineering system provides all the tools required for these tasks: From programming and parameterization, through testing and commissioning, to diagnostics.

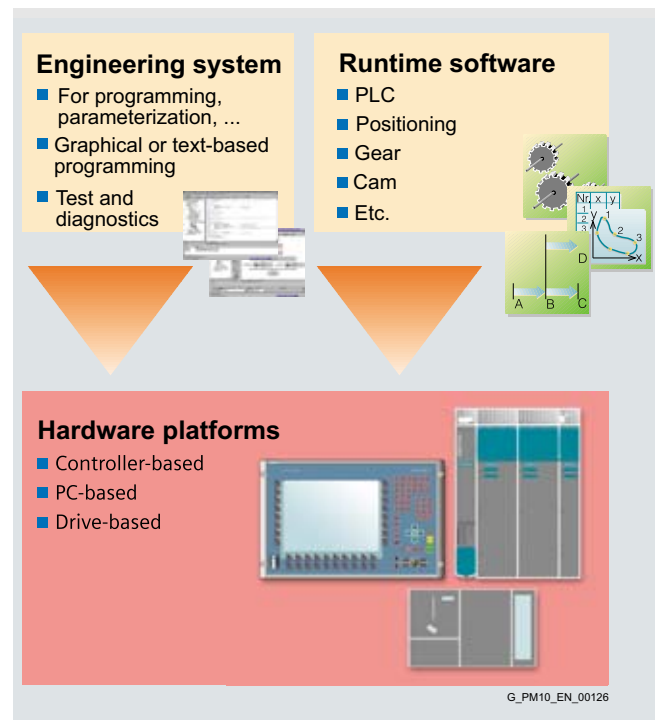
Runtime software modules

These modules provide the various Motion Control and technology functions. The entire system functionality can be adapted to the machine as required by selecting the appropriate modules.

Hardware platforms

The hardware platforms form the basis of the SIMOTION Motion Control system. The application created by the engineering system and the associated runtime software modules can be used on various hardware platforms.

This means that you can always select the platform which is most suited to your machine, whether as a controller, an industrial PC or an intelligent module directly in the drive.



The fast path to the automation solution

With these system components and our concept of ready-to-apply standard applications and ready-to-run machine solutions in the form of SIMOTION Easy Set you can reduce your engineering costs, shorten your project times and thus get quicker to your complete automation solution.

Overview

Automation systems are primarily identified by the following characteristics:

- Software-specific characteristics, e.g., functionality and engineering
- Hardware-dependent characteristics, e.g., performance, design and expandability

However, mechanical engineering demands vary greatly, depending on the specific machine in question.

Every hardware platform has its benefits when used in certain applications. The various platforms can also be combined very easily, which is a particular advantage in modular machines and plants. This is because the individual hardware platforms always contain the same system architecture, i.e., functionality and engineering are always identical, irrespective of the platform used.

PROFIBUS or PROFINET can be used to create the link to the drives and the I/Os remotely.

SIMOTION D – compact and integrated in the drive



With SIMOTION D, the SIMOTION functionality is integrated directly in the closed-loop control module of the new SINAMICS S120 multi-axis drive system. Therefore, the complete system (consisting of the open-loop control and the drive) is extremely compact and responds very quickly. SIMOTION D is available in three performance variants (D425, D435 and D445), ensuring maximum scalability and flexibility. The field of application ranges from single axes to high-performance multi-axis machines. SIMOTION D is supplied with two integrated PROFIBUS interfaces with PROFIdrive and two integrated Industrial Ethernet interfaces. Connection to PROFINET is carried out via the optional Communication Board.

SIMOTION C – modularity and flexibility



SIMOTION C is an S7-300-design controller. It is supplied with four integrated interfaces for analog or stepper drives and several integrated digital inputs and outputs. The controller can also be expanded using I/O modules from the SIMATIC S7-300 range. For additional communication, the controller has access to two PROFIBUS interfaces with PROFIdrive and an Industrial Ethernet interface, thus offering great flexibility in communication.

SIMOTION P – open for other tasks



SIMOTION P350 is a PC-based Motion Control system. The operating system is Windows XP Professional, with a real-time expansion for SIMOTION. This enables PC applications to be carried out alongside SIMOTION machine applications at any time. For example, the SIMOTION engineering system, an operator control application, process data evaluation, a standard PC application, etc.

Several panel options in various screen sizes are available for operating the industrial PC. These panels can either be operated using a keyboard and mouse, or a touch screen. The drives and I/Os are linked via two PROFIBUS interfaces with PROFIdrive or via PROFINET with an optional Communication Board.

SIMOTION at a glance

Runtime system

The Runtime system

Overview

Multi-layer software architecture

With SIMOTION, motion tasks in many different machines are performed easily and uniformly.

To facilitate this, a very special, multi-layer architecture was chosen as the Runtime system. All SIMOTION devices provide you with a basic functionality, such as PLC functionality with a command set in accordance with IEC 61131-3 and a Motion Control basic functionality (speed-controlled axes, output cam, etc.). You can expand this basic functionality using technology packages and function libraries.

Scalable functionality

The technology packages, function libraries and multi-layer architecture of the Runtime system account for the scalable functionality of SIMOTION:

Scalable

- Due to various functionality levels
- Due to Software Modules and technology packages with extensive functionality

Flexible

- Due to the integrated programmable PLC in accordance with IEC 61131-3
- Due to the technology packages with extensive command sets
- Due to the option to run servo, vector, stepper, and hydraulic drives
- Due to the ability to combine the various technology packages and Function Libraries

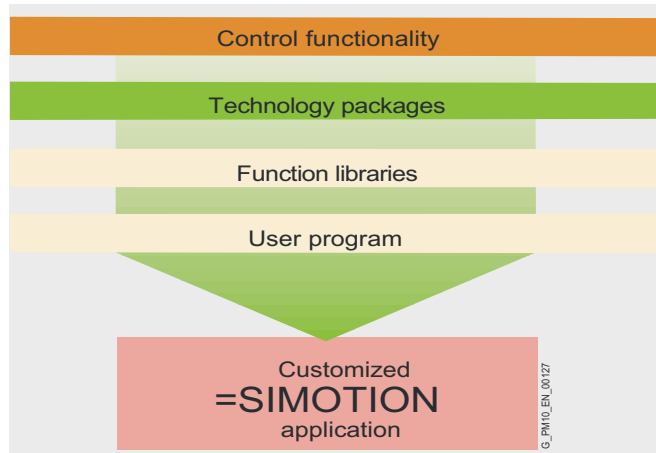
Expandable

- Due to the Function Library standard functions

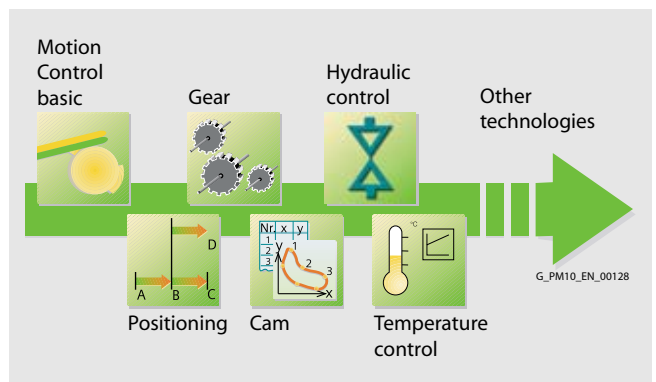
Technology packages

Each of these packages provides complete functionality for the technology in question. For example, the technology package Motion Control provides all functions from precise positioning movements to sophisticated cam operation.

This technology package is also responsible for the cyclic exchange of setpoints and actual values with the drive, the position controller, calculation of the movement profiles, removal or overriding of motions, reference functions, encoder changeover, axis release, status information and more.



In addition to the Motion Control technology package (including positioning, synchronous operation, cam), packages for other technologies, e. g. temperature control, are also available.



Function libraries

The libraries contain standard functions for frequently performed tasks

- implementing special I/O modules (e.g. counter modules, communication modules, AS-Interface, ...)
- expanding system functionality (e.g. controllers)
- controlling axes in accordance with PLCopen

In addition to the standard functions supplied, users can also create their own functions and store them in a library.

Overview

Focus is on user friendliness

As the performance capability of a system grows, so do the requirements for user friendliness. Only in this way can simple operation of the system be ensured for users. For this reason, SIMOTION places particular emphasis on the user friendliness of the SCOUT engineering system, as follows:

- Engineering for Motion Control, PLC and technology, as well as drive configuration and commissioning are integrated in one system.
- Virtually all tasks are performed graphically, including configuring, programming, testing and commissioning.
- Intelligent operator prompting, a context-sensitive help function and an automatic consistency check all make life easier for users, particularly if they are only just beginning to work with Motion Control programming.
- All SCOUT engineering system tools are integrated and have a uniform look and feel.

In this way, the SCOUT engineering system assists you every step of the way, making engineering as a whole simple and efficient.

SCOUT can be used in SIMATIC STEP 7, either with integrated data management and configuration, or as a stand-alone engineering tool (SCOUT Stand-alone).

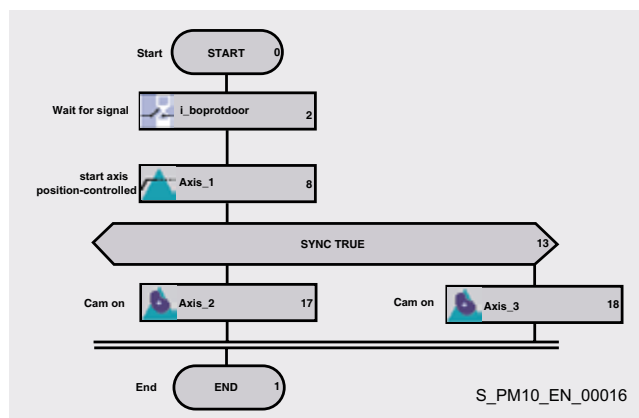
Programming for everyone

When programming SIMOTION you can choose between: Graphic programming using the MCC (Motion Control Chart), LAD (Ladder Diagram)/FBD (Function Block Diagram), or the ST (Structured Text) high-level language – the SCOUT engineering system understands all of these.

In addition to Motion Control commands (e. g. referencing of axis), commands for I/O access, logic and calculations, subroutine calls and controlling of the program flow are also available.

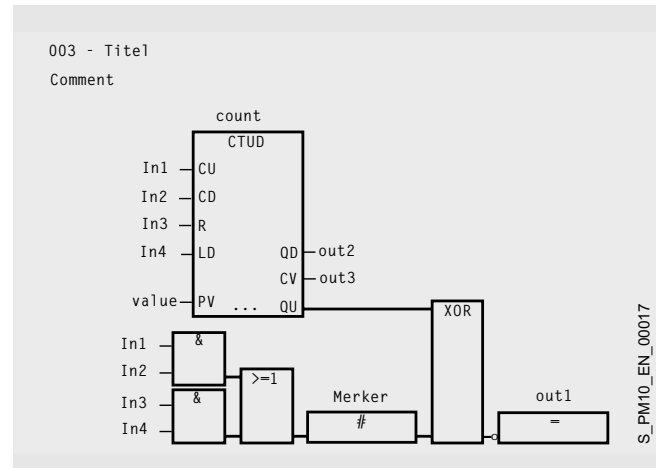
Complex motion relationships can also be programmed easily using cam editors.

Graphic programming



Motion Control Chart enables machine procedures to be programmed graphically as flowcharts. Since commands can be selected and parameterized easily, even beginners are able to achieve their objectives quickly.

PLC programming languages



Are you familiar with the proven LAD (Ladder Diagram) and FBD (Function Block Diagram) programming languages? Then SCOUT will allow you to use this knowledge. As well as the PLC functions defined in accordance with IEC 61131-3, additional system commands and functions are available to you, e. g. for Motion Control in accordance with PLCopen.

High-level language

```

3 INTERFACE
4   VAR_GLOBAL
5     _mcc_product1 : DINT; //only Debugmode
6   END_VAR
7   VAR_GLOBAL RETAIN
8   END_VAR
9   VAR_GLOBAL CONSTANT
10  END_VAR
11 FUNCTION_BLOCK product1;
12 END_INTERFACE
13
14 IMPLEMENTATION
15   EXPRESSION _mcc_product1_condition1;
16   _mcc_product1_condition := (Transport_ein);
17 END_EXPRESSION
18 VAR
19   _mcc_count : INT; //Counter
20   _mccret_DINT : DINT;
21   _mccret_DWORD : DWORD;
22   _mccret_STRUCT : StructRetEncoderValue;
23 END_VAR

```

The Structured Text high-level language allows you to create applications which can be particularly well structured. You get additional support with powerful editing and debugging functions.

SIMOTION at a glance

SIMOTION SCOUT engineering system

The engineering system

Overview (continued)

Centralized management with integrated tools

All data for a particular machine can be managed within one project, including configuration data, programs, movement profiles, and drive data.

The appropriate tools, e. g. for entering a cam or commissioning a drive, are then called from the centralized project management.

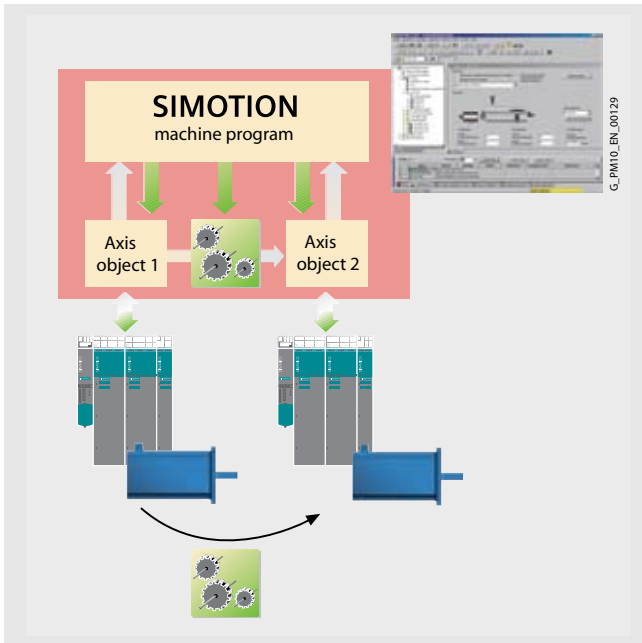
Configuring axes

SIMOTION provides intelligent axis objects for simplified handling of axes. You can create and configure such an object for each axis. The following details are specified:

- Name of the axis
- Associated drive
- Encoder parameterization
- Technology of the axis (e. g. speed-controlled, positioning or synchronized axis)
- Other data relating to the mechanical system of the axis (position control, limitations, etc.)

Using these axis objects has the following benefits:

Regardless of which drive type and connection or which measuring system is used by an axis: All axes are referred to in the same way by the application program i. e. with the axis name, commands and setpoints as well as return values such as status and actual values.



Test and diagnostics

SCOUT provides a wide range of functions which support testing, commissioning and error diagnostics of SIMOTION applications, such as program status, control variables, trace capability and an axis control panel.

Trace

SIMOTION contains a very powerful trace function which can trace system variables, such as actual values and setpoints, as well as the I/O and user data of the integrated PLC.

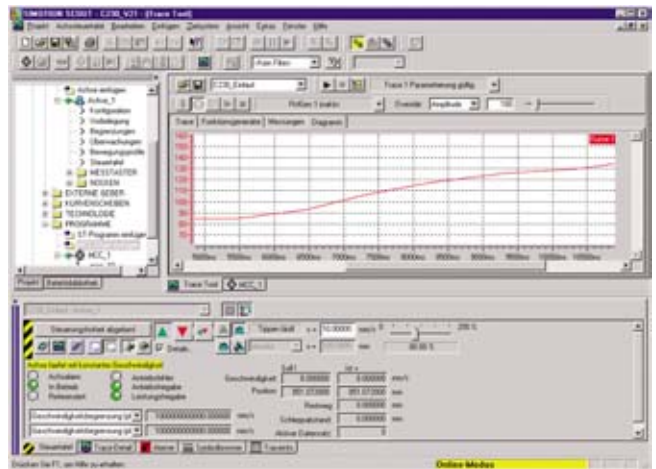
The variables to be recorded, the start condition and the duration of the trace are defined using SCOUT and this configuration is then loaded into the SIMOTION device. The values are re-recorded with accurate times and stored in a trace buffer. The content of the trace buffer can be read by SCOUT and displayed graphically. The traced curves can be stored or exported to Microsoft Excel as a table and evaluated further there.

As well as recording, the trace function also offers, e. g.:

- Bode diagram
- FFT analysis
- Function generator
- Measurement functions
- Mathematical functions

Axis control panel

The axis control panel integrated in SCOUT provides user-friendly support during commissioning, testing and optimization of the machine, due to the option of traversing the axes without the user program.



Overview



SIMOTION C is a Motion Controller in S7-300 design. In addition to the already integrated interfaces, the controller can be expanded using I/O modules from the SIMATIC S7-300 range.

The two variants, SIMOTION C230-2 and SIMOTION C240, differ in terms of their PLC and Motion Control performance.

Design

Interfaces

- Switches, LEDs ...
 - 1 x mode selector
 - 1 x LED strip for fault and status indicators
 - 1 x slot for SIMOTION Micro Memory Card
 - 1 x interface for Industrial Ethernet
 - 2 x interfaces for PROFIBUS DP (of which one interface allows MPI)
 - Power supply terminals
- Drive interfaces
 - 1 x interface for setpoint output for up to 4 axes (either analog or stepper drives)
 - 4 x encoder inputs for incremental or absolute encoders
- Integrated I/Os
 - 18 digital inputs (of which 2 are for high speed inputs and 4 for zero marks)
 - 8 digital outputs

Data storage/data backup

The SIMOTION C Motion Controllers have an integrated non-volatile data memory for storing process variables. The data is backed up on the SIMOTION Micro Memory Card (MMC).

Compatible I/Os

The following can be used as I/Os:

- All certified PROFIBUS standard slaves (DP-V0, DP-V1, DP-V2)
- Isochronous I/O such as ET 200S or ET 200M
- Servo converter of the MASTERDRIVES, SIMODRIVE and SINAMICS series over PROFIBUS DP interface with PROFIdrive
- MICROMASTER and COMBIMASTER frequency converter
- Stepper drives such as SIMOSTEP motors with FM STEPDRIVE power unit

Position-controlled Motion Control

The control and Motion Control functionality runs centrally on the SIMOTION C controller.

The functionality ranges from simple positioning up to complex Motion Control tasks over cams.

Setpoint output/actual value acquisition:

- Position control with analog setpoint output: The SIMOTION C Motion Controllers have one analog output for the speed setpoint and one encoder input for cyclic detection of the actual position value for each axis.
- Position control with pulse direction output for stepper drives: The SIMOTION C Motion Controllers have one pulse output for the position setpoint for each axis. Stepper drives can either be operated without an encoder or be position-controlled with an encoder.
- Position control with digital setpoint output: The PROFIBUS DP interface with PROFIdrive is available for this purpose. The actual position value is read in over PROFIBUS DP and the speed setpoint is output.
- Position control with mixed setpoint output: The analog, stepper and PROFIBUS drive variants can be used in a mixed configuration. The channels of the 4 onboard interfaces can be used for analog or stepper drives.
- Incremental position detection: Incremental encoders supply counter pulses for the traversed path in accordance with their resolution. It is generally necessary to use reference points. The following can be used:
 - Rotary encoders
 - Translatory encoders (length dimensions)
- Absolute position detection: Absolute value encoders with serial interfaces can be used (SSI absolute value encoders). It is not necessary to use homing procedures.
- Isochronous PROFIBUS encoder

Expansion using central I/Os

The central I/O is connected directly to the SIMOTION C Motion Controller.

The I/O installation comprises of two tiers for central I/O (second tier with IM 365 interface) with up to 8 I/O modules each and up to 4 analog modules.

I/O modules from the SIMATIC S7-300 series can be used for a central design.

Additional SIMOTION C240 Functions

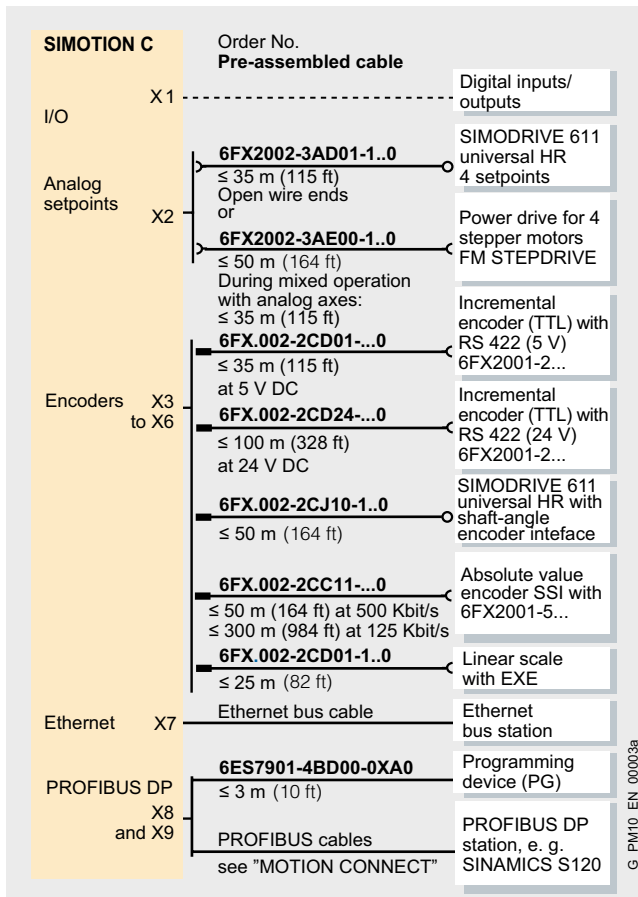
In addition to the SIMOTION C230-2 functions, the SIMOTION C240 Motion Controller has the following additional functions:

- Approx. 2.5x greater performance (application-dependent)
- Larger working memory
- Larger memory for non-volatile process variables
- The analog drive interface can be used for standard outputs (analog and digital outputs).
- The encoder inputs can be used as counters.
- Zero marks can be used as inputs for global measurements.
- Switchable filter time of the analog outputs
- Improved repeatability (jitter) of the cams

SIMOTION C – Controller-based

SIMOTION C230-2/C240

Integration



Overview of connections for SIMOTION C

The maximum permissible cable lengths should be taken into account when planning the cable layout.

Malfunctions may occur if longer lengths are used.

The permissible length of PROFIBUS DP cables depends on the configuration.

Technical specifications

SIMOTION C230-2/C240 Motion Controller

Power supply	
• Rated value	24 V DC
• Permissible range	20.4 V to 28.8 V
Current consumption, typ.	1.2 A
Inrush current, typ.	8.0 A
Power loss	15 W
Permissible ambient temperature	
• Storage and transport	-40 °C to +70 °C (-40 °F to + 158 °F)
• Operation	0 °C to +55 °C (32 °F to + 131 °F)
Permissible relative humidity (without condensation)	5%...95%
Atmospheric pressure	700 hPa to 1060 hPa
Degree of protection to IEC 529	IP20
Dimensions (W x H x D)	200 mm x 125 mm x 118 mm (7.87 in x 4.92 in x 4.65 in)
Weight	
• SIMOTION C230-2	1150 g (2.5 lb)
• Memory card	16 g (0.03 lb)
Relay outputs	5
• of which controller enable	4
• of which READY	1
• Data	
- Max. operational voltage:	50 V DC
- Max. operational current	1 A
- Interrupting capacity, max.	30 W
Operating cycles	
• at 24 V, 1 A	3 x 10 ⁶
Encoder inputs, max.	4
Incremental encoder inputs	
• Interface type (RS 422)	5 V
• Encoder supply	5 V/0.3 A
• Galvanic isolation	No
• Encoder frequency, max.	1 MHz
• Max. cable length	
- at 1 MHz	10 m (32.8 ft)
- at 500 kHz and 300 mA	25 m (82 ft)
- at 500 kHz and 210 mA	35 m (115 ft)
Inputs, SSI absolute encoder	
• Interface type (RS 422)	5 V synchronous serial, single or multitrans
• Encoder supply	24 V/0.3 A
• Galvanic isolation	No
• Transmission rate	187.5/375/750/1500 kbit/s
• Message length, max.	25 bit
• Max. cable length	
- at 187.5 kbit/s	250 m (820 ft)
- at 1500 kbit/s	10 m (32.8 ft)
• Monitoring	
- Short circuit of the sensor supply	Yes
- Wire break	Yes

Technical specifications (continued)

SIMOTION C230-2/C240 Motion Controller

Drive interfaces	4 (each either analog or stepper)
Analog outputs	<ul style="list-style-type: none"> • Voltage range: ± 10.5 V • Resolution: 16-bit, including sign • Galvanic isolation: No • Load impedance: > 3 kΩ • Max. cable length: 35 m (115 ft)
Pulse outputs for stepper drives	<ul style="list-style-type: none"> Output voltage for signal "1", IO = -20 mA: 3.7 V Output voltage for signal "0", IO = 20 mA, max.: 1 V Load resistance, min.: 55 Ω Max. cable length: 50 m (164 ft) Max. pulse frequency: 750 kHz
Real-time clock buffering	<ul style="list-style-type: none"> • Buffer time; typ.: 4 weeks • Charging time, typ.: 1 h
Integrated digital inputs	18 with special functions for: <ul style="list-style-type: none"> • Measuring Input: 2 • BERO connection: 4 (all inputs can be used as standard inputs)
Input voltage	<ul style="list-style-type: none"> • Rated value: 24 V DC • For signal "1": 11 V to 30 V • For signal "0": -3 V to +5 V
Galvanic isolation	<ul style="list-style-type: none"> • Inputs in groups of: 18
Input current	<ul style="list-style-type: none"> • For signal "1", min. / typ.: 6 mA / 8 mA
Input delay (at rated value of input voltage)	<ul style="list-style-type: none"> • 0 → 1, typ./max.: 6 μs/15 μs • 1 → 0, typ./max.: 40 μs/150 μs
Connection of 2-wire proximity switch	Yes
Permissible quiescent current	2 mA
Integrated digital outputs	8 Rated load voltage: 24 V DC <ul style="list-style-type: none"> • Permissible range: 20.4 V to 28.8 V
Output voltage	<ul style="list-style-type: none"> • For signal "1", max.: L+
Galvanic isolation in groups of	8
Output current	<ul style="list-style-type: none"> • For signal "1": 5 mA - Minimum current per channel • For signal "0", max.: 0.5 mA
Residual current, max.	2 mA

SIMOTION C230-2/C240 Motion Controller

Derated loading	<ul style="list-style-type: none"> • at 40 °C: 4 A • at 55 °C: 2 A
Switching frequency of the outputs	<ul style="list-style-type: none"> • With ohmic load: 100 Hz • With inductive load: 2 Hz
Lamp load	5 W
Purge energy/channel	400 mJ (not simultaneous)
Output delay, typ.	150 μs
Short-circuit protection	Yes
Approval according to cULus	Yes

Ordering data

Order No.

SIMOTION C230-2 Motion Controller		6AU1230-2AA01-0AA0
SIMOTION Multi Axes Bundle C230-2	G	6AU1230-2AA01-0CA0
consisting of 1 unit each		
<ul style="list-style-type: none"> • SIMOTION C230-2 • SIMOTION Micro Memory Card (MMC) 32 MB with MultiAxes license 		
SIMOTION Micro Memory Card (MMC) 32 MB		6AU1700-0AA02-0AA0
for SIMOTION C230-2		
SIMOTION Micro Memory Card (MMC) 32 MB		6AU1700-0AA02-0AA0
for SIMOTION C230-2 with MultiAxes Package for SIMOTION C		
SIMOTION C240 Motion Controller	G	6AU1240-1AA00-0AA0
(requires SIMOTION V4.0 HF2)		
SIMOTION Micro Memory Card (MMC) 32 MB		6AU1720-1JA00-0AA0
for SIMOTION C240		
SIMOTION Micro Memory Card (MMC) 32 MB		6AU1720-1JA00-0AA0
for SIMOTION C240 with MultiAxes Package license for SIMOTION C		
Front connector, 40-pin		
<ul style="list-style-type: none"> • Screw-type connection: 6ES7392-1AM00-0AA0 • Spring-tension type: 6ES7392-1BM01-0AA0 		
PS - Cxx connecting comb		6ES7390-7BA00-0AA0
for PS307 power supply		
IM 365 interface		
for expanding the Motion Controller with up to 1 EG, 2 modules with permanent connecting cable (1 m)		
<ul style="list-style-type: none"> • Standard temperature range: 6ES7365-0BA01-0AA0 		
Adapter for programming SIMOTION Micro Memory Card (MMC)		See "SIMOTION software/ engineering software"

G) Subject to export regulations: AL: N and ECCN: 4A994

More information

More information

- on PROFIBUS DP and Industrial Ethernet can be found in Catalog IK PI or in the Interactive Catalog under "Automation Systems/SIMATIC NET Communication Systems".

SIMOTION P350-3

Overview



SIMOTION P350-3 is a PC-based Motion Control system. In comparison to the previous version, the performance has been doubled. It is now possible to control machines with more than 40 axes in cycles of 2 ms. The operating system is Windows XP Professional, with a real-time expansion for SIMOTION. This enables PC applications to be carried out alongside SIMOTION machine applications on SIMOTION P350-3 at any time.

Design

Interfaces

The SIMOTION P350-3 industrial PC contains the following interfaces:

- 1 x IsoPROFIBUS board with two PROFIBUS DP interfaces with PROFIdrive to connect
 - Distributed I/Os (SIMATIC ET200, PROFIBUS DP standard slaves, etc.)
 - Servo converters (e.g., SINAMICS S120, MASTERDRIVES MC, etc.)
 - Engineering systems (PG/PC) or
 - HMI devices (e.g., MP, TP, OP)
- On-board interfaces for standard Windows applications integrated in the PC:
 - 1 x MPI/PROFIBUS DP (not isochronous)
 - 2 x Industrial Ethernet (e.g. engineering system connection)

The open PCI slot can be used to add the following interfaces (optional):

- The MCI-PN communication board for SIMOTION P350-3 supports connection to a PROFINET IO network. This means that in terms of PROFINET, SIMOTION P350-3 is a PROFINET IO controller and supports connection to:
 - Distributed I/Os (SIMATIC ET200, etc.)
 - Servo converters (e.g., SINAMICS S120, etc.)
 - Engineering systems (PG/PC) or
 - HMI devices (e.g., MP, TP, OP).

Compatible panel fronts

SIMOTION P350-3 can be connected to the following panel fronts:

- 12" with membrane-type keys
- 12" for touch screen operation
- 15" with membrane-type keys
- 15" for touch screen operation

The DVI/VGA interface can be used to connect an external monitor.

Compatible I/Os

PROFIBUS DP:

- Certified PROFIBUS DP standard slaves (DP-V0, DP-V1, DP-V2)
- SIMATIC ET 200S/M/X/eco/pro distributed I/O systems
- Distributed drives, e.g. SINAMICS S120 with the CU320 control unit

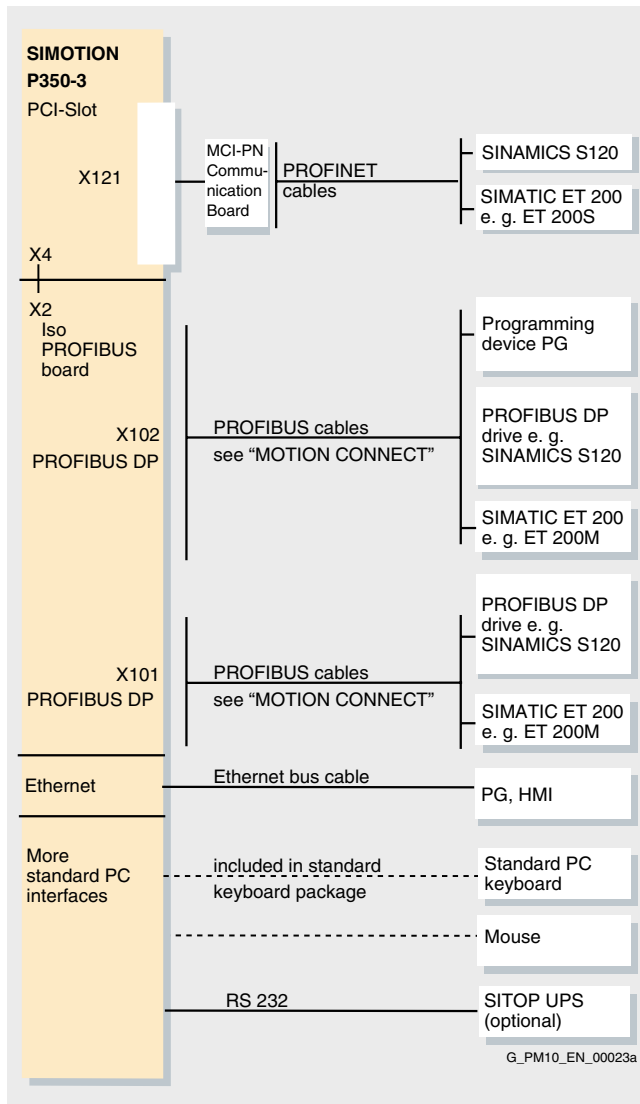
PROFINET IO (via the MCI-PN board, optional)

- SIMATIC ET 200S/pro distributed I/Os
- SINAMICS S120 distributed drives with CU320 control unit and CBE20 communication board as well as SINAMICS S120 Power Modules with CU310PN

Other features

- Processor: Intel® Pentium® M 2 GHz
- 512 MB SDRAM, upgradable to 1 GB
- Hard disk with shock damping, approx. 40 GB
- DVD-ROM drive (optional)
- Microsoft Windows XP Professional operating system, English
- Data backup/restore using the Symantec Ghost data backup software (preinstalled)
- Integrated ports:
 - 1 x COM 1 (V.24), VGA (via DVI adapter)
 - 4 x USB 2.0
 - 1 x MPI/PROFIBUS DP interface (integrated, not isochronous, optically isolated)
 - 2 x Industrial Ethernet 10/100 Mbps (integrated)
- Expansion slots:
 - 1 x PCI/ISA 170 mm (free)
 - 1 x PCI 265 mm (occupied by IsoPROFIBUS board)
- IsoPROFIBUS board (preinstalled):
 - 2 x PROFIBUS DP with PROFIdrive
- PROFINET communication board (optional)

Integration



Overview of the SIMOTION P350-3 connections

Technical specifications

SIMOTION P350-3	
Input voltage	24 V DC
Power consumption, max.	190 W
Mains buffering	max. 20 ms
Degree of protection EN 60529 (IEC 60529)	IP20
Temperature change, max.	10°K/h
Rel. humidity limit values to IEC 68-2-3, IEC 68-2-30, IEC 68-2-56	
• Storage and transport	5% to 95% at +25 °C (+ 77 °F)
• Operation	5% to 80% at +25 °C (+ 77 °F)
Humidity rating in accordance with EN 60721-3-3	Class 3K5 Condensation and icing excluded Low air temperature 0 °C (32 °F)
Permissible ambient temperature	
• Storage and transport	-20 °C to +60 °C (-4 °F to + 140 °F)
• Operation	+5 °C to +45 °C (+41 °F to +113 °F)
Weight, approx.	6 kg (13 lb)
Dimensions (W x H x D)	297 mm x 267 mm x 85 mm (11.69 in x 10.51 in x 3.35 in) (excluding DVD drive) 297 mm x 267 mm x 106 mm (11.69 in x 10.51 in x 4.17 in) (including DVD drive)

Ordering data	Order No.
SIMOTION P350-3 With Intel Pentium M, 2 GHz/ with Windows XP Professional 4.0 English, 512 MB SDRAM, 24 V DC, IsoPROFIBUS board	
• without DVD drive	J 6AU1350-3AK41-1BE2
• with DVD drive	J 6AU1350-3AK43-1BE2
Memory expansion	
• 128 MB DDR2 533 SODIMM	A 6ES7648-2AG10-0GA0
• 256 MB DDR2 533 SODIMM	A 6ES7648-2AG20-0GA0
• 512 MB DDR2 533 SODIMM	A 6ES7648-2AG30-0GA0
MCI PN communication board	A 6AU1390-0BA00-0AA0
Replacement parts	
• Motherboard battery	6FC5247-0AA18-0AA0
Runtime and engineering software	See "SIMOTION software" The Software option must be ordered via z-option

A) Subject to export regulations: AL: N and ECCN: EAR99H

J) Subject to export regulations: AL: N and ECCN: 5D992B2

Panels

Overview



Four different panel fronts with TFT color display are available for the SIMOTION P350-3:

- 12" with membrane keyboard, resolution: 800 x 600 pixels
- 12" for touch screen operation, resolution: 800 x 600 pixels
- 15" with membrane keyboard, resolution: 1024 x 768 pixels
- 15" for touch screen operation, resolution: 1024 x 768 pixels

Design

The panel fronts are suitable for installation in consoles, control cabinets and support arm systems.

The SIMOTION P350-3 is mounted directly behind the panel front as standard. Four knurled-head screws are used to form a mechanical interlock between the SIMOTION P350-3 and the panel front. No special tool is needed for this.

It is also possible to distribute the SIMOTION panel fronts at distances of up to 100 m. For the required components, refer to Thin Client Unit (TCU).

Technical specifications

Panels

Degree of protection in accordance with DIN EN 60529 (IEC 60529) Front panel	IP65
Rel. humidity limit values in accordance with DIN IEC 68-2-3, DIN IEC 68-2-30, DIN IEC 68-2-56	
• Storage and transport	5% to 95% at +25 °C (+77 °F)
• Operation	5% to 80% at +25 °C (+77 °F)
Condensation	Not permitted
Permissible ambient temperature	
• Storage and transport	-20 °C to +60 °C (-4 °F to +140 °F)
• Operation	+5 °C to +45 °C (+41 °F to +113 °F)
Weight	
• 12" panel front, membrane-type keys	6 kg (13 lb)
• 12" panel front, touch screen operation	6 kg (13 lb)
• 15" panel front, membrane-type keys	6 kg (13 lb)
• 15" panel front, touch screen operation	6 kg (13 lb)
Dimensions (W x H x D)	
• 12" panel front, membrane-type keys	483 mm x 310 mm x 100 mm (19.02 in x 12.21 in x 3.94 in)
• 12" panel front, touch screen operation	400 mm x 310 mm x 125 mm (15.75 in x 12.21 in x 4.92 in)
• 15" panel front, membrane-type keys	483 mm x 355 mm x 130 mm (19.02 in x 13.98 in x 5.12 in)
• 15" panel front, touch screen operation	483 mm x 310 mm x 130 mm (19.02 in x 12.21 in x 5.12 in)

Ordering data

Order No.

The panel fronts below can only be used in conjunction with SIMOTION P350-3.

SIMOTION P012T
12" Touch panel front **6AU1300-0CA00-0AA0**

SIMOTION P012K
12" Keys panel front **6AU1300-0DA00-0AA0**

SIMOTION P015T
15" Touch panel front **6AU1300-0EA00-0AA0**

SIMOTION P015K
15" Keys panel front **6AU1300-0FA00-0AA0**

Accessories

Caps
10 units for USB terminal **6FC5248-0AF05-0AA0**

Key labeling strips
For labeling soft keys and function keys, blank, 3 per set (plastic) for

- 12" Keys **6AV7671-3CA00-0AA0**
- 15" Keys **6AV7671-5CA00-0AA0**

Overview

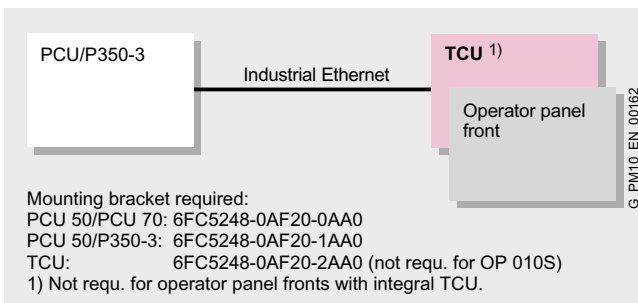


The Thin Client Unit (TCU) for distributed installation permits physical separation of operator panel fronts and SINUMERIK PCU/NCU or SIMOTION P350-3. For this purpose, the operator interface is copied to one/several operator panel fronts with one TCU each.

Integration

The SINUMERIK TCU can be used for:

- SINUMERIK 810D powerline/840D powerline: SINUMERIK PCU 50/PCU 70 with Windows XP SP1 and with PCU basic software WinXP 7.4 and PCU basic software Thin Client, operator panel fronts and SINUMERIK PCU 50/PCU 70 with Windows XP SP2
OP 010/OP 010C/OP 010S/OP 012/TP 012/OP 015/OP 015A/TP 015A with TFT display
- SINUMERIK 840Di sl
- SINUMERIK 840D sl: NCU 710.1/NCU 720.1/NCU 730.1, SINUMERIK PCU 50.3, operator panel fronts
OP 010/OP 010C/OP 010S/OP 012/OP 015/OP 015A/TP 015A with TFT display
- SIMOTION P350-3, operator panel fronts P012T, P012K, P015T, P015K



Connection overview for TCU without central OP on PCU/P350-3

Technical specifications

Order No.	6FC5312-0DA00-0AA0
Product name	Thin Client Unit (TCU)
Input voltage	24 V DC
Power consumption, max.	28.8 W
Degree of protection to EN 60529 (IEC 60529)	IP00
Humidity rating in accordance with EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (+32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95% at +25 °C (+77 °F)
• Transport	5 ... 95% at +25 °C (+77 °F)
• Operation	5 ... 80% at +25 °C (+77 °F)
Ambient temperature	
• Storage	-25 ... +55 °C (-13 ... +131 °F)
• Transport	-25 ... +55 °C (-13 ... +131 °F)
• Operation	0 ... +55 °C (+32 ... +131 °F)
Weight, approx.	1.7 kg (3.75 lb)
Dimensions	
• Width	260 mm (10.23 in)
• Height	265 mm (10.43 in)
• Depth	40 mm (1.57 in)

Ordering data

Order No.

Thin Client Unit (TCU)	6FC5312-0DA00-0AA0
Accessories	
Mounting bracket, flat for PCU with/without video link transmitter in control cabinet	6FC5248-0AF20-0AA0
Mounting bracket, bent for PCU 50, SIMOTION P350-3 with/without video link sender in control cabinet	6FC5248-0AF20-1AA0
Mounting bracket for PCU, video link receiver or TCU behind operator panel front	6FC5248-0AF20-2AA0
IE FC Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to an IE FC outlet RJ45/IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold by the meter; Max. length 1000 m, minimum order quantity 20 m	6XV1840-2AH10
IE FC Trailing Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to an IE FC outlet RJ45/IE FC RJ45 plug 180/90 for use as trailing cable; PROFINET-compatible; without UL approval; sold by the meter; Max. length 1000 m, minimum order quantity 20 m	6XV1840-3AH10
IE FC RJ45 Plug 180 RJ cable connector for Industrial Ethernet with rugged metal housing and integrated insulation displacement contacts; with 180° cable outlet	6GK1901-1BB10-2AA0

MCI-PN communication board

Overview



The MCI-PN communication board for SIMOTION P350-3 supports connection to a PROFINET IO network. This means that in terms of PROFINET, SIMOTION P350-3 is a PROFINET IO controller that offers the following functions:

- PROFINET IO controller
- 100 Mbit/s full duplex
- Support of real time classes of PROFINET IO:
 - RT (realtime)
 - IRT (isochronous realtime)
- Integration of distributed I/O as PROFINET IO devices
- Integration of drives as PROFINET IO devices through PROFIdrive according to the V4 specification
- Support of standard Ethernet communication (TCP/IP), e.g. for integration of SIMOTION SCOUT, HMI or standard TCP, UDP communication to any other devices.
- Integrated 4-port switch with 4 RJ45 sockets based on the PROFINET ASIC ERTEC400.
The optimal topology (line, star, tree or ring) can therefore be constructed without the need for additional external switches.

Design

The MCI-PN communication board is inserted in the spare PCI slot of the SIMOTION P350-3.

Technical specifications

Current consumption	900 mA at 5 V
Permissible ambient temperature	
• Storage and transport	-20 °C to +60 °C (-4 °F to +140 °F)
• Operation	+5 °C to +55 °C (+41 °F to +131 °F)
Weight, approx.	110 g (0.24 lb)
Dimensions	107 mm x 167 mm (4.21 in x 6.57 in)

Ordering data

Order No.

MCI-PN communication board A 6AU1390-0BA00-0AA0

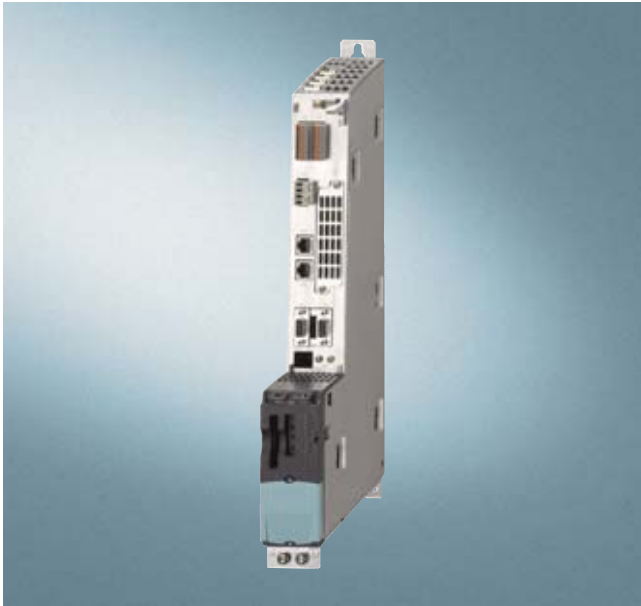
Accessories

The following PROFINET cables and connectors are recommended:

Industrial Ethernet FC RJ45 Plug 145 (1 item)	6GK1901-1BB30-0AA0
Industrial Ethernet FC RJ45 Plug 145 (10 items)	6GK1901-1BB30-0AB0
Industrial Ethernet FC RJ45 Plug 180 (1 item)	6GK1901-1BB10-2AA0
Industrial Ethernet FC RJ45 Plug 180 (10 items)	6GK1901-1BB10-2AB0
Industrial Ethernet FC Stripping Tool	6GK1901-1GA00
Industrial Ethernet FC Standard Cable GP 2x2	6XV1840-2AH10
Industrial Ethernet FC Flexible Cable GP 2x2	6XV1870-2B
Industrial Ethernet FC Trailing Cable GP 2x2	6XV1870-2D
Industrial Ethernet FC Trailing Cable 2x2	6XV1840-3AH10
Industrial Ethernet FC Marine Cable 2x2	6XV1840-4AH10

A) Subject to export regulations: AL: N and ECCN: EAR99H

Overview



SIMOTION D is available in different performance versions. This ensures the highest degree of scalability and flexibility. The individual versions SIMOTION D425 (BASIC Performance), SIMOTION D435 (STANDARD Performance) und SIMOTION D445 (HIGH Performance) differ in their PLC performance and Motion Control performance. In addition, the integral drive control can operate up to 6 SERVO axes in all SIMOTION D versions.

Additional drives can be operated by means of PROFIBUS or PROFINET and SINAMICS CU320 Control Units.

On the D445 and D435, these can be operated direct on the DRIVE-CLiQ with the CX32. Alternatively to the servo control, the speed control can be operated using a vector or U/f control.

Design

Interfaces

- Display, diagnostics
 - LED's for displaying of operating statuses and alarms
 - 3 measuring sockets
- Interfaces
 - 4 x DRIVE-CLiQ (6 x DRIVE-CLiQ with D445)
 - 2 x Industrial Ethernet
 - 2 x PROFIBUS DP
- On-board I/O
 - 8 digital inputs
 - 8 digital in/outputs
- Option Boards
 - Communication Board CBE30 for connection to PROFINET IO
 - Terminal Board TB30 for expansion by 4 digital inputs, 4 digital outputs, 2 analog inputs and 2 analog outputs
- other
 - Connecting terminals for the 24 V electronic power supply

Data storage/data backup

SIMOTION D425, D435 and D445 modules have 320 KB of non-volatile and battery-backed SRAM for retentive tag storage. This backup is stored for at least 5 days. There are two options for storing retentive data for a longer period:

- System commands for storing retentive data on the SIMOTION CF (compact flash card)
- Use of a battery module (combined battery/fan module already included in the scope of supply of a D445)

Runtime software, user data and user programs are saved retentively using a compact flash (CF) card.

Connectable I/O

PROFINET IO: (optionally via CBE30)

- SIMATIC ET 200S/pro distributed I/O
- Distributed drives with the SINAMICS CU320 Control Unit with CBE20 as well as SINAMICS S120 Power Modules with CU310PN

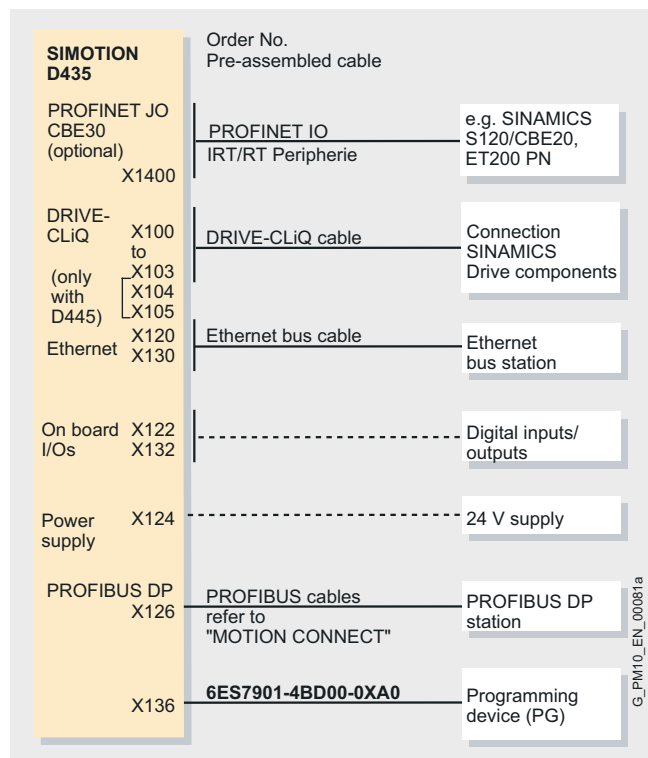
PROFIBUS DP:

- Certified PROFIBUS standard slaves (DP-V0, DP-V1, DP-V2)
- SIMATIC ET200S/M/X/eco/pro distributed I/O systems

DRIVE-CLiQ:

- Modules from the SINAMICS range
- DRIVE-CLiQ cables, which are required to connect line/motor modules to SIMOTION D, are supplied with the line/motor modules (standard length).

Integration



Connection overview SIMOTION D425/D435/D445

The maximum permissible cable lengths should be taken into account when planning the cable layout.

Functional faults can occur when using longer cables.

The permissible length of the PROFIBUS DP cables depends on the configuration.

SIMOTION D – Drive-based

SIMOTION D425/D435/D445

Technical specifications

SIMOTION	D425 – Basic Performance	D435 – Standard Performance	D445 – High Performance
Number of axes max.	16	32	64
Minimum interpolation cycle	2.0 ms	1.0 ms	0.5 ms
Integr. drive control (SERVO)	6	6	6
DRIVE-CLiQ interfaces	4	4	6
Ethernet interfaces	2	2	2
PROFIBUS interfaces	2	2	2
Battery/Fan module	optional	optional	1
Voltage supply			
• nominal value	24 V DC	24 V DC	24 V DC
• permiss. range	20.4 V ... 28.8 V	20.4 V ... 28.8 V	20.4 V ... 28.8 V
Current consumption, typ.	600 mA	600 mA	2 A
Making current, typ.	6.0 A	6.0 A	6.0 A
Power loss	15 W	15 W	50 W
Permiss. ambient temperature			
• Storage and transportation	-40 °C ... +70 °C (-40 °F ... 158 °F)	-40 °C ... +70 °C (-40 °F ... 158 °F)	-40 °C ... +70 °C (-40 °F ... 158 °F)
• Operation	0 °C ... +55 °C (32 °F ... +131 °F)	0 °C ... +55 °C (32 °F ... +131 °F)	0 °C ... +55 °C (32 °F ... +131 °F)
Permiss. relative air humidity (without condensation)	5% ... 95%	5% ... 95%	5% ... 95%
Air pressure	700 hPa ... 1060 hPa	700 hPa ... 1060 hPa	700 hPa ... 1060 hPa
Degree of protection according to IEC 529	IP20	IP20	IP20
Dimensions (W x H x D)	50 mm x 380 mm x 230 mm (1.97 in x 14.96 in x 9.1 in)	50 mm x 380 mm x 230 mm (1.97 in x 14.96 in x 9.1 in)	50 mm x 380 mm x 270 mm (1.97 in x 14.96 in x 10.63 in)
Weight			
• SIMOTION D	2500 g (5 lb)	2500 g (5 lb)	3600 g (8 lb)
• Compact Flash memory card	7 g (0.02 lb)	7 g (0.02 lb)	7 g (0.02 lb)
Digital inputs	8	8	8
Nominal value	24 V DC	24 V DC	24 V DC
• signal „1“	15 V ... 30 V	15 V ... 30 V	15 V ... 30 V
• signal „0“	-3 V ... +5 V	-3 V ... +5 V	-3 V ... +5 V
Galvanic isolation	Yes, in groups of 4	Yes, in groups of 4	Yes, in groups of 4
Typ. current consumption with signal level 1	10 mA at 24 V	10 mA at 24 V	10 mA at 24 V
Signal propagation delay	100 µs	100 µs	100 µs
Digital inputs/outputs (parameterizable)	8	8	8
When used as input			
• Input voltage			
- Nominal value	24 V DC	24 V DC	24 V DC
- signal „1“	15 V ... 30 V	15 V ... 30 V	15 V ... 30 V
- signal „0“	-3 V ... +5 V	-3 V ... +5 V	-3 V ... +5 V
• Galvanic isolation	No	No	No
• Typ. current consumption with signal level 1	10 mA at 24 V	10 mA at 24 V	10 mA at 24 V
• Signal propagation delay	100 µs (1 µs as probe)	100 µs (1 µs as probe)	100 µs (1 µs as probe)

Technical specifications (continued)

SIMOTION	D425 – Basic Performance	D435 – Standard Performance	D445 – High Performance
When used as output			
• Rated load voltage	24 V DC	24 V DC	24 V DC
- permissible range	20.4 V ... 28.8 V	20.4 V ... 28.8 V	20.4 V ... 28.8 V
• Output voltage			
- signal „1“, max.	15 V ... 30 V	15 V ... 30 V	15 V ... 30 V
• Galvanic isolation	No	No	No
• Current load, max.	500 mA per output	500 mA per output	500 mA per output
• Leakage current, max.	2 mA	2 mA	2 mA
• Output switching frequency			
- ohmic load	100 Hz	100 Hz	100 Hz
- inductive load	2 Hz	2 Hz	2 Hz
• Short-circuit protection	Yes	Yes	Yes
Backup real-time clock/SRAM			
• backup time, min.	5 days	5 days	5 days
• charging time, typ.	few minutes	few minutes	few minutes
Approval according to cULus	http://www.ul.com File E164110	http://www.ul.com File E164110	http://www.ul.com File E164110

Ordering data

Order No.

SIMOTION D425	G	6AU1425-0AA00-0AA0
SIMOTION D435	G	6AU1435-0AA00-0AA1
SIMOTION D445	G	6AU1445-0AA00-0AA0
CompactFlash Card (CF) 512 MB		6AU1400-2NA00-0AA0
with SINAMICS drive runtime software V2.4 and SIMOTION Kernel 4.0		
SIMOTION Multi Axes Bundle D425	G	6AU1425-0AA00-0CA0
comprising of 1 piece of the following		
• SIMOTION D425		
• CompactFlash Card 512 MB with Multi Axes Package license for D425 platform		
SIMOTION Multi Axes Bundle D435	G	6AU1435-0AA00-0CA1
comprising of 1 piece of the following		
• SIMOTION D435		
• CompactFlash Card 512 MB with Multi Axes Package license for D435 platform		
Adapter		
for programming of CompactFlash Card (CF)		Please refer to „SIMOTION Software/ Engineering software“
Battery and Fan module		6FC5348-0AA01-0AA0
• D425/D435 – optional		
• D445 – included in the scope of delivery		
Accessories		
Battery		6FC5247-0AA18-0AA0

G) Subject to export regulations: AL: N and ECCN: 4A994

More information

More information

- on PROFIBUS DP, Industrial Ethernet and PROFINET can be found in the IK PI catalog or the interactive catalog under „Automation systems/SIMATIC NET communication systems“.
- on ordering data for SINAMICS drive components: Line Modules, Motor Modules, DRIVE-CLiQ cable etc. please refer to Catalog D21.1 (SINAMICS S120 Drive system) or the interactive catalog under „Drives/AC converters/...“.

SIMOTION D – Drive-based

CBE30 Communication Board

Overview



The CBE30 Communication Board for SIMOTION D425, D435 and D445 allows the SIMOTION to be connected to a PROFINET IO network. The SIMOTION D then assumes the function of a PROFINET IO Controller and can perform the following:

- PROFINET IO Controller functions
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (RealTime)
 - IRT (Isochronous RealTime)
- Connects distributed IOs as PROFINET IO devices
- Connects drives as PROFINET IO devices using PROFIdrive compliant with specification V4
- Supports standard Ethernet communication (TCP/IP), e.g. for interfacing SIMOTION SCOUT, HMI or standard TCP, UDP communication, to devices of any other type
- Integrated 4-port switch with four RJ45 sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

Integration

The CBE30 Communication Board plugs into the option slot on the SIMOTION D Control Unit.

Technical specifications

Max. current requirement (at 24 V DC)	0.25 A
Permissible ambient temperature	
• Storage and transport	-40 °C to +70 °C (-40 °F to 158 °F)
• Operation	0 °C to +55 °C (32 °F to +131 °F)
Dimensions	113 mm x 77 mm (4.45 in x 3.03 in)
Weight, approx.	100 g (0.22 lb)

Ordering data

Order No.

CBE30 Communication Board	6FC5312-0FA00-0AA0
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Accessories

The following PROFINET cables and connectors are recommended:

Industrial Ethernet FC RJ45 Plug 145 (1 item)	6GK1901-1BB30-0AA0
Industrial Ethernet FC RJ45 Plug 145 (10 items)	6GK1901-1BB30-0AB0
Industrial Ethernet FC Stripping Tool	6GK1901-1GA00
Industrial Ethernet FC Standard Cable GP 2x2	6XV1840-2AH10
Industrial Ethernet FC Flexible Cable GP 2x2	6XV1870-2B
Industrial Ethernet FC Trailing Cable GP 2x2	6XV1870-2D
Industrial Ethernet FC Trailing Cable 2x2	6XV1840-3AH10
Industrial Ethernet FC Marine Cable 2x2	6XV1840-4AH10

For further details about connectors and cables, please refer to Catalog IK PI.

Overview

SIMOTION Kernel – Basic functionality

The basic functionalities of the SIMOTION devices are combined within the SIMOTION Kernel.

The SIMOTION Kernel provides high-performance functions for

- PLC functionality (to IEC 61131-3)
- Program control
- Timers
- I/O operation
- Communication

It also provides a powerful Runtime system with

- Cyclic tasks (synchronized and cyclic)
- Sequential tasks
- Time-driven tasks
- Event-driven tasks

The scope of the language conforms to the IEC 61131-3 standard and contains all PLC commands required for I/O management and process and machine control. LAD (Ladder Diagram), FBD (Function Block Diagram), ST (Structured Text), and MCC (Motion Control Chart) are used for programming.

The SIMOTION Kernel basic functionality can be expanded by loading SIMOTION technology packages.

SIMOTION technology packages

Technology packages combine software functions which are required for automation in mechanical engineering in various sectors. Technology packages are loaded into the controller during configuration and expand the basic functionality by additional system functions.

SIMOTION Motion Control technology package

The comprehensive Motion Control functions offer very open and flexible ways of influencing application programming and ensure that future Motion Control applications can be implemented.

The SIMOTION Motion Control technology package contains the following technology functions:

- Motion Control Basic
- Positioning – Position
- Synchronous operation/electronic gear – Gear
- Cam – CAM
- Supplementary technology functions

The technology package functions are accessed via additional language commands and system variables, as well as via functional blocks in accordance with PLCopen. Programming of motion sequences is therefore simple and integrated.

SIMOTION temperature control technology package – TControl

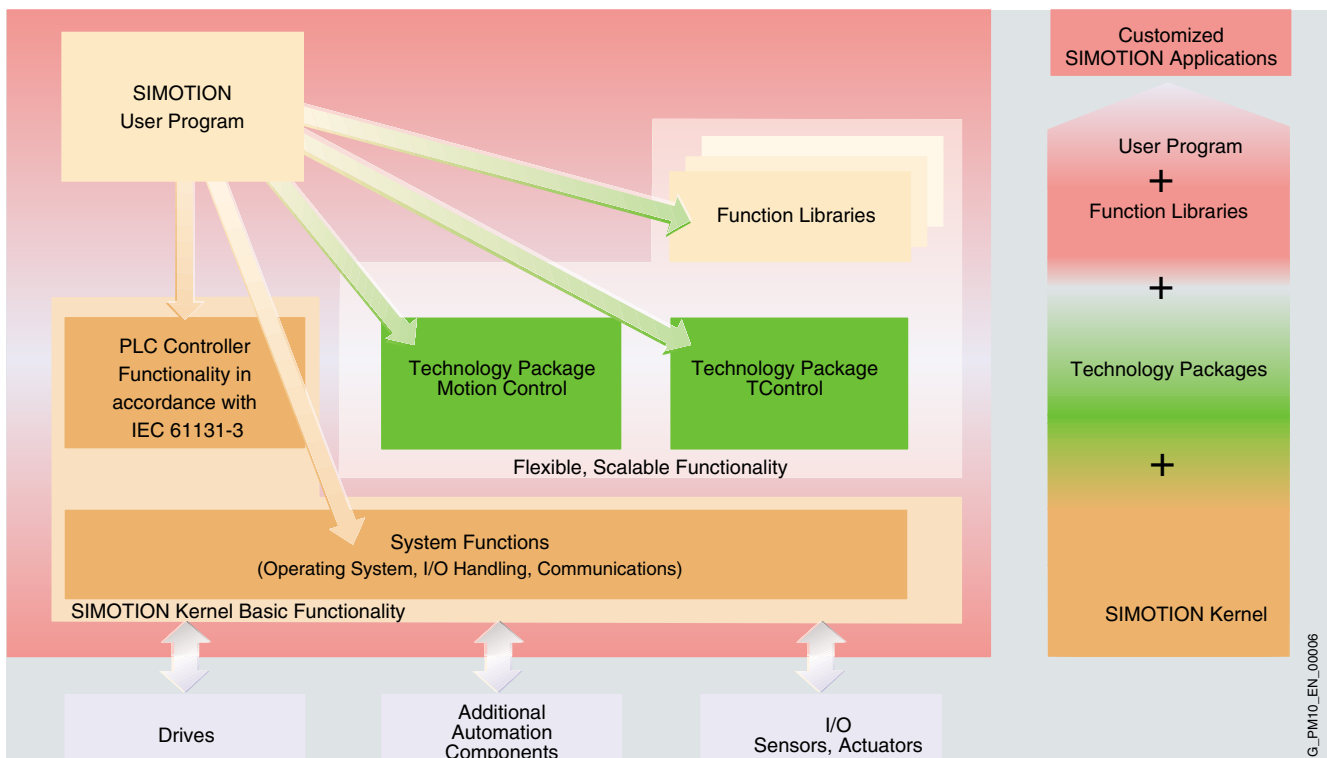
The SIMOTION technology package for temperature control provides temperature channels with extensive functions.

These functions are also accessed via additional language commands and system variables.

SIMOTION Function Library

The SIMOTION Function Library contains standard functions for integrating special I/O modules, standard functions for controlling axes in accordance with PLCopen and programming examples.

Up to Version V3.2, SP1, the function library was supplied on a separate CD in the SCOUT package. In Version V4.0, the standard functions are available with expanded scope in the SCOUT command library and are therefore particularly easy to integrate into the user program. The programming examples are included from V4.0 upwards in the "Utilities & Applications" CD. This CD is supplied free of charge in the SCOUT package.



SIMOTION software structure

Overview (continued)

SIMOTION isochronous mode

In the SIMOTION system, all the components (one or more control units, drives, isochrone I/Os) are synchronized to the basic cycle of the machine, the PROFIBUS DP/PROFINET cycle. The application is also synchronized with this cycle through synchronous application tasks (in servo and interpolation cycle). Isochrone mode therefore permeates the whole machine application (also in the case of distributed systems) which provides considerable advantages:

- Short response times from terminal to terminal and terminal to axis
- High machine cycle times
- Programming of synchronous closed-loop control tasks
- High product quality thanks to a deterministic and reproducible machine response

SIMOTION user program

The SIMOTION technology package functions are accessed in the same way as the SIMOTION Kernel functions, via language commands from the user program.

Programming can be performed either textually, using ST (Structured Text), or graphically.

The graphical programming languages LAD (Ladder Diagram), FBD (Function Block Diagram) and MCC (Motion Control Chart) make programming particularly user-friendly.

Combining the PLC with Motion Control and technology simplifies the optimization of motional sequences (no PLC/Motion interaction), reduces engineering costs and increases both product quality and machine productivity (machine cycle and output) by eliminating interfaces and dead times.

Direct access to the drive bus allows:

- Increased uniformity and integration depth as far as the drive (access to control/status words and drive data, flexible torque limits, additive torque setpoint)
- Synchronization with drives and modular open-loop controls
- Highly-dynamic applications thanks to DSC (DynamicServo-Control) with position-control cycles of 125 μ s

SIMOTION supports additional modular machine approaches with its

- modular software development with libraries and reusable modules,
- division into individual machine modules, which are linked via distributed synchronous operation (for example over PROFIBUS DP or PROFINET IO with IRT)
- Based on a maximum project, the project can be reconfigured, for example, using HMI
- activation/deactivation of DP slaves (I/O components) and technology objects (drives, axes, external encoders, and cams) during engineering and normal operation,

thus reducing engineering and commissioning costs.

SIMOTION communication functions

Communication via PROFIBUS

The communication functions are available via PROFIBUS on all platforms:

- Communication with programming devices (programming device functions)
- Communication with ProTool/Pro and WinCC flexible
- Communication with PCs on which SIMATIC NET OPC is installed. SIMATIC NET SOFTNET S7 software is required on the PC side.

Communication using Ethernet / PROFINET

The communication functions below are available via Ethernet on all platforms:

- Communication with programming devices (programming device functions)
- Communication via UDP and TCP/IP with SIMOTION devices, SIMATIC CPUs and non-Siemens devices
- Communication with ProTool/Pro and WinCC flexible
- Communication with PCs on which SIMATIC NET OPC is installed. SIMATIC NET SOFTNET S7 software is required on the PC side.
- Integration of drives and distributed I/O over PROFINET IO.

SIMOTION IT

SIMOTION IT enables additional communication functions via Ethernet (HTML through Internet Browser):

- Diagnostics functions via SIMOTION IT DIAG
- Communication via SIMOTION IT OPC XML-DA

Runtime software licensing

With SIMOTION, the functionality is mainly defined in software. It is not necessary to purchase additional hardware. The control hardware remains the same with SIMOTION for one axis or 20, with or without temperature controllers and with or without communication services; the software is simply used differently.

The functions below are provided by the basic functionality. The rights of use for these software components are included when the basic unit is purchased:

- **SIMOTION Kernel runtime software**
SIMOTION Kernel is already installed on the device.
- **Motion Control Basic technology functions**
Use of technology functions for speed-controlled axes, single output cams and cam tracks, sensor probes, and external encoders.
- **Supplementary technology functions**
Use of supplementary technology functions, such as summaters, formula objects and fixed gears.
- **Communication functions**
This covers SIMATIC S7 communication functions on the SIMOTION side (programming device/OP communication to programming devices, for engineering and communication to OPs and PCs with SIMATIC HMI, e.g., ProTool/Pro, WinCC flexible or SIMATIC NET OPC), as well as UDP and TCP/IP communication.

Other functions can be licensed using the following software options:

Motion Control technology functions

Other technology functions in the Motion Control technology package are licensed axis-specifically:

- POS (use of the POS technology function for a created positioning axis)
- GEAR (use of the GEAR technology function for a created synchronized axis)
- CAM (use of the CAM technology function for a created cam axis)

You license these technology functions for each axis, using a separate order number for each. Licensing only applies to real axes, virtual axes are not subject to license.

The GEAR technology function contains the POS technology function, while the CAM technology function contains the POS and GEAR technology functions.

Overview (continued)

The MultiAxis package makes licensing very easy. It contains the license for unlimited use of the CAM technology function on one CPU. In addition to the platform-independent MultiAxis Package, variably priced packages for C230-2, C240, P350-3 or D425, D435 and D445 are offered.

TControl technology function

The TControl technology package is licensed channel-specifically, in packages of 8 temperature channels.

SIMOTION IT DIAG option

The IT DIAG option is licensed for each SIMOTION device.

SIMOTION IT OPC XML-DA option

The OPC-XML option is licensed for each SIMOTION device.

Licensing notes

Runtime licenses are not version-specific.

The functionally scalable software options and axis-specific licensing result in a simple pricing structure, allowing you to only pay for what you really need.

When configuring using SIMOTION SCOUT, the required software options (licenses) are displayed.

A license is required for the runtime software

- When it is used in a machine or a machine component before it is supplied by the manufacturer
- When it is used by the customer on completion of initial commissioning
- When it is retrofitted following completion of initial commissioning
- In large-scale plants that are installed directly at the production site without previous initial commissioning by the manufacturer, on completion of initial commissioning before test operation commences.

The required software options are assigned to hardware (memory cards or PC) by generating a license key online.

Pre-installed licenses

Another option is to order SIMOTION memory cards (MMC and CF) and SIMOTION P350-3 with pre-installed licenses. When hardware is ordered (MMC, CF or P350-3), the number of licenses must also be specified:

- Pxx – POS license and number (e.g., P02 = 2x POS license)
- Gxx – GEAR license and number (e.g., G03 = 3x GEAR license)
- Cxx – CAM license and number (e.g., C01 = 1x CAM license)
- Txx – TControl license and number (e.g., T03 = 3x TControl license)
- X00 – OPC XML license
- D00 – IT DIAG license
- M00 – MultiAxis package license (platform independent)
- M24 – MultiAxis package license for C230-2 and C240
- M35 – MultiAxis package license for P350-3
- M42 – MultiAxis package license for D425
- M43 – MultiAxis package license for D435 (incl. D425)
- M44 – MultiAxis package license for D445 (incl. D435 and D425)
- Vxy – Software version for SIMOTION P350-3, XP variant (e.g., V40 = Version 4.0)
- W0x – Service Pack number for SIMOTION P350-3, XP variant (e.g. W02 = Service Pack 2)
- K00 – OPC server license, on SIMOTION P350-3, XP variant

Ordering example

Compact Flash 512MB for SIMOTION D with 3 POS licenses, 2 CAM licenses and 1 TControl license

- Order No.: 6AU1400-2NA00-0AA0-Z P03 C02 T01

Compact Flash card 512MB for SIMOTION D425 with MultiAxis package for D425

- Order No.: 6AU1400-2NA00-0AA0-Z M42

Ordering configurator on the Internet

An electronic ordering configurator is available on the Internet for simple ordering of SIMOTION hardware with corresponding licenses. Customers with Mall access can order directly through the ordering configurator.

Ordering data	Order No.
Technology functions Licenses for runtime software (not version-specific) <ul style="list-style-type: none"> • POS, license for using the positioning technology functions for 1 axe 	6AU1820-1AA20-0AB0
<ul style="list-style-type: none"> • GEAR, license for using the synchronous-operation technology functions for 1 axe 	6AU1820-1AB20-0AB0
<ul style="list-style-type: none"> • CAM, license for using the cam technology functions for 1 axe 	6AU1820-1AC20-0AB0
<ul style="list-style-type: none"> • MultiAxes Package, platform-independent License for unrestricted use of the CAM technology function on a C2xx, P350-3 or D4x5 	6AU1820-0AA20-0AB0
<ul style="list-style-type: none"> • MultiAxes Package for C2xx License for unrestricted use of the CAM technology function on a C230-2 or C240 	6AU1820-0AA24-0AB0
<ul style="list-style-type: none"> • MultiAxes Package for P350-3 License for unrestricted use of the CAM technology function on a P350-3 	6AU1820-0AA35-0AB0
<ul style="list-style-type: none"> • MultiAxes Package for D425 License for unrestricted use of the CAM technology function on a D425 	6AU1820-0AA42-0AB0
<ul style="list-style-type: none"> • MultiAxes Package for D435 License for unrestricted use of the CAM technology function on a D435 or D425 	6AU1820-0AA43-0AB0
<ul style="list-style-type: none"> • MultiAxes Package for D445 License for unrestricted use of the CAM technology function on a D445, D435 or D425 	6AU1820-0AA44-0AB0
<ul style="list-style-type: none"> • TControl, license for using the TControl technology functions for 8 temperature channels 	6AU1820-2AA20-0AB0
Communication functions Licenses for Runtime software (not version-specific)	
SIMOTION IT DIAG Option license for standard diagnostics pages	6AU1820-8BA20-0AB0
SIMOTION IT OPC XML-DA Option license for OPC XML-DA server	6AU1820-8BB20-0AB0

Overview

While the SIMOTION Motion Control system provides a wide variety of preprogrammed functions, you can also assign parameters and program it for customized use.

High performance tools, which provide optimum support and ease of use for the necessary engineering steps, are required for this.

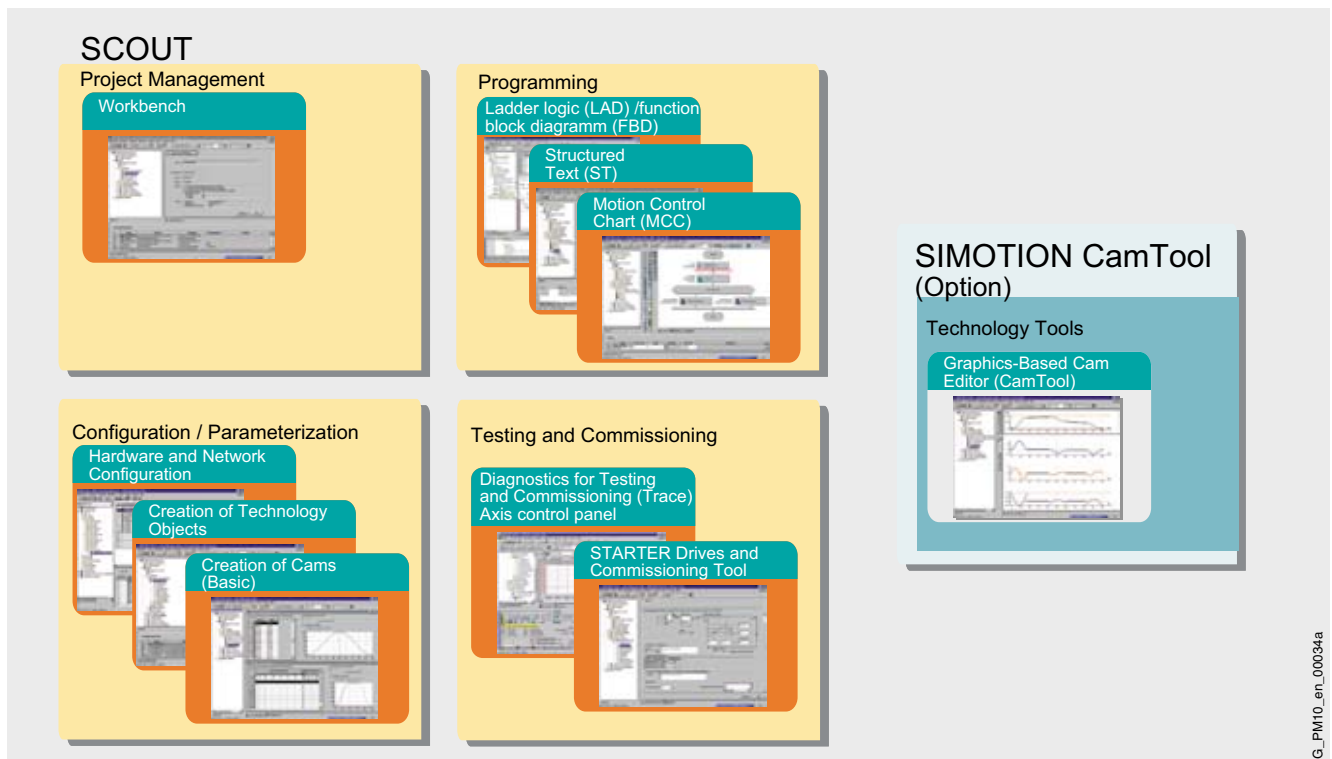
The SCOUT engineering system is the basis for uniform automation in mechanical engineering with SIMOTION and is integrated into the SIMATIC environment in accordance with TIA.

SCOUT provides

- an integrated, function-oriented view of your automation task, combined with
- a high level of user friendliness.

The possible SIMOTION applications range from a simple, parameterizable, speed-controlled single axis through to complex, mechatronically-coupled and programmable multi-axis machines.

Therefore, SCOUT provides views adapted to the task and can be expanded with additional tools (e.g. tool for the graphic creation of cams).



SCOUT is the engineering system for SIMOTION integrated in STEP 7 and provides all the required tools for

- Configuration
- Parameterization
- Programming
- Testing
- Diagnostics

are available.

Tasks such as

- the creation of the hardware and network configuration and the
- creation, configuration and parameterization of technological objects, such as
 - axes,
 - measuring inputs,
 - cams, cam tracks,
 - cam plates, etc.

are graphically supported with operator prompting.

The following are available for programming a SIMOTION application:

- ST (Structured Text to IEC 61131) textual high-level language
- LAD (Ladder Diagram) and FBD (Function Block Diagram)
- MCC (Motion Control Chart), which is a graphical flow diagram language, optimized to provide the simplest operation possible

The integrated test and diagnostics functions are useful when commissioning and servicing.

SCOUT stand-alone is available for users who are not using S7 CPUs. SCOUT stand-alone features the same functions as SCOUT.

STARTER drive/commissioning tool

The aim of STARTER is the simple and rapid commissioning, optimization and diagnostics of all new-generation Siemens drives with only one tool.

The STARTER drive/start-up tool supports the following drives:

- SINAMICS
- MICROMASTER 420/430/440
- MICROMASTER 411/COMBIMASTER 411
- COMBIMASTER

Overview (continued)

CamTool cam editor option package

Simple editors are already integrated in the basic SCOUT package for the creation of cams.

The CamTool option package expands SCOUT with a powerful tool for the graphical creation and optimization of cams.

CamTool is fully integrated into the SCOUT user interface.

System requirements

Software

- SCOUT
 - Windows 2000 SP4 or
 - Windows XP Professional SP2
 - STEP7 V5.3 SP3 or V5.4 (not required for SCOUT stand-alone)
 - Optional: Drive-ES Basic V5.4 required, if SIMODRIVE 611 universal or MASTERDRIVES MC are to be integrated in the project data management.
- CamTool
 - Requirements as for SCOUT
 - SCOUT must be installed.

Hardware

Minimum system requirements PG/PC for SCOUT

- Hardware requirements for
 - Windows 2000, Pentium II 400 MHz/512 MB and higher
 - Windows XP Professional, Pentium III 500 MHz/512 MB and higher
- Main memory configuration 512 MB for:
 - PG/PC
 - SIMOTION P350-3
- Min. screen resolution: 600 x 800 pixels
- Free hard-disk storage: 1.6 GB, 2.3 GB for SCOUT stand-alone

PC card adapter

Special hardware requirements

SIMOTION Kernel updates for SIMOTION C and SIMOTION D are supplied on CD and can then be copied from the PG/PC to the SIMOTION Micro Memory Card (C2xx) or SIMOTION Compact Flash Card (D4x5). An adapter is needed to write to the SIMOTION MMC (Micro Memory Card) or the SIMOTION CF (Compact Flash Card).

We recommend the following products for the SIMOTION Micro Memory Card:

- Windows XP and Windows 2000 operating systems:
 - Floppy disk adapter
Manufacturer: JVC
Product designation: SD/MultiMediaCard CU-VFSD50U
- Suitable for Windows 2000/XP operating system only:
 - USB adapter
Manufacturer: Simple Technologies
Product designation: UMSD-100

Note:

If you choose to use a different USB adapter, you must ensure that it supports both the SD Card and the SIMOTION Micro Memory Card by Infineon Technologies AG.

Adapters can usually be found in PC shops and at electronics shops.

We do not recommend any special product for the CF (Compact Flash Card), since electronics dealers offer a large range.

Ordering data

Order No.

SIMOTION SCOUT V4.0 (German/English/Italian, French) Single license including STARTER, Runtime software and documentation with data carrier for SIMOTION SCOUT	6AU1810-BA40-0XA0
<ul style="list-style-type: none"> • on CD-ROM • on DVD 	0 1
SIMOTION SCOUT V4.0 upgrade (German/English/Italian, French) Single license including STARTER, Runtime software and documentation with data carrier for SIMOTION SCOUT	6AU1810-BA40-0XE0
<ul style="list-style-type: none"> • on CD-ROM • on DVD 	0 1
SIMOTION SCOUT stand-alone V4.0 (German/English/Italian, French) Single license including STARTER, Runtime software and documentation with data carrier for SIMOTION SCOUT	6AU1810-CA40-0XA0
<ul style="list-style-type: none"> • on CD-ROM • on DVD 	0 1
SIMOTION SCOUT stand-alone V4.0 upgrade (German/English/Italian, French) Single license including STARTER, Runtime software and documentation with data carrier for SIMOTION SCOUT	6AU1810-CA40-0XE0
<ul style="list-style-type: none"> • on CD-ROM • on DVD 	0 1
SIMOTION SCOUT software maintenance service Current software version required	6AU1810-BA00-0XL0
<ul style="list-style-type: none"> • on CD-ROM • on DVD 	0 1
SIMOTION CamTool V2.1 SP1 (German/English) Single license, with data carrier	6AU1810-0FA21-0XA0
SIMOTION CamTool V2.1 SP1 Upgrade (German/English) Single license, with data carrier	6AU1810-0FA21-0XE0
SIMOTION CamTool V2.1 SP1 Upgrade to Service Pack 1 With data carrier	6AU1810-0FA21-1XU0

More information

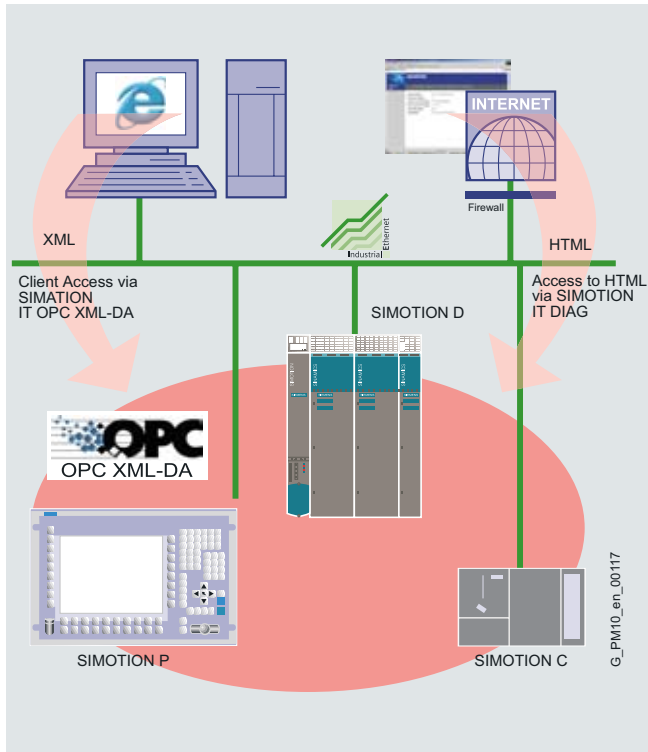
A number of additional software products can be used in conjunction with SIMOTION SCOUT. It must be ensured that the corresponding versions of these software products are compatible. Please consult the compatibility list "Software Products for Use with SIMOTION".

Additional information is available in the Internet under:

<http://support.automation.siemens.com/WWW/view/en/18857317>

SIMOTION IT

Overview



The SIMOTION devices offer communication with standard IT protocols (HTTP) via the integrated Ethernet or PROFINET interface. This makes it possible to access data on the SIMOTION devices from any location within the network or over the Intranet/Internet. The use of standard protocols makes the communication client completely platform-independent.

SIMOTION offers two Runtime software options for this purpose:

- SIMOTION IT DIAG
- SIMOTION IT OPC XML DA

This makes it possible to create simple service and diagnostics tools as well as small HMI applications without having to use vendor-specific software components on the client device.

For OPC XML-DA, a client application is created, e.g. using C#, C++ or Java.

With SIMOTION IT DIAG, apart from the HTML pages already available in the device, users can create their own HTML pages and load them into the device. They can then be accessed using any standard Internet browser.

Both functions offer access to the runtime variables of SIMOTION.

Ordering data	Order No.
SIMOTION IT V 4.0 firmware with Ethernet-based HMI and diagnostics functions CD-ROM with firmware for all SIMOTION platforms with SIMOTION IT functions (current version)	6AU1800-0KA40-0AA0
SIMOTION IT DIAG License for standard diagnostics pages option	6AU1820-8BA20-0AB0
SIMOTION IT OPC XML-DA License for OPC XML-DA server option	6AU1820-8BB20-0AB0

I/O Modules

Overview

IM 174 (Interface Module for 4 Axes)



- For connecting up to 4 electrical or hydraulic drives with analog setpoint interface or stepper drives with pulse-direction interface to a SIMOTION Controller
- Operation with isochronous PROFIBUS DP

Terminal Module TM41



The TM41 Terminal Module supplies TTL signals which simulate an incremental encoder, e.g. for a higher-level control. The encoder interface (incremental encoder simulation) can be linked to an encoder signal from the Control Unit, e.g. incremental encoder sin/cos, by parameter assignment. Alternatively, as far as SIMOTION is concerned, the TM41 can be handled in the same manner as an axis. In this way, for example, the axis position (a master value) can be made available to a second control unit as an encoder signal.

The TM41 Terminal Module increases the number of digital inputs/outputs and analog inputs that are available in the drive system.

Ordering data

Order No.

IM 174 (Interface Module for 4 Axes)

6ES7174-0AA00-0AA0

TM41 Terminal Module with 4 DI, 4 DI/O, 1 AI, 1 TTL (without DRIVE-CLiQ cable)

6SL3055-0AA00-3PA0

More Information

For further details, please refer to the Interactive catalog under "Automation systems/SIMOTION Motion Control System/System components".

SIMATIC HMI

Overview

SIMATIC Panels



A finely graded range of HMI devices is available for local operator control and monitoring.

Apart from the devices listed in Catalog PM10, 2005 Edition, the following devices can also be connected to SIMOTION:

- Panels: TP177B, OP177B, TP277 5.7", OP277 5.7"
- Multi Panels: MP277 8" and MP277 10"
- Mobile Panel: MP177 and MP277

All the panels have one PROFIBUS and/or PROFINET interface and can be configured exclusively with WinCC flexible.

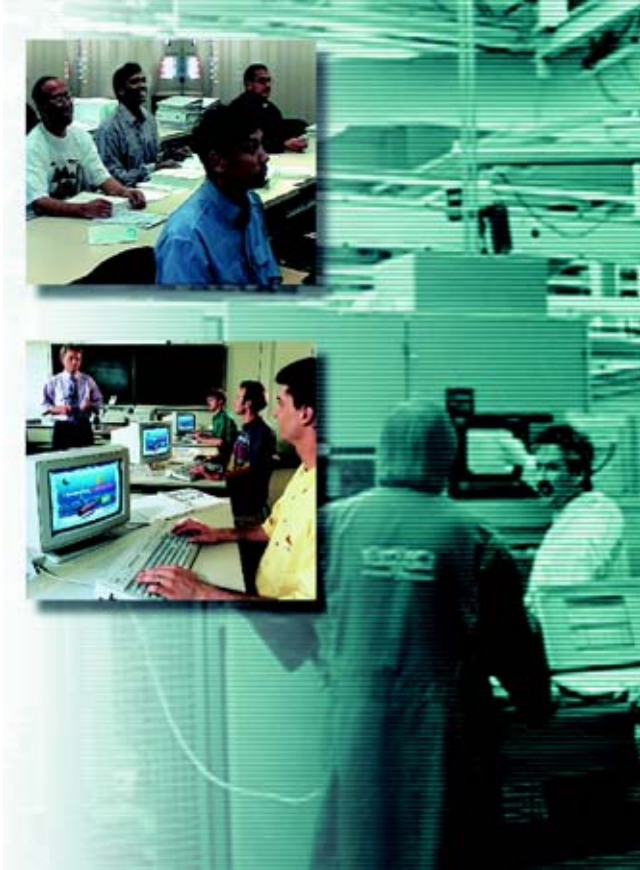
More Information

More information on HMI can be found in

- Catalog ST 80
- the Interactive Catalog under "Automation Systems/SIMATIC HMI Systems".

SIMOTION Training Courses

Overview



To use PLCs economically, specialists are required who can operate, program and service the devices.

The training centers of the Automation and Drives Group train your employees to master this innovative technology. Well-trained employees are motivated and implement optimal automation tasks with dedication.

The courses are modular in design and are intended for a variety of target groups as well as individual customer requirements. We offer courses for:

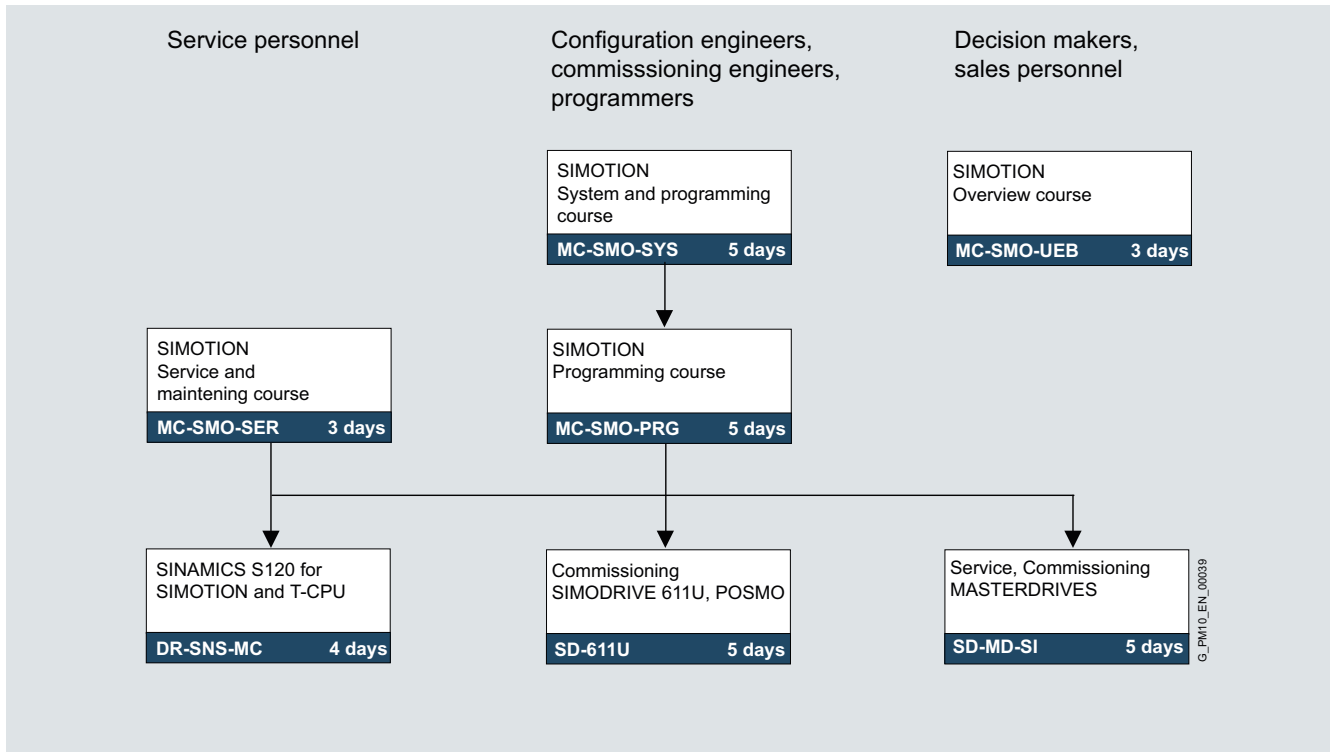
- Decision makers and managers
- Operators
- Programmers
- Configuration engineers
- Maintenance personnel

In addition to the standard training courses at our training centers, we also offer individual courses which are tailored to the special requirements of our customers and can be held on site, if required.

The training courses for SIMOTION are as follows:
For further information, see Catalog ITC.

SIMOTION training courses

The following training courses are available for the SIMOTION Motion Control system:



Design

Title	Target group							Duration/ medium	Abbreviated title
	Decision makers, sales personnel	Project managers, project workers	Programmers	Commissioning engineers, configurators	Service personnel	Operators, users	Maintenance personnel		
SIMOTION introductory course	X	X						3 days	MC-SMO-UEB
SIMOTION system and programming course			X	X	X			5 days	MC-SMO-SYS
SIMOTION programming course			X	X				5 days	MC-SMO-PRG
SIMOTION service and maintenance course					X	X	X	3 days	MC-SMO-SER
SINAMICS S120 on SIMOTION and T-CPU				X	X			4 days	DR-SNS-MC

Description

SIMOTION introductory course MC-SMO-UEB

This course has been designed especially for decision-makers and sales staff who want a quick introduction to the SIMOTION Motion Control system.

Exercises and presentations also provide a hands-on introduction to the SIMOTION SCOUT engineering system.

SIMOTION system and programming course MC-SMO-SYS

The course provides the fundamentals required for the SIMOTION Motion Control system. Participants learn to configure and start-up the system with associated drives and visual display devices. The course also covers how to program motion sequences using MCC (Motion Control Chart) and LAD / CSF (contact / function diagram). Applications for the positioning, synchronous operation, probe and output cam technologies are discussed and explored through practical examples on training devices. The course provides the fundamentals required for the MC-SMO-PRG programming course.

SIMOTION programming course MC-SMO-PRG

This course allows SIMOTION programmers and users to deepen their knowledge of programming with Structured Text (ST) and Motion Control Chart (MCC) on the basis of the knowledge acquired from the system course. A focus is the creation of programmable blocks, e.g. FC and FB using the Structured Text language. The creation of cams and camming is discussed on the basis of the positioning and geared synchronous motion technologies. The applications for the technologies are discussed through selected examples on training devices.

SIMOTION service and maintenance course MC-SMO-SER

The course is designed for service and maintenance personnel, which has to restart and troubleshoot production machines and is responsible for current maintenance and service tasks.

SINAMICS S120 on SIMOTION and T-CPU DR-SNS-MC

The course is designed for users of SINAMICS S120 drives in conjunction with SIMOTION and/or SIMATIC T-CPU Motion Control systems. The course starts with an introduction to the SIMOTION and SIMATIC T-CPU controllers and an overview of the SINAMICS S120 drive system's hardware and documentation before describing the software functions, parameter structure and function charts for Motion Control applications.

It provides the technical knowledge required for start-up, parameterization and troubleshooting. Even more detailed information is provided in the form of practical exercises on the training cases and the SCOUT, T-Config and "STARTER integrated" start-up tools.

Implementation and concept

The SITRAIN course program for SIMOTION began with the system and programming course in parallel to the market introduction of the new Motion Control system. The standard courses are offered at the Nuremberg-Moorenbrunn head office or somewhere close to you.

The practical exercises are based on the course content and are performed on specially developed and well-equipped training devices.

For further information on our SIMOTION courses, please refer to the SIMOTION training brochure (see selection and ordering data).

Ordering data

Order No.

SIMOTION training brochure

E20001-A130-P850

More information

Contact

For more information on the courses offered, please contact:

Course office infoline: **(01805) 235611** or visit us on the Internet.

Additional information is available in the Internet under:

<http://www.siemens.com/sitrain>

Here you can find our complete course program with the latest additional dates, the current number of participants and further information.

Siemens AG
A&D Training Center
Gleiwitzer Str. 555
90475 Nuremberg-Moorenbrunn
Phone: (01805) 235611
Fax: (01805) 235612
E-mail: A&D.kursbuero@nbgm.siemens.de

SIMOTION trainings in USA:
 The SIMOTION courses MC-SMO-SYS and MC-SMO-PRG are also offered in Atlanta/Georgia.

Training schedule:
<http://www.automation.usa.siemens.com/sitrain>

Appendix

Siemens Contacts Worldwide



At

<http://www.siemens.com/automation/partner>

you can find details of Siemens contact partners worldwide responsible for particular technologies.

You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training,
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.



In the face of harsh competition you need optimum conditions to keep ahead all the time:

A strong starting position, a sophisticated strategy and team for the necessary support - in every phase.

Service & support from Siemens provides this support with a complete range of different services for automation and drives.

In every phase: from planning and commissioning to maintenance and upgrading.

Our specialists know when and where to act to keep the productivity and cost-effectiveness of your system running in top form.

Online support



The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

<http://www.siemens.com/automation/service&support>

Technical support



Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

Phone: +49 (0)180 50 50 222
Fax: +49 (0)180 50 50 223
E-Mail: adsupport@siemens.com

In the United States, call toll-free:

Phone: +1 800 333 7421
Fax: +1 423 262 2200

E-Mail: solutions.support@sea.siemens.com

In Canada, call:
Phone: +1 888 303 3353
E-Mail: cic@siemens.ca

In Asia:
Phone: +86 10 6475 7575
Fax: +86 10 6474 7474
E-Mail: adsupport.asia@siemens.com

Technical consulting

Support in the planning and designing of your project from detailed actual-state analysis, target definition and consul-

ting on product and system questions right to the creation of the automation solution. ¹⁾

Optimization and upgrading

To enhance productivity and save costs in your project we

offer high-quality services in optimization and upgrading. ¹⁾

Configuration and software engineering



Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project. ¹⁾

Service on site



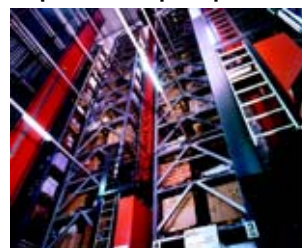
With service on site we offer services for commissioning and maintenance, essential for ensuring system availability.

In Germany
Phone: 0180 50 50 444 ¹⁾

In the United States, call toll-free:
Phone: +1 800 333 7421

In Canada, call:
Phone: +1 888 303 3353

Repairs and spare parts



In the operating phase of a machine or automation system we provide a comprehensive repair and spare parts service ensuring the highest degree of operating safety and reliability.

In Germany
Phone: 0180 50 50 448 ¹⁾

In the United States, call toll-free:
Phone: +1 800 241 4453

In Canada, call:
Phone: +1 888 303 3353

SPARESonWeb - Online spare parts catalog



SPARESonWeb is a web-based tool for selecting the spare parts available for the SINAMICS system. After you have registered and entered the serial number and order number, the spare parts available for the relevant unit are displayed.

The delivery state for specific orders can be displayed for all shipped SINAMICS products.

<http://workplace.automation.siemens.de/sparesonweb>

¹⁾ For country-specific telephone numbers go to our Internet site at: <http://www.siemens.com/automation/service&support>

Overview

Software types

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.

Data generated with engineering software and executable programs can be duplicated for your own use or for use by third parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.

The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.

You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.

Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Automation & Drives offers various types of software license:

- Floating license
- Single license
- Rental license
- Trial license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started.

A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific number of hours (the operating hours do not have to be consecutive).

One license is required for each installation of the software.

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Factory license

With the Factory License the user has the right to install and use the software at one permanent establishment only. The permanent establishment is defined by one address only. The number of hardware devices on which the software may be installed results from the order data or the Certificate of License (CoL).

Certificate of license

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.

A separate upgrade must be purchased for each original license of the software to be upgraded.

ServicePack

ServicePacks are used to debug existing products.

ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Automation & Drives supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).



Detailed explanations concerning license conditions can be found in the "Terms and Conditions of Siemens AG" or under <http://www.siemens.com/automation/mall> (A&D Mall Online-Help System)

A&D/Software licenses/En 03.08.06

Overview

The "General License Conditions for Software Products for Automation and Drives" are applicable for supplies and deliveries of A&D software products.

Legal notes during setup for new software products

All software products feature a uniform reference to the license conditions. The license conditions are enclosed either with the documentation or in the software pack. When software is downloaded from the Internet, the license contract is displayed before the ordering procedure and must be accepted by the user before downloading can continue.

Notice:

This software is protected by German and/or US copyright laws and the regulations of international agreements. Unauthorized reproduction or sale of this software or parts of it is a criminal offense. This will lead to criminal and civil prosecution, and may result in significant fines and/or claims for damages. Prior to installing and using the software, please read the applicable license conditions for this software. You will find these in the documentation or packaging.

If you have received this software on a CD that is marked "Trial version", or accompanying software that is licensed for your use, the software is only permitted to be used for test and validation purposes in accordance with the accompanying conditions for the trial license. To this end, it is necessary for programs, software libraries, etc. are installed on your computer. We therefore urgently recommend that installation is performed on a single-user computer or on a computer that is not used in the production process or for storing important data, since it cannot be completely excluded that existing files will be modified or overwritten. We accept no liability whatsoever for damage and/or data losses that result from this installation or the non-observance of this warning. Every other type of use of this software is only permitted if you are in possession of a valid license from Siemens is obtained.

If you are not in possession of a valid license that can be proven by presenting an appropriate Certificate of License/software product certificate, please abort installation immediately and contact a Siemens office without delay to avoid claims for damages.

Software Update Services

Order

To order the Software Update Service, an order number must be specified. The Software Update Service can be ordered when the software products are ordered or at a later date. Subsequent orders require that the ordering party is in possession at least of a single license.

Note:

It is recommended that the Software Update Service is ordered as early as possible. If a new software version of a software product is released for delivery by Siemens, only those customers will receive it automatically who are entered in the appropriate delivery list at Siemens at this time. Previous software versions, or the current software version are not supplied when the Software Update Service is ordered. The Software Update Service requires that the software product is up-to-date at the time of completion of the contract for the Software Update Service.

Delivery

When a Software Update Service is ordered, you will be sent the contractual conditions of this service and the price is due for payment. At the same time, you will be included in a delivery list for the software product to be updated. If Siemens releases a new software version for the corresponding software product for general sale (function version or product version), it will be delivered automatically to the goods recipient specified in the delivery address within the contract period.

Appendix

Metal surcharges

Explanation of the metal factor

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded.

The surcharges will be determined based on the following criteria:

- Official price of the metal
- Official price on the day prior to receipt of the order or prior to the release order (=daily price) for
 - silver (sale price of the processed material),
 - gold (sale price of the processed material)
- Source: Umicore, Hanau (<http://www.metalsmanagement.umicore.com>) and for
 - copper (low DEL notation + 1%),
 - aluminum (aluminum in cables) and
 - lead (lead in cables)
- Source: German Trade Association for Cables and Conductors (<http://www.kabelverband.de>)
- Metal factor of the products
- Certain products are assigned a metal factor. The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used (weight or percentage method). An exact explanation is given below.

Structure of the metal factor

The metal factor consists of several digits; the first digit indicates whether the method of calculation refers to the list price or a discounted price (customer net price) (L = list price / N = customer net price).

The remaining digits indicate the method of calculation used for the respective metal. If no surcharge is added, a "-" is used.

1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG)
3rd digit	for copper (CU)
4th digit	for aluminum (AL)
5th digit	for lead (PB)
6th digit	for gold (AU)

Weight method

The weight method uses the basic official price, the daily price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the daily price. The result is then multiplied by the raw material weight.

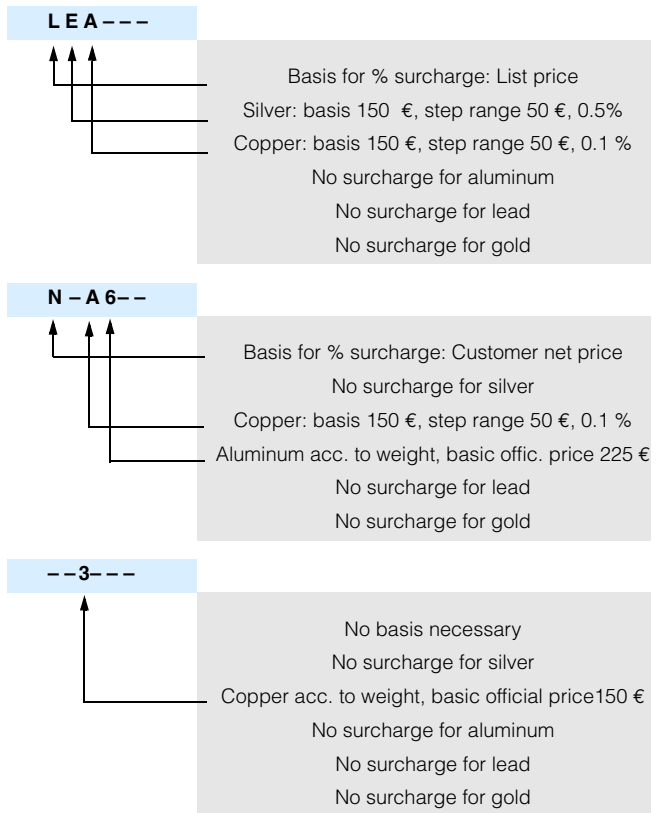
The basic official price can be found in the table below using the number (2 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

Percentage method

Use of the percentage method is indicated by the letters A-Z at the respective digit of the metal factor.

The surcharge is increased - dependent on the deviation of the daily price compared with the basic official price - using the percentage method in "steps" and consequently offers surcharges that remain constant within the framework of this "step range". A higher percentage rate is charged for each new step. The respective percentage level can be found in the table below.

Metal factor examples



A&D/MZ_1/En 05.09.06

Values of the metal factor

Percentage method	Basic official price	Step range	% surcharge 1st step	% surcharge 2nd step	% surcharge 3rd step	% surcharge 4th step	% surcharge per additional step
			Official price 151 € – 200 €	Official price 201 € – 250 €	Official price 251 € – 300 €	Official price 301 € – 350 €	
A	150	50	0.1	0.2	0.3	0.4	0.1
B	150	50	0.2	0.4	0.6	0.8	0.2
C	150	50	0.3	0.6	0.9	1.2	0.3
D	150	50	0.4	0.8	1.2	1.6	0.4
E	150	50	0.5	1.0	1.5	2.0	0.5
F	150	50	0.6	1.2	1.8	2.4	0.6
G	150	50	0.7	1.4	2.1	2.8	0.7
H	150	50	1.2	2.4	3.6	4.8	1.2
I	150	50	1.6	3.2	4.8	6.4	1.6
J	150	50	1.8	3.6	5.4	7.2	1.8
K	150	50	2.0	3.5	5.0	6.5	1.5
L	150	50	2.2	4.4	6.6	8.8	2.2
M	150	50	2.5	5.0	7.5	10.0	2.5
			176 € – 225 €	226 € – 275 €	276 € – 325 €	326 € – 375 €	
O	175	50	0.1	0.2	0.3	0.4	0.1
P	175	50	0.2	0.4	0.6	0.8	0.2
Q	175	50	0.3	0.6	0.9	1.2	0.3
R	175	50	0.5	1.0	1.5	2.0	0.5
			226 € – 275 €	276 € – 325 €	326 € – 375 €	376 € – 425 €	
S	225	50	0.2	0.4	0.6	0.8	0.2
T	225	50	0.5	1.0	1.5	2.0	0.5
U	225	50	1.0	2.0	3.0	4.0	1.0
V	225	50	1.0	1.5	2.0	3.0	1.0
W	225	50	1.2	2.5	3.5	4.5	1.0
			126 € – 150 €	151 € – 175 €	176 € – 200 €	201 € – 225 €	
X	125	25	1.9	3.8	5.7	7.6	1.9
			151 € – 175 €	176 € – 200 €	201 € – 225 €	226 € – 250 €	
Y	150	25	0.3	0.6	0.9	1.2	0.3
			401 € – 425 €	426 € – 450 €	451 € – 475 €	476 € – 500 €	
Z	400	25	0.1	0.2	0.3	0.4	0.1
Price basis (1st digit)							
L	Charged on the list price						
N	Charged on the customer net price or discounted list price						
Weight method	Basic official price						
2	100						
3	150						
4	175						
5	200	Calculation based on raw material weight					
6	225						
7	300						
8	400						
9	555						
Misc.							
–	No metal surcharge						

Appendix

Conditions of sale and delivery/Export regulations

Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusively for orders placed with Siemens AG.

For customers with a seat or registered office in Germany

The "General Terms of Payment" as well as the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany" shall apply.

For customers with a seat or registered office outside of Germany

The "General Terms of Payment" as well as the "General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

General

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold, if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order.

The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products. An exact explanation of the metal factor can be found on the page entitled "Metal surcharges".

The texts of the Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

- 6ZB5310-0KR30-0BA1
(for customers based in Germany)
- 6ZB5310-0KS53-0BA1
(for customers based outside of Germany)

or download them from the Internet
<http://www.siemens.com/automation/mall>
(Germany: A&D Mall Online-Help System)

Export regulations

The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the <u>German Export List</u> Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an " <u>AL</u> " not equal to "N" are subject to a European or German export authorization when being exported out of the EU.
ECCN	<u>Export Control Classification Number</u> . Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an " <u>ECCN</u> " not equal to "N" are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

Errors excepted and subject to change without prior notice.

A&D/VuL_mit MZ/En 05.09.06

Catalogs of the Automation and Drives Group (A&D)

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

Automation and Drives	<i>Catalog</i>		
Interactive catalog on CD-ROM and on DVD			
• The Offline Mall of Automation and Drives	CA 01		
Automation Systems for Machine Tools			
SINUMERIK & SIMODRIVE	NC 60		
SINUMERIK & SINAMICS	NC 61		
Drive Systems			
<u>Variable-Speed Drives</u>			
SINAMICS G130 Drive Converter Chassis Units, SINAMICS G150 Drive Converter Cabinet Units	D 11		
SINAMICS G110 Inverter Chassis Units	D 11.1		
SINAMICS GM150/SINAMICS SM150 Medium-Voltage Converters	D 12		
SINAMICS S120 Drive Converter Systems	D 21.1		
SINAMICS S150 Drive Converter Cabinet Units	D 21.3		
Asynchronous Motors Standardline	D 86.1		
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2		
DC Motors	DA 12		
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1		
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2		
SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units	DA 22		
SIMOVERT PM Modular Converter Systems	DA 45		
SIEMOSYN Motors	DA 48		
MICROMASTER 410/420/430/440 Inverters	DA 51.2		
MICROMASTER 411/COMBIMASTER 411	DA 51.3		
SIMOVERT MASTERDRIVES Vector Control	DA 65.10		
SIMOVERT MASTERDRIVES Motion Control	DA 65.11		
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES	DA 65.3		
SIMODRIVE 611 universal and POSMO	DA 65.4		
<u>Low-Voltage Three-Phase-Motors</u>			
IEC Squirrel-Cage Motors	D 81.1		
<u>Automation Systems for Machine Tools SIMODRIVE</u>	NC 60		
• Main Spindle/Feed Motors			
• Converter Systems SIMODRIVE 611/POSMO			
<u>Automation Systems for Machine Tools SINAMICS</u>	NC 61		
• Main Spindle/Feed Motors			
• Drive System SINAMICS S120			
<u>Drive and Control Components for Hoisting Equipment</u>	HE 1		
Electrical Installation Technology			
<i>PDF: ALPHA Small Distribution Boards and Distribution Boards, Terminal Blocks</i>	ETA 1		
<i>PDF: ALPHA 8HP Molded-Plastic Distribution System</i>	ETA 3		
BETA Low-Voltage Circuit Protection	ET B1		
<i>PDF: DELTA Switches and Socket Outlets</i>	ET D1		
GAMMA Building Controls	ET G1		
Human Machine Interface Systems SIMATIC HMI	ST 80		
Industrial Communication for Automation and Drives		<i>Catalog</i>	IK PI
Low-Voltage			
Controls and Distribution – SIRIUS, SENTRON, SIVACON		LV 1	
Controls and Distribution – Technical Information SIRIUS, SENTRON, SIVACON		LV 1 T	
SIDAC Reactors and Filters		LV 60	
SIVENT Fans		LV 65	
SIVACON 8PS Busbar Trunking Systems		LV 70	
Motion Control System SIMOTION			PM 10
Process Instrumentation and Analytics			
Field Instruments for Process Automation		FI 01	
Measuring Instruments for Pressure, Differential Pressure, Flow, Level and Temperature, Positioners and Liquid Meters			
<i>PDF: Indicators for panel mounting</i>		MP 12	
SIREC Recorders and Accessories		MP 20	
SIPART, Controllers and Software		MP 31	
SIWAREX Weighing Systems		WT 01	
Continuous Weighing and Process Protection		WT 02	
Process Analytical Instruments		PA 01	
<i>PDF: Process Analytics, Components for the System Integration</i>		PA 11	
SIMATIC Industrial Automation Systems			
SIMATIC PCS Process Control System		ST 45	
Products for Totally Integrated Automation and Micro Automation		ST 70	
SIMATIC PCS 7 Process Control System		ST PCS 7	
Add-ons for the SIMATIC PCS 7 Process Control System		ST PCS 7.1	
Migration solutions with the SIMATIC PCS 7 Process Control System		ST PCS 7.2	
pc-based Automation		ST PC	
SIMATIC Control Systems		ST DA	
SIMATIC Sensors			FS 10
SIPOS Electric Actuators			
Electric Rotary, Linear and Part-turn Actuators		MP 35	
Electric Rotary Actuators for Nuclear Plants		MP 35.1/2	
Systems Engineering			
Power supplies SITOP power		KT 10.1	
System cabling SIMATIC TOP connect		KT 10.2	
System Solutions			
Applications and Products for Industry are part of the interactive catalog CA 01			
TELEPERM M Process Control System			
<i>PDF: AS 488/TM automation systems</i>			PLT 112

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Automation and Drives
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