

# SIMADYN D Control System

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# SIMADYN D Control System

## Introduction

### Overview



SIMADYN D is a well-proven subrack-based system (Rack Based), with a modular hardware and software design. This means that it can be configured for any type of application.

SIMADYN D distinguishes itself due to the various packaging types with subracks which are suitable for small extending up to high requirements. Not only this, but also the matching modules for closed-loop control, input/output and communications.

The subracks with up to 24 slots have two high-performance 16-bit backplane buses for fast data transfer between the individual modules.

### Benefits

In addition to user-friendly engineering using graphic program techniques, users have all of the advantages of a system which has proven itself admirably in the widest range of applications, and that for over a decade now

#### Graphic engineering

For many years now, using SIMADYN D, control concepts have been developed, implemented and tested on the target system with the graphic STEP 7, and CFC engineering tools and, as an option, SFC - and that directly on the screen. These advantages have a positive impact in all of the phases of a project:

- Standard tools for engineering/configuring, testing, commissioning, service and maintenance as well as when making changes and expanding the functionality
- Configuring instead of programming: Suitable function blocks, e.g. for closed-loop control, arithmetic operations, input/output, communication or diagnostic tasks, are selected from a library and are located as graphic symbol directly on the "work-sheet" on the screen. These function blocks are then interconnected using the mouse or are parameterized. A high-performance auto router immediately visualizes the signal flow which has been entered

- Complex tasks can be broken-down into transparent sub-tasks. This supports structured work and makes it easier to understand and even allows older concepts to be comprehended.
- An authentic print-out can be created from the configured hardware and software at the "press of a button".

The fact that automation tasks can be solved in a standard integrated fashion is reflected in the fact that the operator control and visualization systems of the SIMATIC HMI family, such as Operator Panels (OP/TP) and process visualization systems, based on WinCC, can be connected.

#### Advantages at a glance

- Using SIMADYN D, every automation task can be simply tackled thanks to the free graphic configuring/engineering using the SIMATIC S7 software tools. This significantly reduces the total costs when generating automation and drive solutions. A technology diagram can be printed-out for documentation purposes.
- Using state-of-the-art CPU modules, extremely high-performance system buses for effective multi-processing and with a fast operating system, which is tailored for complex control systems, SIMADYN D masters tasks requiring the highest dynamic response and complexity.
- SIMADYN D can be optimally adapted to any application as a result of the modular hardware and software structure - from small applications up to large plants. There are no restrictions due to the defined functions of a standard controller. SIMADYN D can also be subsequently expanded at any time for plant expansions and retrofits.
- SIMADYN D can be connected to higher-level automation systems and subordinate drive systems using standardized bus systems.

### Application

Because of its excellent performance, SIMADYN D is especially suitable for all applications where a high control dynamic response and arithmetic accuracy are required or where a high level of functionality is required.

SIMADYN D can be used for the widest range of applications and industry sectors as it can be freely configured and because of its extensive range of modules:

- Closed-loop torque, speed and position control for converter-fed DC and three-phase drives. For example, for synchronous operation, dancer or tension controls, winders, multi-motor drives, gearbox/motor test stands, complex setpoint calculations and closed-loop control for cross-cutters, "break-proof" electronic shafts
- High precision rolling mill drives
- Hydraulic drives with a high dynamic response
- Special applications using converters, e.g. for closed-loop excitation current control, high voltage DC power transmission, static reactive power compensation equipment

### Design

The SIMADYN D control system is of a modular design comprising hardware and software components, which are combined for a specific application.

#### Subracks

The selected modules are operated in a SIMADYN D subrack (SR..). Depending on the number of subracks required, there are versions available with between 6, 12 and 24 slots. Two high-performance backplane buses guarantee extremely fast data exchange between the various modules.

For extremely complex tasks, several subracks are connected together through an extremely fast fiber-optic cable coupling.

#### CPU modules

A SIMADYN D system always contains one or several CPU modules. The configured user program (e.g. user software) run on these CPU modules. For extremely complex, sophisticated tasks, or if many functions have to be processed in extremely short cycle times, then several CPU modules are used. There are various types of CPU modules with the following features:

- State-of-the art, high-performance 32-bit technology (PM5, PM6) permits cycle times for typical control loops of approximately 0.5 ms.
- PM5 for standard applications and PM6 for applications requiring a high performance

Up to 8 CPU modules can be operated in a subrack.

#### Program memory modules

A program, generated on a PC, is downloaded into a program memory module (MS..). This memory module is then inserted in the CPU module. The memory modules also have a non-volatile memory for permanently saving online changes.

#### Buffer memory

If more than one CPU module is operated in a subrack, a buffer memory module MM.. must be inserted between the CPUs to implement data exchange.

#### Input/output modules

Analog, digital and incremental encoder signals are connected to input/output expansion modules IT41/IT42 as well as via the SITOP converter module ITDC.

Every CPU module can be expanded by a max. of 2 IT.. modules.

The EA12 and EB11 input/output modules also provide additional connections for analog, digital and incremental encoder signals.

#### Communication modules

High-performance serial couplings are implemented (PROFIBUS DP, Industrial Ethernet, fiber-optic cable subrack coupling) using the communication modules (CS..) and the communication sub-modules which can be inserted on them.

It is important to especially mention the CS7 carrier module. Up to three communication modules, type SS4 (for DUST/USS protocols) or SS52 (for PROFIBUS DP) can be plugged-onto the CS7.

A SIMOLINK master interface ITSL is directly plugged onto one of the CPU modules.

#### Interface modules

As a result of the high quantity of signals, the plant and process signals, for example, analog, digital and incremental encoder signals, are acquired through interface modules.

The interface modules (SA.., SE.., SU..) are snapped onto mounting rails in the cabinet and are connected to the modules through pre-assembled, plug-in cables (SC..).

Using these interface modules, analog signals can be electrically isolated and adapted.

Digital signals are displayed on LEDs and can be electrically isolated.

#### Operator panels

SIMATIC operator panels are connected to MPI through the CS7 communication module and the SS52 communication module. Several operator panels can be operated on the MPI bus.

The user programs the function and display of the operator panels using the ProTool/ Lite SIMATIC tool. This means, for example, that several process quantities can be monitored and changed.

Commands can be entered, the SIMADYN D clock time can be set and displayed using function keys.

Operating and fault messages can be defined in the OP using the user data areas.

### Integration

Serial coupling to PROFIBUS DP, SIMOLINK or Industrial Ethernet is established with communication modules. Plug-in communication submodules are inserted on the main communication modules.

As a result of the high number of signals, the plant and process signals, for example analog, digital and incremental encoder signals are not directly connected to the modules but rather to interface modules and plug-in terminals.

### Configuration

Control-related applications are quickly and simply created using CFC function blocks.

# SIMADYN D Control System

## Subracks

### Overview

- For a module format ES 902C (233.4 x 220 mm)
- A housing enclosed and shielded on all sides with SR8x slot covers.
- A battery can be installed or connected to save data when the power is disconnected or during power failures: 3.4 V/5 Ah Lithium battery; size C (baby cell)
- Backplane buses with integrated bus terminating circuit
- Degree of protection IP00
- Can be supplied with or without fan; fan operating time, 40,000 h; the fan can be retrofitted or removed

### Features of the integrated power supplies

- Permissible voltage ranges:
  - for 115/230 V AC: - 15 %, + 10 %
  - for 24 V DC: + 20 to + 30 V
- Input and output voltages are monitored; switch-off routines initiated to maintain data and reset outputs
- LED operating status display
- Automatic restart after power supply dips or failure

### Subrack types

- SR6: 6 slots for 230 V AC power supply voltage
- SR12: 12 slots for 24 V DC or 115 – 230 V AC supply voltages
- SR24: 24 slots for 24 V DC or 115 – 230 V AC power supply voltages

### Application

The SRxx subracks represent the mechanical rack system for the SIMADYN D control system.

### Function

These subracks have the following tasks:

- They mechanically accommodate the modules
- They supply the modules with the operating voltages
- Fast data transfer between the individual modules through the L and C backplane buses
- CPU, buffer memory, input/ output, expansion and communication modules can be inserted

The output power of the integrated power supply is limited. For this reason it is important to observe the power requirement of the modules used (especially the current consumption at 5 V).

If the power supply output available with an SR6 or SR12 is not sufficient, then the next larger subrack should be used (SR12 or SR24).

#### Overview



- Subracks with 6 slots and power supply (as plug-in module)
- 230 V AC power supply voltage
- An external battery can be connected to save the data when the power supply is disconnected
- Cooling:
  - SR6 subracks: Without fan
  - SR6V subracks: With fan ("ventilated"); mounted on the top assembly; no fan monitoring; forced ventilation is required for the PM6 CPU modules

#### Application

- For SIMADYN D racks (cannot be used for CSH11, CS12 to CS22)
- For small and average sized applications

#### Function

L bus (local bus) with bus termination

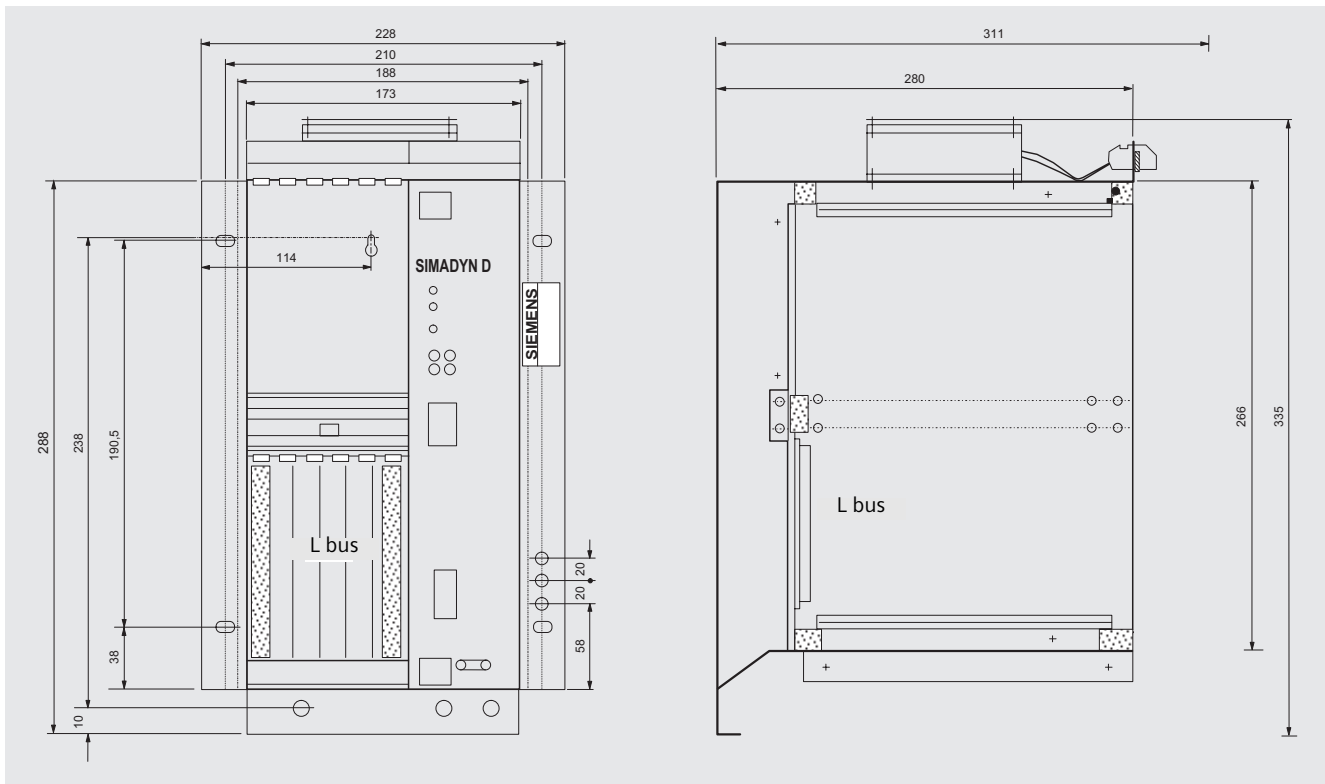
#### Technical specifications

Rated input voltage	1 AC 50/60 Hz 230 V
Dimensions W x H x D in mm	
• SR6	228 x 320 x 280
• SR6V (fan)	228 x 335 x 280
Weight	4 kg
Nominal input current	AC 0.6 A
I <sup>2</sup> t value	0.5 A <sup>2</sup> s
Maximum value	25 A
Output voltages	+ 5 V/7 A +15 V/0.7 A - 15 V/0.6 A

#### Selection and ordering data

	Order No.
<b>SR&amp; subrack</b> without fan, 6 slots, 230 V AC input voltage	<b>6DD1 682-0BB0</b>
<b>SR6V subrack</b> with fan, 6 slots, 230 V AC input voltage	<b>6DD1 682-0BB1</b>

#### Dimension drawing



# SIMADYN D Control System

## Subracks

### SR12 Subrack

#### Overview



- Rack with 12 slots and power supply
- Slot for a buffer battery for saving data when the power is disconnected; this back-up battery must be ordered separately
- For versions with fan: The fan is integrated in the power supply, fan monitoring; forced cooling is required for the PM6 CPU module as well as CS12 to CS22
- Subrack with 12 slots and power supply. There are four supply voltage versions (supply voltage) and cooling versions:
  - SR12.1 with fan, 24 V DC input voltage
  - SR12.2 without fan, 24 V DC input voltage
  - SR12.3 with fan, 115/230 V AC input voltage
  - SR12.4 without fan, 115/230 V AC input voltage

<b>SR12.3 subrack with fan</b>	
Rated input voltage	1 AC 50/60 Hz 115/230 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	11 kg
Rated input current	2.4 A, 115 V 1.2 A, 230 V
Inrush current, max.	3 A, 115 V 6 A, 230 V
I <sup>2</sup> t value	0.15 A <sup>2</sup> s, 115 V 0.6 A <sup>2</sup> s, 230 V
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

<b>SR12.4 subrack without fan</b>	
Rated input voltage	1 AC 50/60 Hz 115/230 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	10.5 kg
Rated input current	2.4 A, 115 V 1.2 A, 230 V
Inrush current, max.	3 A, 115 V 6 A, 230 V
I <sup>2</sup> t value	0.15 A <sup>2</sup> s, 115 V 0.6 A <sup>2</sup> s, 230 V
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

#### Application

- For SIMADYN D modules
- For small, mid-range and large scale applications

#### Technical specifications

<b>SR12.1 subrack with fan</b>	
Rated input voltage	DC 24 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	11 kg
Rated input current	16 A
Inrush current, max.	32 A
I <sup>2</sup> t value	10 A <sup>2</sup> s
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

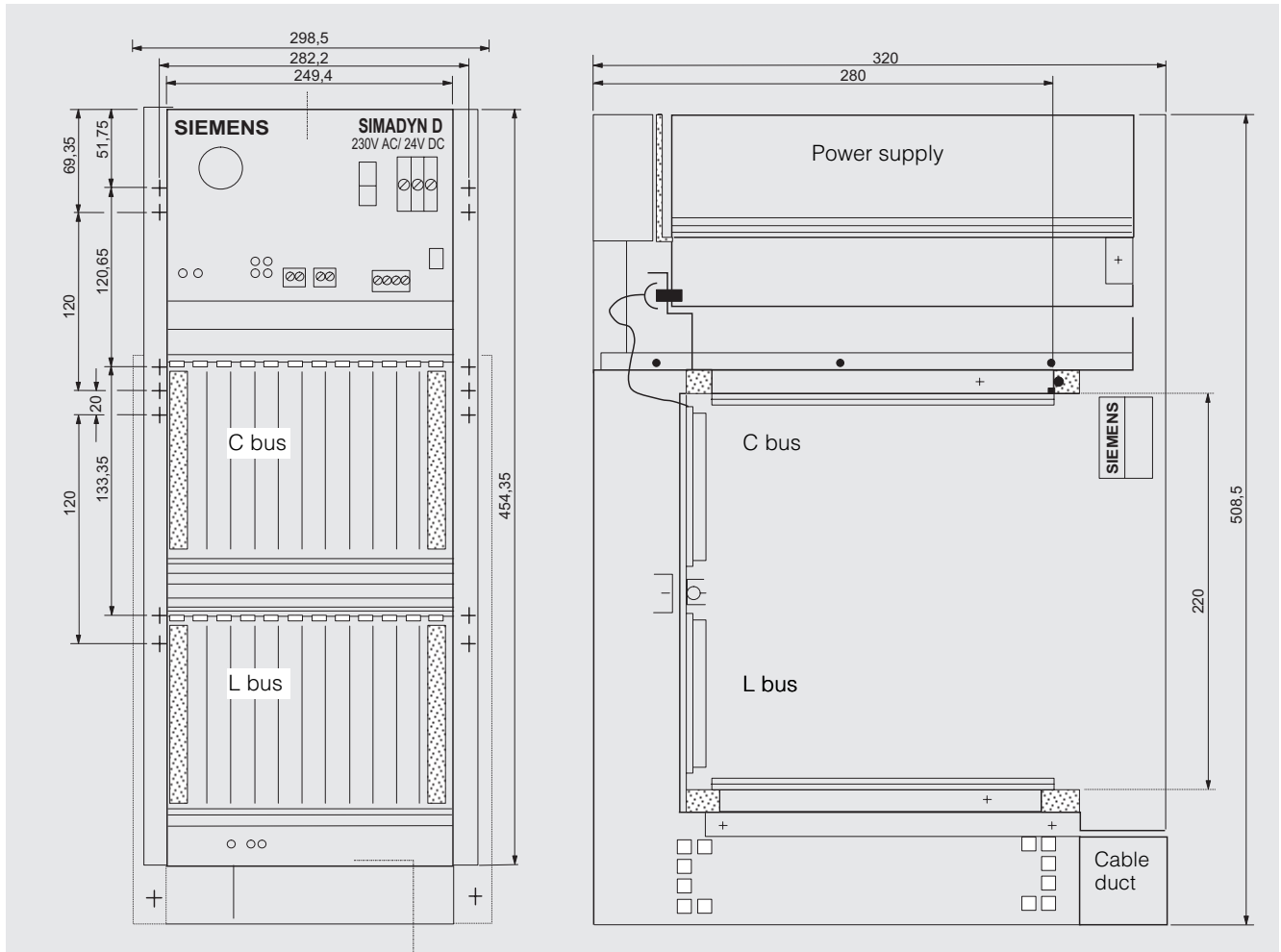
<b>SR12.2 subrack without fan</b>	
Rated input voltage	DC 24 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	10.5 kg
Rated input current	16 A
Inrush current, max.	32 A
I <sup>2</sup> t value	10 A <sup>2</sup> s
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

#### Selection and ordering data

	Order No.
<b>SR12.1 subrack</b> with fan, 12 slots, 24 V DC input voltage	<b>6DD1 682-0CC0</b>
<b>SR12.2 subrack</b> without fan, 12 slots, 24 V DC input voltage	<b>6DD1 682-0CD0</b>
<b>SR12.3 subrack</b> with fan, 12 slots, 115/230 V AC input voltage	<b>6DD1 682-0BC3</b>
<b>SR12.4 subrack</b> without fan, 12 slots, 115/230 V AC input voltage	<b>6DD1 682-0BC4</b>



### Dimension drawing



# SIMADYN D Control System

## Subracks

### SR24 Subrack

#### Overview



- Rack with 24 slots and power supply
- Slot for a buffer battery for saving data when the power is disconnected; this back-up battery must be separately ordered
- For versions with fan: The fan is integrated in the power supply, fan monitoring; forced cooling is required for the PM6 CPU module as well as CS12 to CS22
- There are 3 input voltage and cooling versions:
  - SR24.1 with fan, 24 V DC input voltage
  - SR24.2 without fan, 24 V DC input voltage
  - SR24.3 with fan, 115/230 V AC input voltage

#### Application

- For SIMADYN D modules
- For demanding applications

#### Function

- Continuous Local Bus (L bus) and Communication Bus (C bus) with the relevant bus termination
- The operating status (ready/fault) from the power supply, and if relevant, a fan, is signaled using a separate fan

#### Technical specifications

##### SR24.1 subrack with fan

Rated input voltage	DC 24 V
Dimensions W x H x D in mm	542 x 508.5 x 320
Weight	17.3 kg
Rated input current	32 A
Inrush current, max.	64 A
I <sup>2</sup> t value	10 A <sup>2</sup> s
Output voltages	+ 5 V/52 A +15 V/6.5 A - 15 V/6 A

##### SR24.2 subrack without fan

Rated input voltage	DC 24 V
Dimensions W x H x D in mm	542 x 508.5 x 320
Weight	16.2 kg
Rated input current	32 A
Inrush current, max.	64 A
I <sup>2</sup> t value	10 A <sup>2</sup> s
Output voltages	+ 5 V/52 A +15 V/6.5 A - 15 V/6 A

##### SR24.3 subrack with fan

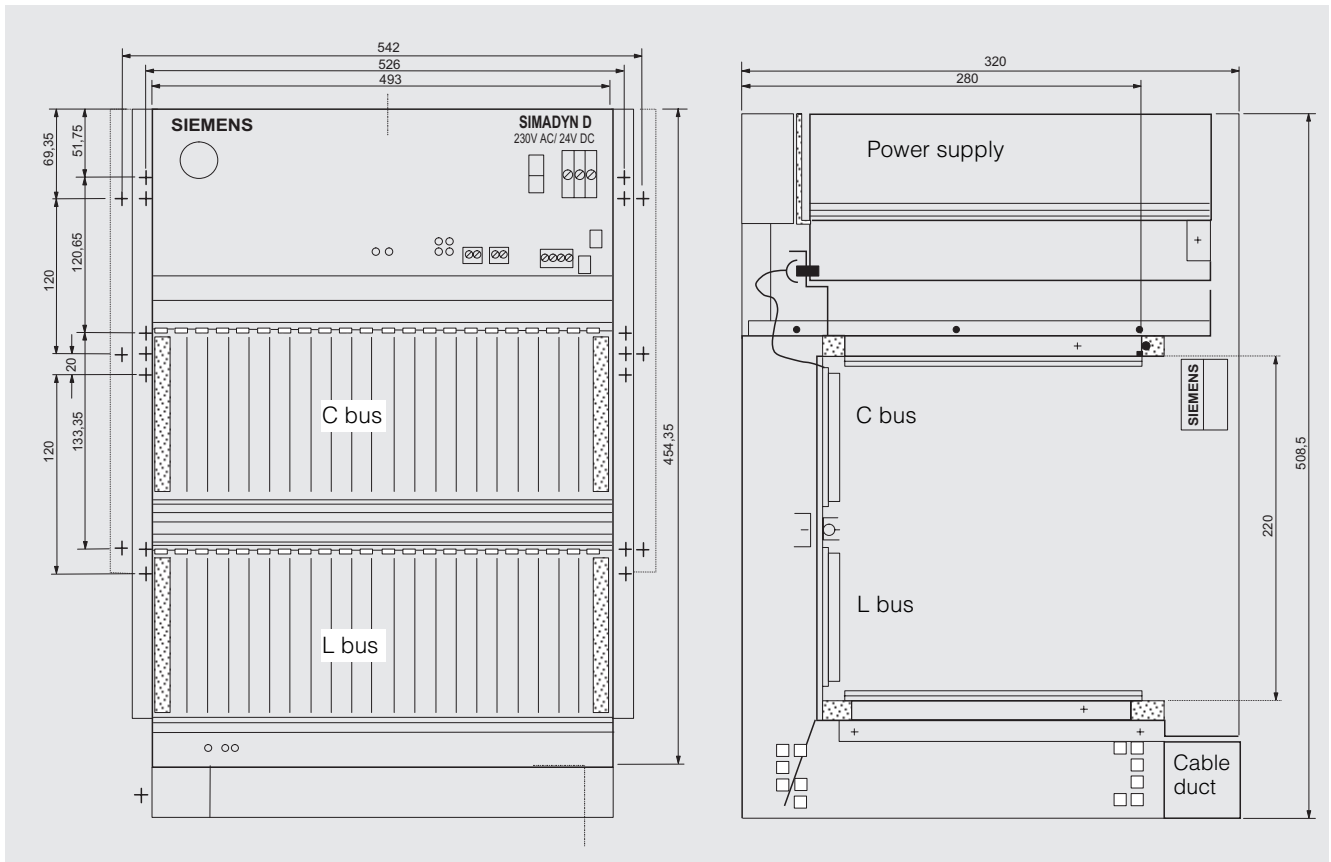
Rated input voltage	1 AC 50/60 Hz, 115/230 V
Dimensions W x H x D in mm	542 x 508.5 x 320
Weight	17.3 kg
Rated input current	5.4 A, 115 V 2.7 A, 230 V
Inrush current, max.	4.5 A, 115 V 9 A, 230 V
I <sup>2</sup> t value	0.25 A <sup>2</sup> s, 115 V 1 A <sup>2</sup> s, 230 V
Output voltages	+ 5 V/52 A +15 V/6.5 A - 15 V/6 A

#### Selection and ordering data

	Order No.
<b>SR24.1 subrack</b> with fan, 24 slots, 24 V DC input voltage	<b>6DD1 682-0BC0</b>
<b>SR24.2 subrack</b> without fan, 24 slots, 24 V DC input voltage	<b>6DD1 682-0BE0</b>
<b>SR24.3 subrack</b> with fan, 24 slots, 115/230 V AC input voltage	<b>6DD1 682-0CE3</b>



#### Dimension drawing



# SIMADYN D Control System

## Subracks

### SR8x Slot Covers

#### Overview



Slot covers for unused slots in an SR6, SR12 or SR24 subrack.

- SR81: Cover for one slot, 20.32 mm wide
- SR82: Cover for two slots, 40.64 mm wide
- SR83: Cover for three slots, 60.96 mm wide

#### Application

Used in an SR6, SR12 or SR24 subrack.

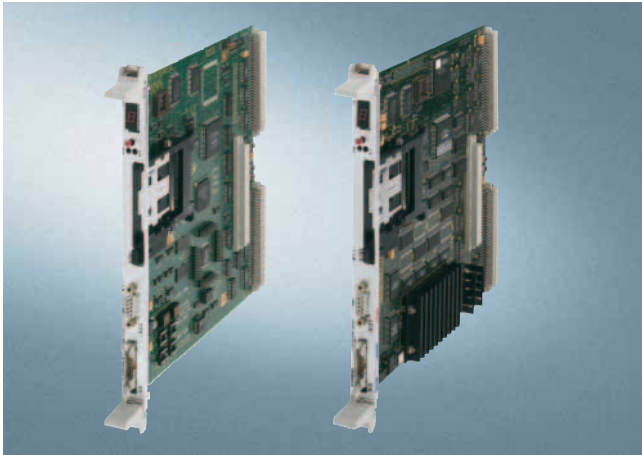
#### Function

This is required to maintain the electromagnetic compatibility (EMC).

#### Selection and ordering data

	Order No.
<b>SR81 slot cover</b> for 20.32 mm wide slots	<b>6DD1 682-0AJ1</b>
<b>SR82 slot cover</b> for 40.64 mm wide slots	<b>6DD1 682-0AJ2</b>
<b>SR83 slot cover</b> for 60.96 mm wide slots	<b>6DD1 682-0AJ3</b>

### Overview



#### CPU modules

For SIMADYN D, general open-loop and closed-loop control tasks are executed on high-performance 32 and 64-bit CPU modules with RISC processors.

Both CPU modules offer a slot for Flash program memory modules MS5, MS51, MS52 (supplementary components)

#### Buffer memory modules

- The buffer memory modules provide a memory via which several CPU modules can exchange data with one another.

### Benefits

- By utilizing floating-point arithmetic CPU modules achieve high arithmetic accuracy.
- Configuring is simplified because normalization is not required. SIMADYN D application software programs can be very simply ported to other SIMATIC modules.

### Application

PM5 CPU module for standard applications, PM6 for high-performance applications.

### Function

- Floating-point arithmetic
- Up to four digital inputs can be used to call interrupt tasks; with selectable signal level or edge evaluation
- Interface modules to use digital inputs: SB10, SB60, SB61, SU12. The 10-pin SC7 flat cable is required to connect the interface modules. Isolation with SB60, SB61 interface modules is possible
- Programming and operating:  
Round cable with 9-pin sub-D connectors to connect a PC as programming and operator device to the serial interface of the CPU module
- Saving data  
One buffered SRAM (using a battery in the subrack) permits up to 1000 configured processor quantities, messages and trace data to be saved in a non-volatile fashion (through power failures)
- Real-time clock to stamp messages of a configured message system and diagnostic messages of the operating system;  
Note: When the power fails, the time is not buffered! If buffering is required, then the MM3 buffer memory module must be used with integrated real-time clock

- Supplementary functions  
Up to two "expansion modules" can be mounted on the CPU modules. They provide the following supplementary functions for this CPU module:
  - IT41: Analog and digital inputs/outputs, incremental encoder connections
  - IT42: Analog and digital inputs/outputs, integrating analog inputs
  - ITDC: To control line-commutated converters with a SITOP interface
  - ITSL: SIMOLINK connection with master function
- Commissioning and troubleshooting  
9-pin sub-D socket (X01) on the front panel for the serial RS 232 interface for
  - commissioning and troubleshooting the processor program (using "Service-IBS" or the CFC test mode)
  - downloading the processor program with the 9-pin sub-D socket (X01)

### Technical specifications

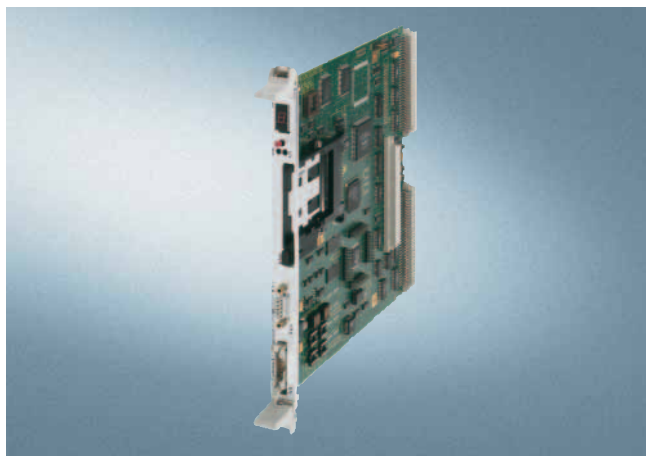
SIMADYN CPU module	PM5, PM6
Smallest sampling time	0.5 ms
Typical sampling time, approx.	0.5 ms
Display of state of operation	7-segment display
Bus connections	C bus, L bus
Width	1 slot

# SIMADYN D Control System

## CPU Modules

### PM5 CPU Module (Standard CPU)

#### Overview



32-bit CPU module for SIMADYN D. The module can be operated in a non-ventilated rack

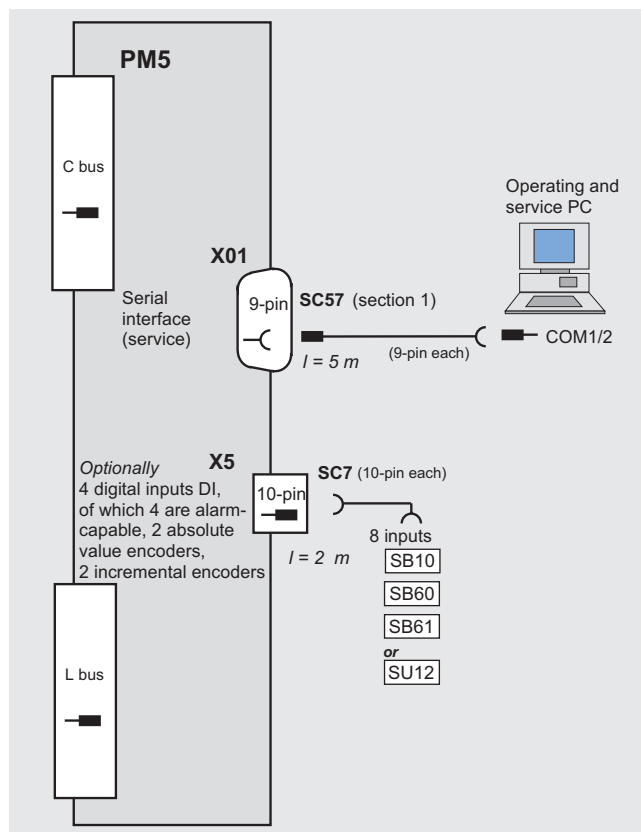
#### Technical specifications

Voltage/current supply (rated values)	+ 5 V/1.2 A + 15 V/25 mA - 15 V/25 mA
Back-up battery (can be connected-up through the subrack)	3.4 V/10 $\mu$ A
I/O (technical specifications of the inputs: similar to T400, see page 2/4)	<ul style="list-style-type: none"> <li>• 4 interrupt-capable digital inputs, or</li> <li>• 2 absolute value encoder inputs, or</li> <li>• 2 incremental encoder inputs</li> </ul>
Real-time clock, resolution	0.1 ms
Clock-rate (external/internal)	32/32 MHz
Cache	16 KB program, 4 KB data
Memory area which can be buffered using the subrack battery; to save configured data in a non-volatile fashion	64 KB SRAM
Program and data memory	4 MB SRAM
Inputs/outputs	<p>10-pin front panel connector X5: The function of the signals fed through the connector, are set using coding connectors on the module. One of the following combinations can be selected</p> <ul style="list-style-type: none"> <li>• 8 digital inputs; 4 of which are interrupt-capable</li> <li>• 4 digital inputs (interrupt-capable) and 1 absolute value encoder</li> <li>• 4 digital inputs (interrupt-capable) and 1 incremental encoder</li> <li>• 1 absolute value encoder and 1 incremental encoder for extremely fast position calculations</li> <li>• 2 absolute value encoders</li> <li>• 2 incremental encoders</li> </ul>
Space requirement/width	1 slot (20.32 mm)
Weight	0.6 kg

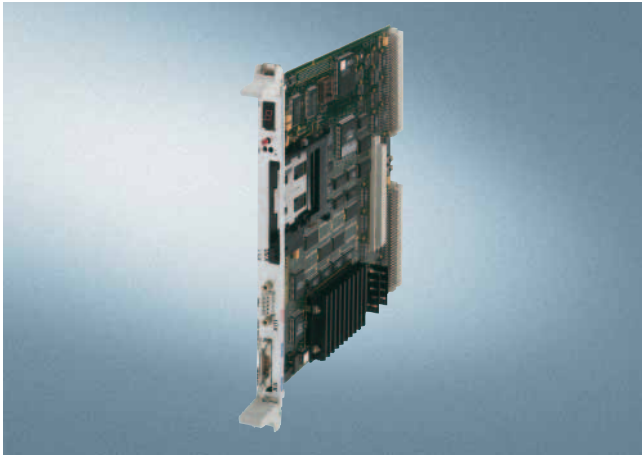
#### Selection and ordering data

	Order No.
<b>PM5 CPU module</b>	<b>6DD1 600-0AJ0</b>
Discontinued since 10/2003	

#### Connection diagram



#### Overview



64 bit-CPU module for SIMADYN D. The module can only be operated in a forced-ventilation subrack.

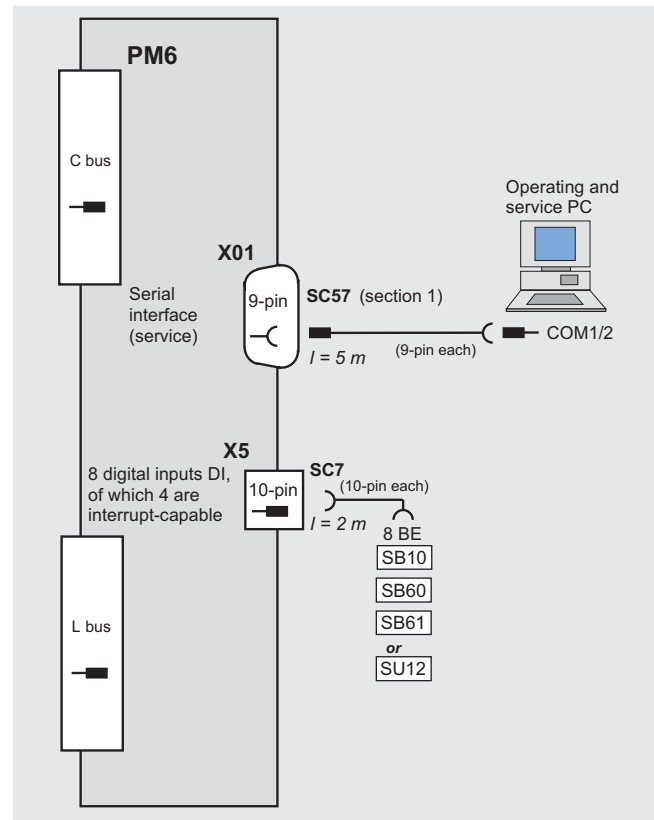
#### Technical specifications

Voltage/power supply (rated values)	+ 5 V/1.7 A +15 V/50 mA - 15 V/30 mA
Back-up battery (must be connected-up through the subrack)	3.4 V/10 µA
<b>Digital inputs: Connector X5</b>	
Number of inputs	8 max. 4 interrupt-capable
Electrical isolation	No; only using optional interface modules
Electrical isolation	
• Rated value	DC 24 V
• For "0" signal	-1 to +6 or open-circuit input
• For "1" signal	+13 to +33 V
Input current	
• For "0" signal	–
• For "1" signal	5 mA
Delay time	0.05 ms
Real time clock, resolution	0.1 ms
Clock-pulse (external/internal)	32 MHz for local I/O or 64 MHz for DRAM access/128 MHz internal
Cache	16 Kbyte program, 16 Kbyte data
Memory area, which can be buffered using the subrack battery; to save configured data in a non-volatile fashion	256 Kbyte SRAM
Program and data memory	8 Mbyte DRAM
Space requirement / width	1 slot (20.32 mm)
Weight	0.6 kg

#### Selection and ordering data

	Order No.
<b>PM6 CPU module</b>	<b>6DD1 600-0AK0</b>
Fast 64 bit CPU module with digital inputs, L bus and C bus	

#### Connection diagram



# SIMADYN D Control System

## CPU Modules

### MS5, MS51, MS52 Flash Memory

#### Overview



MS5x program memory modules contain the program to be processed by the CPU modules (PM5, PM6) as well as a memory for operating parameters which can be modified.

#### Application

The program memory modules are suitable for the CPU modules (PM5, PM6).

- MS5: 2 Mbyte flash for universal use
- MS51: 4 Mbyte flash for large programs
- MS52: 8 Mbyte flash for extremely large programs, preferably for PM6

#### Function

##### Configuring and downloading

The program is generated on a PC (configured) using STEP7/CFC and then downloaded into the program memory module. Downloading can be carried out with a PC Card Slot (PCMCIA) integrated into the PC. Typical flash programming time for a medium-sized program is approx. 0.5 min.

This memory module is then inserted in the slot provided on the CPU module.

##### Erasing

Can be electrically erased (flash technology).

##### Restriction of write operations

The EEPROM (8 Kbyte) allows a maximum of 100,000 write operations. This restriction must be carefully observed if write access operations are frequently made, e.g. from an automation system through PROFIBUS or USS (e.g. in the form of a "permanent change task"). Continuous changes should be made as simple change task (in the RAM).

#### Technical Specifications

Current consumption at + 5 V	
• MS5	150 mA
• MS51	150 mA
• MS52	180 mA
Program memory	
• MS5	2 Mbyte Flash
• MS51	4 Mbyte Flash
• MS52	8 Mbyte Flash
Dimensions (in mm)	3.3 x 54 x 8.6
Weight	0.03 kg

#### Selection and ordering data

	Order No.
<b>MS5 flash memory</b> 2 Mbyte	<b>6DD1 610-0AH0</b>
<b>MS51 flash memory</b> 4 Mbyte	<b>6DD1 610-0AK0</b>
<b>MS52 flash memory</b> 8 Mbyte	<b>6DD1 610-0AH2</b>

#### Overview



The MM3 module makes 2 x 64 Kbyte buffer memories available to exchange data between CPU modules

The module contains a clock unit which can be optionally synchronized by keys and by receiving the DCF77 time signal (radio-based clock)

This clock can be used as source for all clock function blocks of the CPU modules in the subrack ("system time", max. jitter between the individual modules: 3 ms).

The time and the date are used to stamp messages of a configured message system and for diagnostic messages of the operating system.

#### Application

Applications can be found in:

- SIMADYN systems with more than one CPU
- SIMADYN systems which require clock time

#### Function

- With radio-based clock
- L and C bus connection
- 64 Kbyte RAM for L and C bus respectively
- Real-time clock; the time is buffered using the battery in the subrack
  - the time can be set via keys
  - the time can be received (DCF77)
- 10 digit, 7-segment display to display the time: Month, day, hour, minute, seconds (years can be alternatively displayed as a 4-digit number)
- 4 LEDs to display the status of the time receiver
- Digital output (relay) to output a system error (program interrupted/stop status of a CPU module)

#### Technical specifications

Current consumption	+ 5 V/600 mA + 15 V/50 mA +3.4 V/0.02 mA
Space requirement	1 slot (20.32 mm)
Weight	0.5 kg

#### Selection and ordering data

	Order No.
<b>MM3 buffer memory module</b>	<b>6DD1 611-0AF0</b>
2 x 64 Kbytes for the L and C buses	

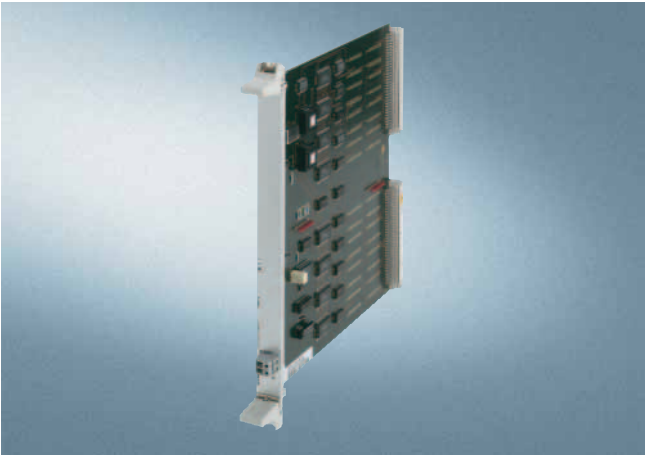


# SIMADYN D Control System

## Buffer Memory Modules

### MM4 Buffer Memory

#### Overview



The MM4 module makes 2 x 2 Mbyte buffer memories available to exchange data between CPU modules.

#### Application

The MM4 should be used if there is a high memory requirement, e.g. due to a large number of connections between the various CPU modules (\$ signals) as well as extensive communications.

#### Function

- L and C bus connection
- 2 Mbyte RAM for L and C bus respectively
- Digital output (relay) to output a system error (program interrupted/stop status of a CPU module)

#### Technical specifications

Current consumption	+ 5 V/600 mA + 15 V/50 mA +3.4 V/0.02 mA
Space requirement	1 slot (20.32 mm)
Weight	0.5 kg

#### Selection and ordering data

	Order No.
<b>MM4 buffer memory module</b> 2 x 2 MB for the L and C buses	<b>6DD1 611-0AG0</b>

### Overview

Input and output modules provide additional analog and digital inputs/outputs as well as incremental encoder connections.

### Design

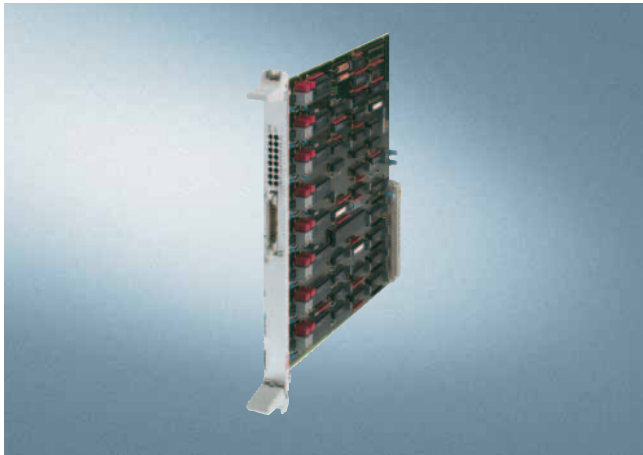
- Type Exxx input/output modules can be inserted at any slot in the subrack
- Type ITxx expansion modules are directly mounted on the CPU modules (PM5, PM6) (max. two modules)
- Interface modules, which can be mounted on rails, provide the associated screw-plug-in terminals to connect the signal lines. The interface modules are connected to the input/output modules by using appropriate pre-assembled cables

### Function

- The input/output channels of different CPU modules can be used with Exxx type input/output modules by means of the L/C bus.
- ITxx expansion modules supplement the CPU modules by input/output functions. Data is not exchanged through the L/C bus, but through a direct connection to the CPU module (LE bus). This means that it is especially fast (instantaneous) and does not influence data transfer with other modules through the L/C bus. However, only this CPU module can directly use the inputs/outputs of the IT modules.

### EA12 Analog Output Module

### Overview

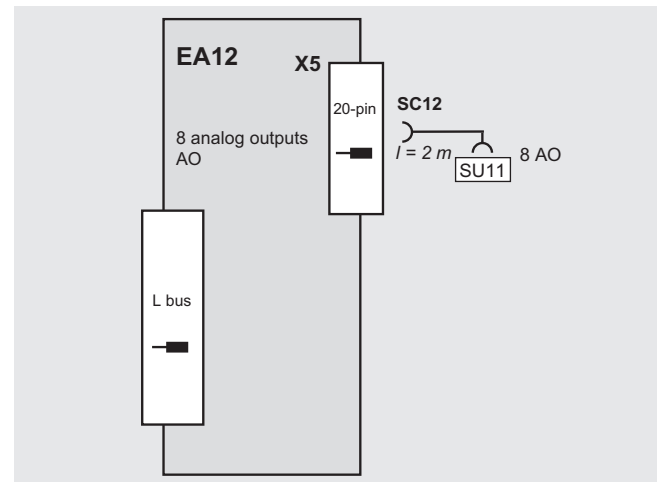


The EA12 module outputs analog signals

### Selection and ordering data

	Order No.
<b>EA12 analog output module</b>	<b>6DD1 642-0BC0</b>
8 AO, $\pm 10$ V	

### Connection diagram



### Function

- 8 analog outputs,  $\pm 10$  V, with the associated test sockets
- There is no electrical isolation; optional via interface modules
- L-bus connection

### Technical specifications

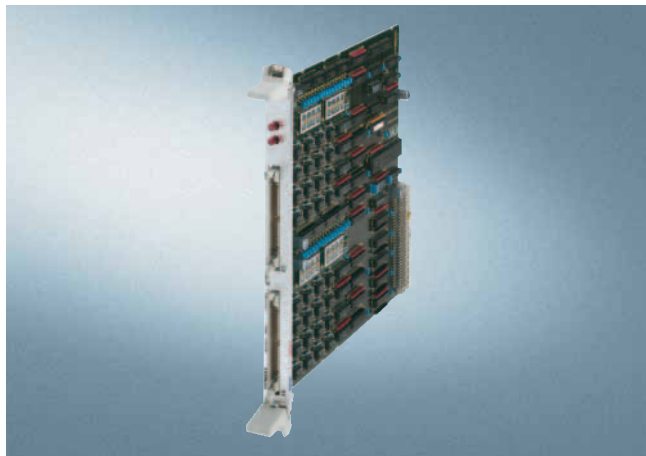
Current consumption	+ 5 V/600 mA + 15 V/200 mA - 15 V/200 mA
Space requirement	1 slot (20.32 mm)
Weight	0.5 kg
Analog outputs	X5A to X5H
Output voltage	-10 to +10 V
Output current	$\leq 10$ mA
Resolution	16 bit
Monotony	14 bit over the complete temperature range
Absolute accuracy	Typical 13 bit over the complete temperature range
Short-circuit protection to ground	$R = 56 \text{ Ohm}$
Short-circuit duration	$\leq 120$ s

# SIMADYN D Control System

## Input/Output Modules

### EB11 Digital Input and Output Module

#### Overview



The EB11 digital input and output module reads-in 16 digital signals and outputs 16 digital signals.

#### Design

- 16 digital inputs and 16 digital outputs are combined in a connector; these 16 inputs/outputs are combined, on the software side to form two groups of 8 (function blocks)

#### Function

- 2 x 16 digital inputs and 2 x 16 digital outputs
- Electrical isolation is optionally possible through interface modules
- Electronic/thermal overload protection of the digital outputs with display
- Overload display (LED) of the digital outputs for each connector
- L-bus connection

#### Technical specifications

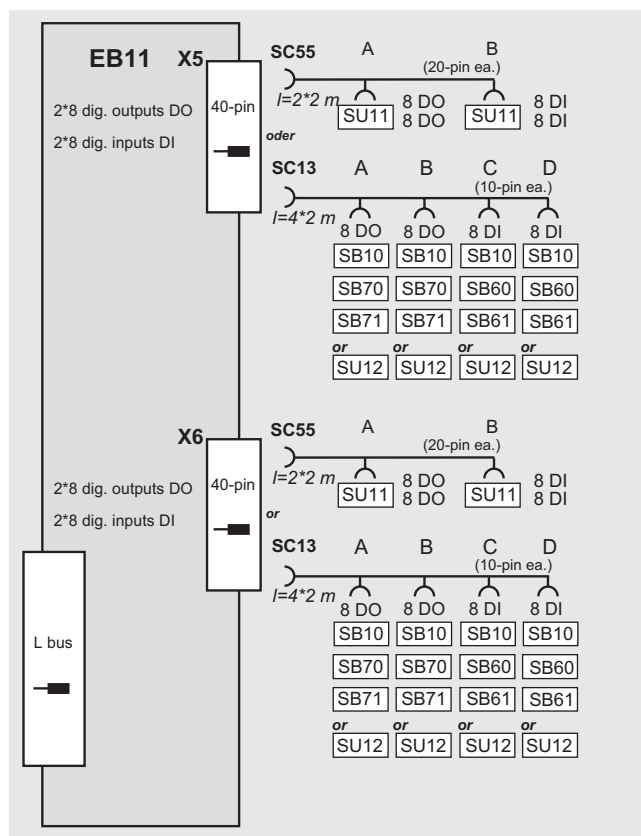
Current consumption	<ul style="list-style-type: none"> <li>+ 5 V/400 mA</li> <li>+ 15 V/0 mA</li> <li>- 15 V/20 mA</li> <li>+ 24 V/200 mA (without X5/X6)</li> </ul>
Space requirement	1 slot (20.32 mm)
Weight	0.6 kg
<b>Digital outputs</b>	X5A/X5B (2 x 8 outputs) X6A/X6B (2 x 8 outputs)
Electrical isolation	No
External P24 power supply	<ul style="list-style-type: none"> <li>• Rated value +24 V</li> <li>• Ripple 3.6 V</li> <li>• Permissible range (including ripple) +20 to +30 V</li> <li>• Briefly for <math>t \leq 0.5</math> s +35 V</li> </ul>
Output current for a 1 signal	<ul style="list-style-type: none"> <li>• Rated value 50 mA</li> <li>• Permissible range 0.2 to 100 mA</li> </ul>
Short-circuit protection	Electronic, at approx. 250 mA
Residual current for a 0 signal	0.02 mA
Signal level of the outputs	<ul style="list-style-type: none"> <li>• For a 0 signal &lt; +3V</li> <li>• For a 1 signal &gt; P24 -2.5 V</li> </ul>
Switching delay	0.015 ms

<b>Digital inputs</b>	X5C/X5D (2 x 8 inputs) X6C/X6D (2 x 8 inputs)
Electrical isolation	No
Input voltage	<ul style="list-style-type: none"> <li>• Rated value +24 V</li> <li>• For a 0 signal -1 to +6 V or open-circuit input</li> <li>• For a 1 signal +13 to +33 V</li> </ul>
Input current for a 1 signal (typical)	5 mA
Delay time	0.2 ms

#### Selection and ordering data

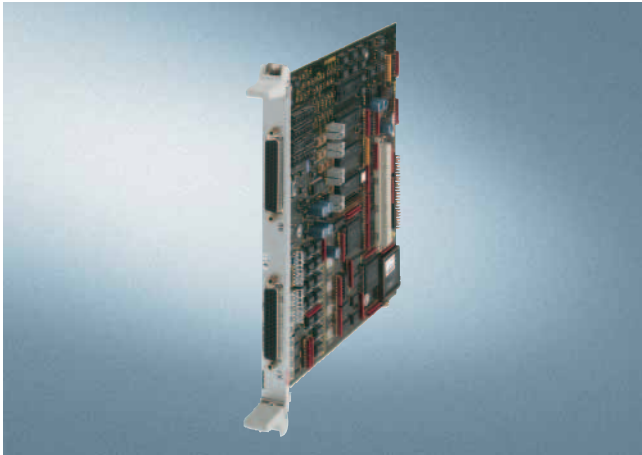
	Order No.
<b>EB11 digital input and output module</b>	<b>6DD1 641-0AC0</b>
2 x 16 DI, 2 x 16 DO	

#### Connection diagram



### IT41 Digital/Analog Input and Output Module

#### Overview



Expansion module for CPU modules (PM5, PM6) for additional analog and digital I/Os as well as incremental encoders

#### Function

- 4 analog outputs,  $\pm 10$  V, 16-bit resolution, 14-bit accuracy, short-circuit proof to ground
- 4 analog inputs,  $\pm 10$  V differential signal, 12-bit resolution
- 16 digital outputs, 24 V
- 16 digital inputs, 24 V
- The inputs/outputs are not electrically isolated
- 4 incremental encoder inputs with zero pulse, suitable for differential signals, floating:
  - for tracks (A, B), offset through  $90^\circ$  or separate forwards and reverse tracks
  - for 15 V (HTL) or 5 V encoders
  - With interrupt inputs and outputs and monitoring tracks for the appropriate encoders (Sony encoder)
  - Max. 1 MHz (15 V) or 2.5 MHz (5 V) pulse frequency (dependent on the cable length)

#### Technical specifications

<b>Power supply</b>	
Rated voltage	+ 5 V/400 mA + 15 V/0 mA - 15 V/20 mA + 24 V/200 mA (must be externally connected)
Typical current consumption	
• at +5 V	420 mA
• at +15 V	450 mA + encoder currents
• at -15 V	175 mA
• at +24 V	100 mA + digital output current
Space requirement	1 slot (20.32 mm)
Weight	600 g
<b>Analog outputs</b>	
Number of outputs	4
Version	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	$\pm 10$ mA
Resolution	16 bit
Monotony	14 bit over the complete temperature range
Absolute accuracy	Typical 13 bit over the complete temperature range

Short-circuit protection to ground	Yes
<b>Analog inputs</b>	
Number of inputs	4
Version	Differential inputs, non-floating
Input voltage range	- 10 V $\pm$ 4 LSB to + 10 V $\pm$ 4 LSB (1 LSB = 4.88 mV)
Input resistance	470 k $\Omega$
Input filter	3 dB transition frequency: 1.5 kHz
Resolution	12 bit
Absolute accuracy, typ.	11 bit over the complete temperature range
Max. conversion time	45 $\mu$ s
<b>Digital outputs</b>	
Number of digital outputs	16, non-floating
Power supply voltage	Must be externally connected
• Rated value	24 V
• Permissible range (including ripple)	+20 to +30 V
• Briefly	+35 V, max. 0.5 s
Output current for a 1 signal	
• Rated current	50 mA
• Permissible range	to 100 mA
Short-circuit protection	Electronic/thermal at approx. 250 mA
Limiting inductive switch-off voltages	Power supply voltage + 1 V
Total load	80% at 50°C, all outputs 50 mA
Residual current for a 0 signal	20 $\mu$ A
Signal level of the output	
• For a 0 signal, max.	3 V
• For a 1 signal	Power supply voltage - 2.5 V
Switching delay, max.	15 $\mu$ s
<b>Digital inputs</b>	
Number of digital inputs	16, non-floating
Input voltage	
• Rated voltage	+24 V
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal, typ.	3 mA
Delay time, max.	200 $\mu$ s
<b>15 V incremental encoder</b>	
Number of encoders, max.	4 (including 5 V encoder)
Version	Differential inputs, with electrical isolation
Internal current limiting, approx.	15 mA (electronic)
Track signals	Tracks A and B (phase-shifted through 90 degrees), if required with zero pulse N
Monitoring track	One monitoring track per encoder; specification as for the digital inputs
Pulse frequency, max.	1 MHz, dependent on the cable length (track frequency)
Phase difference of the track signals	Independent of the pulse frequency, min. 200 ns

# SIMADYN D Control System

## Input/Output Modules

### IT41 Digital/Analog Input and Output Module

Input voltage	
• For a 0 signal	-30 V to +4 V (for 15 mA load)
• For a 1 signal	+8 V to +30 V (for 15 mA load)
Permissible input voltage range	Differential voltage -30 V to +30 V
Noise pulse suppression	Can be configured at the speed actual value function block: 0 – 16 µs (62.5 kHz)

#### 5 V Incremental encoder

Number of encoders, max.	4 (including 15 V encoder)
Version	Differential inputs, with electrical isolation
Track signals	1.) For tracks A and B (phase-shifted through 90°), if required with zero pulse N 2.) For separate forward and reverse track
Pulse frequency, max.	2.5 MHz (this depends on the cable length)
Permissible input voltage range	Differential voltage -5 V to +5 V
Max. input current	15 mA (Caution: This is not limited by the module!)

Input voltage	
• For a 0 signal	-5 V to 0 V
• For a 1 signal	+3 V to +5 V
Input resistance	
• Steady-state	180 Ohm
• Dynamic	100 Ohm (corresponding to the characteristic resistance of a twisted pair cable)
Noise pulse suppression	This can be configured at the speed actual value function block: 0 or 125 ns

#### Interrupt inputs (e.g. for Sony encoders)

Number of interrupt inputs	4
Version	Non-floating
Permissible input voltage range	0 V to +5 V
Input voltage	
• For a 0 signal	< 1.4 V
• For a 1 signal	> 2.0 V
Input current	
• For a 0 signal	Min. -5 mA, max. -3.6 mA
• For a 1 signal	Min. -3 mA, max. 0 mA

#### Interrupt reset outputs (e.g. for Sony encoders)

Number of interrupt outputs	4
Version	Non-floating
Output voltage	15 V via 1 kΩ output resistor
Output voltage for 10 mA load	5 V

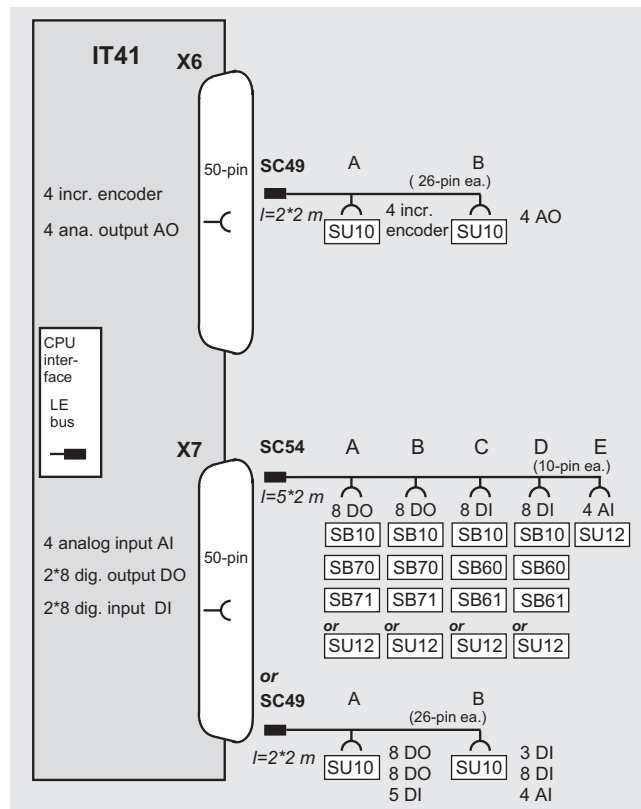
#### Power supply connection for pulse encoder

Version	Non-floating, electronic short-circuit and overload protection
Output voltage, approx.	14 V
Max. output current	100 mA

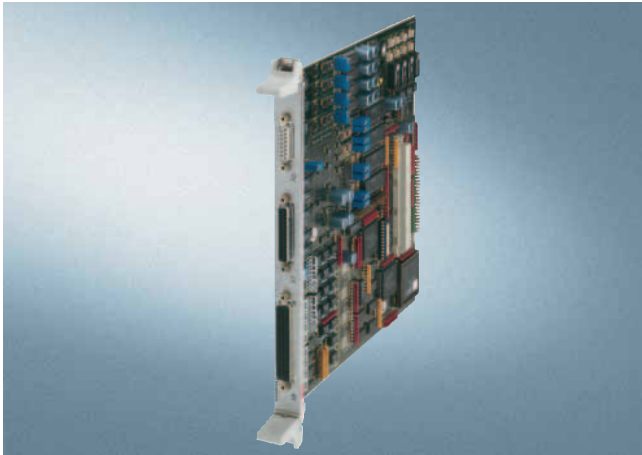
### Selection and ordering data

	Order No.
<b>IT41 digital/analog input and output module</b> with 4 incremental encoder inputs	<b>6DD1 606-3AC0</b>

### Connection diagram



#### Overview



Expansion module for CPU modules (PM5, PM6) for additional digital inputs/outputs and high-resolution, integrating analog inputs.

#### Function

- With high-resolution analog outputs
- 16 digital outputs, 24 V
- 16 digital inputs, 24 V
- 4 analog outputs,  $\pm 10$  V, 16-bit resolution, 14-bit accuracy, short-circuit proof to ground
- 4 analog inputs,  $\pm 10$  V differential signal, 12-bit resolution
- 4 integrating analog inputs (V/Hz conversion),  $\pm 10$  V differential signal, floating, up to 17-bit resolution depending on the integrating time, the integrating time can be externally triggered
- All of the other I/Os are non-floating; electrical isolation is optionally possible when using interface modules

#### Technical specifications

<b>Power supply</b>	
Nominal voltage	<ul style="list-style-type: none"> <li>+ 5 V/400 mA</li> <li>+ 15 V/0 mA</li> <li>- 15 V/20 mA</li> <li>+ 24 V/200 mA (without X5/X6)</li> </ul>
<b>Typical current consumption</b>	
• at +5 V	420 mA
• at +15 V	450 mA
• at -15 V	140 mA
• at +24 V	100 mA + digital output currents
Space requirement	1 slot (20.32 mm)
Weight, approx.	500 g
<b>Analog outputs</b>	
Number of analog outputs	4
Version	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	$\pm 10$ mA
Resolution	16 bit
Monotony	14 bit over the complete temperature range
Absolute accuracy, typ.	13 bit over the complete temperature range
Short-circuit protection to ground	Yes
<b>Integrating analog inputs (V/Hz)</b>	
Number of integrating inputs	4
Version	Differential inputs, floating, integrating, V/Hz conversion; integrating time can also be externally triggered
Input voltage range	-10 V to +10 V
Input resistance	470 k $\Omega$
Input filter	3 dB transition frequency : 2 kHz
Resolution	Up to 17 bit (depending on the integration time): <ul style="list-style-type: none"> <li>• 13 bit for 1 ms integration time</li> <li>• 15 bit for 4 ms integration time</li> <li>• 17 bit for 20 ms integration time</li> </ul>
Relative accuracy, typ.	14 bit over the complete temperature range
<b>Analog inputs</b>	
Number of analog inputs	4
Version	Differential inputs, non-floating
Input voltage range	- 10 V $\pm$ 4 LSB to + 10 V $\pm$ 4 LSB (1 LSB = 4.88 mV)
Input resistance	470 k $\Omega$
Input filter	3 dB transition frequency: 1.5 kHz
Resolution	12 bit
Absolute accuracy	Typical 10 bits over the complete temperature range
Max. conversion time	45 $\mu$ s

# SIMADYN D Control System

## Input/Output Modules

### IT42 Digital/Analog Input and Output Module

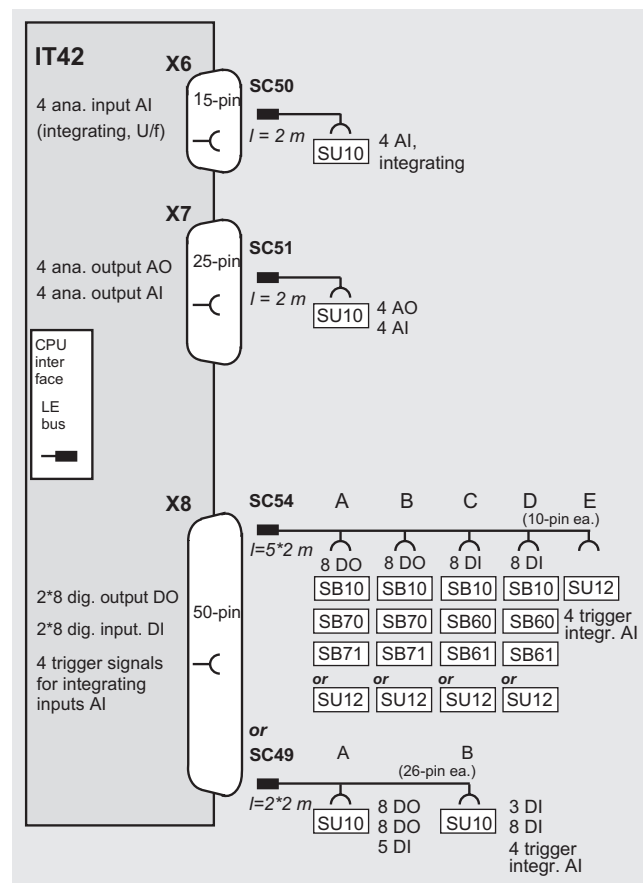
#### Digital outputs

Number of digital outputs	16, non-floating
Supply voltage	
• Rated value (including ripple)	24 V
• Permissible range (including ripple)	+20 to +30 V
• Briefly	+35 V, max. 0.5 s
Output current for a 1 signal	
• Rated current	50 mA
• Permissible range	< 100 mA
Short-circuit protection	Electric/thermal at approx. 250 mA
Limiting of inductive switch-off voltages	$V_{CC} + 1 \text{ V}$
Total load	80 % at 50 degrees C, all outputs 50 mA
Residual current for a 0 signal	20 $\mu\text{A}$
Signal level of the outputs	
• For a 0 signal, max.	3 V
• For a 1 signal	Power supply voltage - 2,5 V
Switching delay, max.	15 $\mu\text{s}$

#### Digital inputs

Number of inputs	16, non-floating
Trigger inputs for integrating A/D converter	4, non-floating
Input voltage	
• Rated voltage	+24 V
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal	3 mA typ.
Delay time, max.	200 $\mu\text{s}$

#### Connection diagram



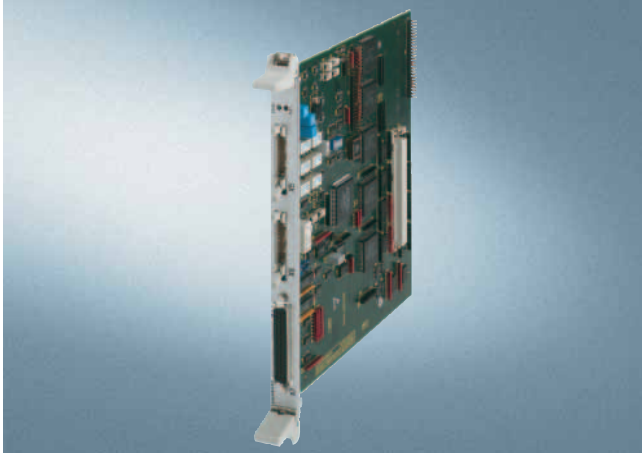
#### Selection and ordering data

	Order No.
<b>IT42 digital/analog input and output module</b>	<b>6DD1 606-4AB0</b>
with high-resolution analog outputs	



### ITDC SITOR Converter Gating Module

#### Overview



Expansion module for CPU modules (PM5, PM6) to gate line-commutated converters via a SITOR interface ("torque shell" for DC drives).

#### Design

- It is not possible to operate two ITDC modules on a single CPU module.

#### Function

- 2 analog outputs, of which 1 output optionally for an excitation current setpoint for an external closed-loop excitation current control
- 4 digital outputs, 24 V
- 4 digital inputs, 24 V
- No electrical isolation of the inputs/outputs
- 1 incremental encoder input
- Various SITOR setpoint/actual value as well as service/ diagnostics signals

#### Features of the converter gating

- Auto-reversing stage
- Current controller
- Gating unit (for 8 - 400 Hz line frequency)
- For 6-pulse converters

#### Technical specifications

<b>Power supply</b>	
Rated voltage	+ 5 V/400 mA + 15 V/0 mA - 15 V/20 mA + 24 V/200 mA (without X5/X6)
<b>Typical current consumption</b>	
• at +5 V	100 mA
• at +15 V	490 mA + encoder currents
• at -15 V	75mA
• at +24 V	40 mA + digital output currents
<b>Analog outputs</b>	
Number of analog outputs	2
Version	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	± 10 mA
Resolution	12 bit

Monotony	10 bit over the complete temperature range
Absolute accuracy	Typical 9 bit over the complete temperature range
Short-circuit protection to ground	Yes
<b>Digital outputs</b>	
Number of digital outputs	4, non-floating
<b>Power supply voltage</b>	
• Rated value	24 V DC
• Permissible range	+20 to +30 V including ripple
• Briefly	+35 V, max. 0.5 s
<b>Output current for a 1 signal</b>	
• Rated current	50 mA
• Permissible range	Up to 100 mA
Short-circuit protection	Electronic/thermal at approx. 250 mA
Limiting of inductive switch-off voltages	Power supply voltage + 1 V
Total load	80 % at 50 degrees C, all outputs 50 mA
Residual current	20 µA for a 0 signal
<b>Signal level</b>	
• For a 0 signal, max.	3 V
• For a 1 signal	Power supply voltage - 2,5 V
<b>Switching delay</b>	
1 -> 0: max. 10 µs	
0 -> 1: max. 100 µs	
<b>Digital inputs</b>	
Number of digital inputs	4, non-floating
<b>Input voltage</b>	
• For a 0 signal	+24 V rated voltage
• For a 1 signal	-1 to +6 V or open-circuit digital inputs
• For a 1 signal	+13 to +33 V
<b>Input current</b>	
• For a 0 signal	0 mA
• For a 1 signal	3 mA typ.
Delay time	50 µs

(continued on next page)

# SIMADYN D Control System

## Input/Output Modules

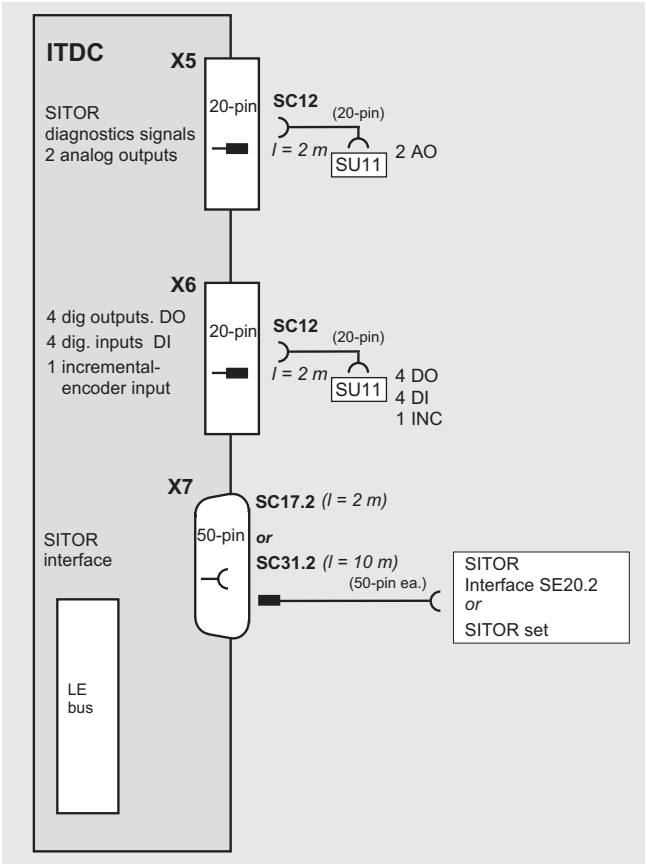
### ITDC SITOR Converter Gating Module

<b>15 V Incremental encoder</b>	
Number of encoders	1, non-floating
Version	Differential inputs, without electrical isolation, can be changed over 5 V/15 V (HTL)
Track signals	Track A and B (shifted through 90 degrees), if required with zero pulse N
Pulse frequency, max.	1 MHz, dependent on the cable length (track frequency)
Phase difference of the track signals	Independent of the pulse frequency, minimum 200 ns
Input voltage at 15 V (HTL)	<ul style="list-style-type: none"> <li>• For a 0 signal -30 V to +5 V</li> <li>• For a 1 signal +8 V to +30 V</li> </ul>
Input voltage for 5 V	<ul style="list-style-type: none"> <li>• For a 0 signal -7 V to -1,5 V</li> <li>• For a 1 signal +1,5 V to +7 V</li> </ul>
Permissible input voltage range	Differential voltage -30 V to +30 V
Input resistance, approx.	40 kΩ
Noise pulse suppression	This can be configured at the speed actual value function block: 0 – 16 µs (62.5 kHz)
<b>Power supply voltage for the pulse encoder</b>	
Output voltage, approx.	14 V
Max. output current	100 mA
Version	Non-floating, electronic short-circuit- and overload protection
<b>General information</b>	
Space requirement	1 slot (20.32 mm)
Weight	600 g

#### Selection and ordering data

	Order No.
<b>ITDC SITOR converter gating module</b>	<b>6DD1 601-0AH0</b>
<b>SITOR SA60.1 synchronization module</b>	<b>6DD2 920-0AR5</b>

#### Connection diagram



### Overview

#### Coupling to SIMOREG, SIMOVERT converter units

Protocol	Hardware (module, sub-module)	Application, comment
PROFIBUS DP	CS7 with SS52	<ul style="list-style-type: none"> <li>CS7/SS52 has a master function</li> <li>User data is adapted to the device parameterization (PPO types)</li> <li>For process data and parameters</li> </ul>

#### Coupling to automation devices

Protocol	Hardware (module, sub-module)	Application, comment
Industrial Ethernet (SINEC H1)	CSH11	<ul style="list-style-type: none"> <li>Fast, serial bus, preferably for the master control level</li> </ul>
PROFIBUS DP	CS7 with SS52	<ul style="list-style-type: none"> <li>As slave or master</li> </ul>
DUST3	CS7 with SS4	<ul style="list-style-type: none"> <li>Protocol 3964(R) with RK512</li> </ul>

#### Coupling to additional SIMADYN D subracks

Protocol	Hardware (module, sub-module)	Application, comment
Fiber-optic cable sub-rack coupling	CS12/13/14 (Master) and CS22 (Slave)	<ul style="list-style-type: none"> <li>Extremely fast</li> <li>Star topology</li> <li>Up to 9 subracks and more can be coupled</li> </ul>
Industrial Ethernet (SINEC H1)	CSH11	<ul style="list-style-type: none"> <li>Serial bus, preferably for the supervisory level</li> <li>Recommended if there are additional SINEC H1 bus nodes in the overall system</li> </ul>
PROFIBUS DP	CS7 with SS52	<ul style="list-style-type: none"> <li>Master or slave interface</li> <li>Recommended if there are additional DP nodes</li> </ul>

#### PC couplings for service and download

Protocol	Hardware (module, sub-module)	Application, comment
Industrial Ethernet (SINEC H1)	CSH11	<ul style="list-style-type: none"> <li>Fast, high-performance coupling</li> <li>Recommended if there are several H1 bus nodes (especially SIMADYN D racks)</li> <li>Industrial Ethernet interface is required in the PC</li> </ul>
DUST1	CS7 with SS4	<ul style="list-style-type: none"> <li>Low-cost point-to-point (no special PC hardware)</li> </ul>

#### Coupling to the operator panels

Protocol	Hardware (module, sub-module)	Application, comment
MPI (Multi-Point-Interface)	CS7 with SS52	<ul style="list-style-type: none"> <li>SIMATIC OPs</li> </ul>

# SIMADYN D Control System

## Communication Modules

### CS7 Carrier Module

#### Overview



The carrier module is prerequisite for the use of SS4, SS5x communication modules

#### Function

- Operation of up to three SS4 and SS52 communication modules
- L-bus connection
- 2 LEDs for each slot to indicate the operating status of the communication module and the interface and bus activity

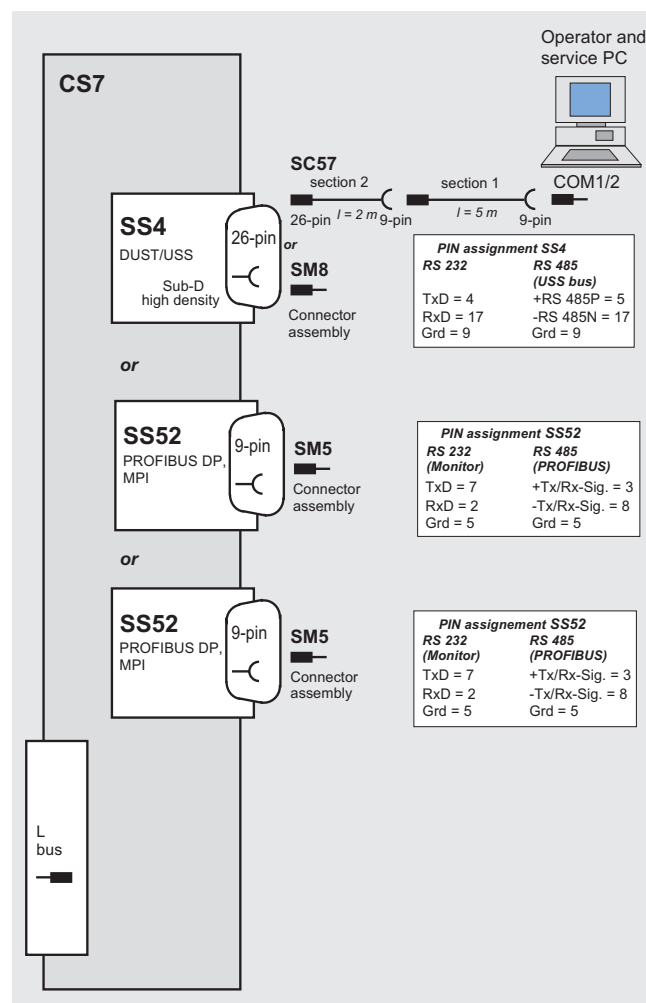
#### Technical specifications

Current consumption	+5 V/400 mA
Space requirement	2 slots (40.64 mm)
Weight	0.5 kg

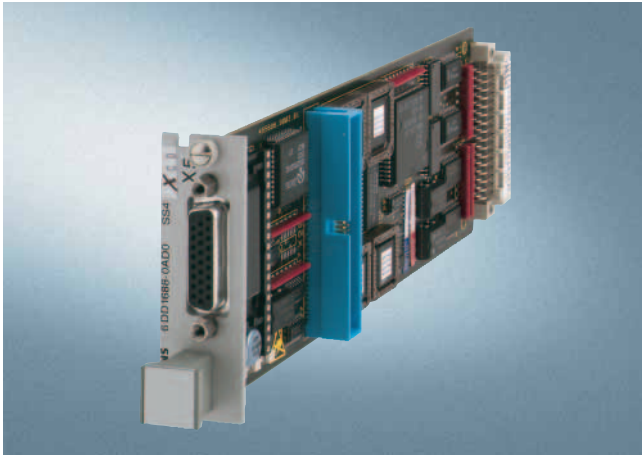
#### Selection and ordering data

	Order No.
<b>CS7 carrier module</b>	<b>6DD1 662-0AB0</b>
for SS4 and SS5x communication modules	

#### Connection diagram



#### Overview



- Communication module which is inserted in the CS7 carrier module

#### Application

This is used for the most part as an interface to commission a multi-processor system. It is connected to a PC (operator/ programming device) for CFC/CFC test mode or service commissioning.

#### Design

- This module is inserted in one of the three slots of the CS7 carrier module

#### Function

- RS 232 interface for a configured USS or DUST protocol

Usable protocols:

- USS for SIMOREG and SIMOVERT drive converters
- DUST1 PC coupling for commissioning, TELEMATER, program download and the CFC test mode
- DUST3 protocol 3964 of the SIMATIC S5
- The data transmission format can be appropriately modified by inserting an interface submodule (e.g. to adapt to the coupling partners, to increase the noise immunity or for longer cables):
  - interface submodule SS1 for a 20 mA line current

#### Technical specifications

Current consumption	+ 5 V/300 mA + 15 V/100 mA - 15 V/100 mA
Space requirement	1 slot on CS7
Weight	0.2 kg

#### Selection and ordering data

	Order No.
<b>SS4 communication module</b>	<b>6DD1 688-0AD0</b>
for DUST/USS	

### SS1 20 mA-Interface Sub-Module for SS4

#### Overview

Serial interface with 20 mA for process coupling.

#### Design

- Interface submodule for inserting onto a SS4 communication module

#### Function

- 1 send and 1 receive circuit (full duplex) with the associated line current source can be connected
- The sender and receiver circuits can be electrically isolated with respect to the electronics of the carrier module through optocouplers

#### Technical specifications

Max. data transmission rate	19.2 kbit/s
Max. cable length	1000 m
Current consumption	+5 V/45 mA +15 V/40 mA
Weight	0.011 kg

#### Selection and ordering data

	Order No.
<b>SS1 20 mA interface submodule</b>	<b>6DD1 688-1AA0</b>
for SS4 communication module	

# SIMADYN D Control System

## Communication Modules

### SS2 RS 232 Interface Sub-Module

#### Overview

Serial interface with an RS 232 signal level.

#### Application

SS2 should be used for the SS4 communication module instead of the simple and integrated RS 232 interface if the coupling partner requires V.24 (RS 232 C) control signals (CTS, RTS, etc.).

#### Design

- Interface submodule for inserting onto a SS4 communication module
- 1 send and 1 receive channel
- No electrical isolation
- Max. data transmission rate: 76.8 kbit/s
- Max. cable length: This is inversely proportional to the data transmission rate and depends on cable parameters, e.g. approx. 50 m at 19.2 kbit/s.

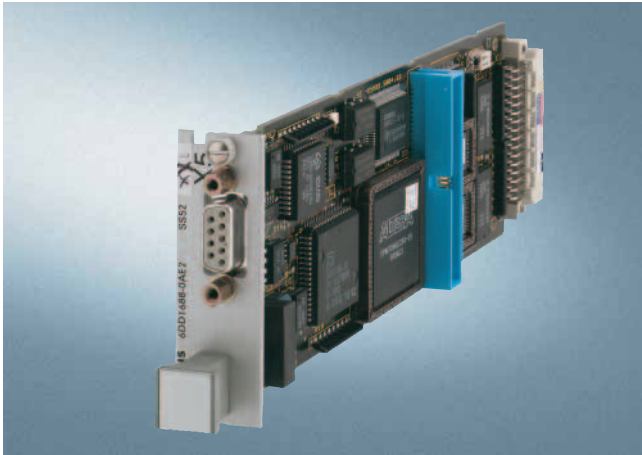
#### Technical specifications

Current consumption	+ 5 V/95 mA + 15 V/75 mA - 15 V/75 mA
Weight	0.011 kg

#### Selection and ordering data

	Order No.
<b>SS2 RS 232 interface sub-Module</b> for SS4 communication module	<b>6DD1 688-1AB0</b>

#### Overview



Communication module for PROFIBUS DP in master or slave function

#### Application

It is especially important to note that the SIMATIC distributed I/O can be connected to the SS52 - e.g.:

- ET 200B/C/L/U/IS and
- Conditionally ET 200M with signal modules, no signal pre-processing modules

If the SS52 is used as PROFIBUS DP master, the associated bus parameters must be calculated on the PC using the parameterizing software COM PROFIBUS and downloaded into the SS52.

#### Design

- Submodule which can be inserted in a CS7 slot

#### Function

- RS 485 interface for PROFIBUS DP, electrically isolated
- RS 232 interface to parameterize the bus node using COM PROFIBUS. The data set which is generated is downloaded into the SS52 via serial data transfer
- Connection to the bus cable via (also refer to Catalog IK PI):
  - PROFIBUS bus connector with integrated terminating resistors (up to 12 Mbit/s), e.g. 6ES7 972-0BB12-0XA0, 6ES7 972-0BB41-0XA0,
  - PROFIBUS bus terminal with integrated terminating resistors and plug-in cable to the SS52 (up to 1.5 Mbit/s), e.g. 6GK1 500-0AA10
- 1 diagnostics LED for the interface; located on the PC board
- The SS52 also has the additional functions - shared input, SYNC and FREEZE.
- Data transmission rate: 9.6 kbit/s up to 12 Mbit/s
- Max. 127 slaves can be connected
- Telegram length: max. 244 bytes per slave
- No parameters are required to be set in the DP slave or MPI function

#### Technical specifications

Current consumption	+ 5 V/300 mA + 15 V/50 mA - 15 V/50 mA
Space requirement	1 slot on the CS7 carrier module
Weight	0.2 kg
<b>DP slaves used, e.g.</b>	
SIMATIC S7	315-2DP, 413-2DP, 414-2DP, 416-2DP, CP 342-5, CP 443-5 Ext.
PC	CP 5511
Machine Tools	SINUMERIK 840D

#### Selection and ordering data

	Order No.
<b>SS52 communication module</b>	<b>6DD1 688-0AE2</b>
for PROFIBUS DP/MPI	
<b>Parameter assignment software</b>	<b>6ES5 895-6SE03</b>
COM PROFIBUS V5.1	



# SIMADYN D Control System

## Communication Modules

### COM PROFIBUS Parameter Assignment Software

#### Overview

COM PROFIBUS is a parameter assignment software to set the SS52 communication module as PROFIBUS master.

COM PROFIBUS runs on Windows, including Win 2000.

#### Function

The data record to be generated with COM PROFIBUS should be downloaded onto the SS52.

It can be downloaded using:

- Bus cable with PROFIBUS DP interface in the PC, e.g. with CP 5511 (PCMCIA)
- The "SS52load" program via the serial PC interface on the RS 232 interface of the SS52. The "SS52load" download program is included in the COM PROFIBUS parameter assignment tool

#### Technical specifications

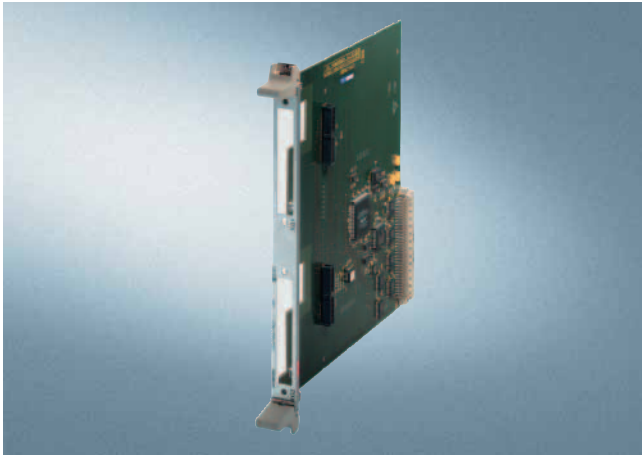
**Connector assignment of the RS 232 connecting cable for "SS52load"**

SS52	PC (9-pin interface)	PC (25-pin interface)
2	2	3
7	3	2
1	5	7

#### Selection and ordering data

	Order No.
<b>COM PROFIBUS V5.1 parameter assignment software</b>	<b>6ES5 895-6SE03</b>
Released for use with windows, including Win 2000	

#### Overview



The CS8 module is a carrier module for the following MASTERDRIVE communication modules

- CBP2
- CBC, CBD, CBL

#### Design

- L bus connection
- 2 slots (X01, X02) for 2 communication modules (COMBOARDS, CBx)

#### Function

Serial data transmission protocols (CAN, DEVICE-NET Slave, PROFIBUS DP Slave) can be implemented using the CS8 and the communication modules

The properties and features of communication interfaces are defined by the MASTERDRIVES communication modules which are actually used.

#### Technical specifications

Power consumption	+5 V/400 mA
Space requirement	1 slot (20.32 mm)
Weight	0.3 kg

#### Selection and ordering data

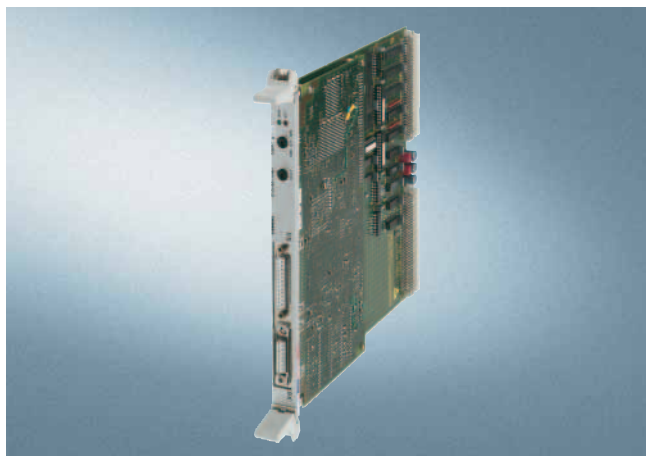
	Order No.
<b>CS8 carrier module</b> for MASTERDRIVES communication modules CBx	<b>6DD1 662-0AC0</b>
<b>CBP2 communication module</b> for PROFIBUS DP/US	<b>6SE7 090-0XX84-0FF5</b>
<b>CBC communication module</b> for CAN	<b>6SE7 090-0XX84-0FG0</b>

# SIMADYN D Control System

## Communication Modules

### CSH11 Communication Module

#### Overview



Communication connection for "Industrial Ethernet" - previously called SINEC H1.

#### Application

Using this interface, a process coupling can be established to higher-level automation systems.

The CSH11 can only be used in subracks with C bus (SR12, SR24) and can exchange data directly only over the C bus.

#### Design

- RS 485 interface for the bus
- RS 232 interface for parameterization
- Includes the CP 1470 SIMATIC communications processor
- L and C bus connection
- CSH11 modules require force-ventilated subracks - this means that they can be used in subracks SR12.1, SR12.3/SR24.1, SR24.3

#### Function

##### Setting parameters with SINEC NML

The PC software (for DOS) "SINEC NML" with the SIMADYN D-specific supplement is required to parameterize the module for the Industrial Ethernet bus.

The software, which can be downloaded at no charge from the Internet, contains a pre-configured database (e.g. for profiles and function distribution tables for layer 4 and 7 applications and application relationships).

The layer 7 functions of the CSH11 include the SINEC technological functions (STF) according to the "SINEC AP 1.0 specifications".

The data set, created using SINEC NML can be downloaded via the RS 232 interface of the CSH11.

Provided an Industrial Ethernet interface (e.g. CP 1512 (PCI) or CP 1613) is built into the PC, it is possible to load the data record through the bus.

#### Technical specifications

Current consumption	+ 5 V/2,5 A + 15 V/600 mA - 15 V/100 mA
Space requirement	1 slot (20.32 mm)
Weight	0.6 kg

#### Selection and ordering data

	Order No.
<b>CSH11 communication module</b> for Industrial Ethernet (SINEC H1), discontinued since 10/2003	<b>6DD1 661-0AB1</b>
<b>SINEC NML</b> German	<b>6GK1 740-0AB00-0BA0</b>
<b>SINEC NML</b> English	<b>6GK1 740-0AB01-0EA0</b>

### Fiber-Optic Cable Subrack Coupling

#### Overview

SIMADYN D subracks can be coupled with one another using an extremely fast fiber-optic cable coupling.

#### Application

For mastering complex open and closed-loop control and arithmetic tasks.

#### Design

Pre-assembled SIMATIC fiber-optic (glass) cables (refer to Catalog IK PI) are used to connect the modules, e.g. 6XV1820-5Bxxx.

- Connections for FOC with BF0C connectors (bayonet type); e.g. 6GK1901-0DA20-0AA0
- L and C bus connection (the modules cannot be used in subrack SR6!)
- Requires force-ventilated subracks, i.e. can be used in subracks SR12.1, .3 /SR24.1, .3.

Up to 8 slaves can be connected to a master. If additional subracks are connected to one another, several masters can also be

inserted in a subrack. 8 slaves can then be connected (several master-slave arrangements) to each of these masters).

In addition, a master module can also be inserted in a slave subrack. This means that, for example, together with its associated slaves in additional subracks, a second master-slave arrangement can be established.

Any subracks can be connected with one another using this possibility of combining and cascading subracks.

#### Function

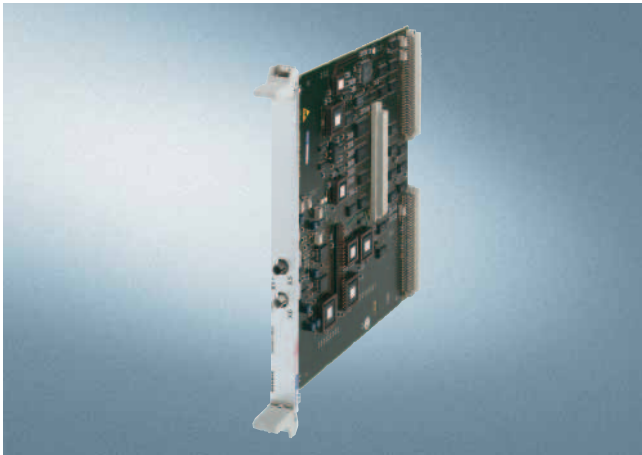
The fiber-optic cable coupling represents an approximately parallel "extension" of the L and C bus. The access to a connected subrack is realized within 5 to 8  $\mu$ s per word.

All of the slaves are connected to the master module using full duplex point-to-point couplings (2 fiber-optic cables).

- Max. glass FO cable of a point-to-point coupling: 200 m (cable sold by the meter e.g. 6XV1820-5AH10 or 6XV1820-6AH10)
- A master module can, in addition to the configured process data, also transfer the following signals to the slave:
  - base sampling time (for synchronization)

### CS12 Master Module

#### Overview



Master module of a fiber-optic cable connection to connect additional subracks through a CS22 slave module.

#### Technical specifications

Current consumption	+ 5 V/1.8 A + 15 V/50 mA
Space requirement	1 slot (20.32 mm)
Weight	0.4 kg

#### Selection and ordering data

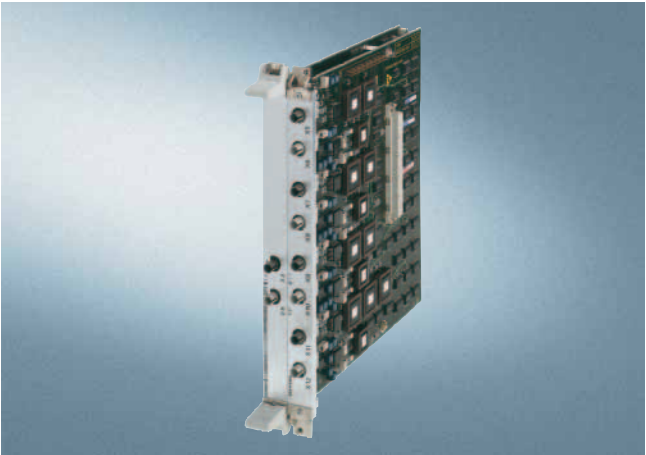
	Order No.
<b>CS12 master module</b>	<b>6DD1 660-0BA0</b>
for 1 slave	

# SIMADYN D Control System

## Communication Modules

### CS13 Master Module

#### Overview



Master module of a fiber-optic cable coupling to connect up to 4 additional subbracks through an appropriate number of CS22 slave modules.

#### Design

The CS13 comprises a CS12 master module on which a ICS1 module is mounted. This ICS1 module has the FO cable connections for the 4 slave modules.

The two FO cable connections of the basic CS12 module cannot be used in this configuration.

#### Technical specifications

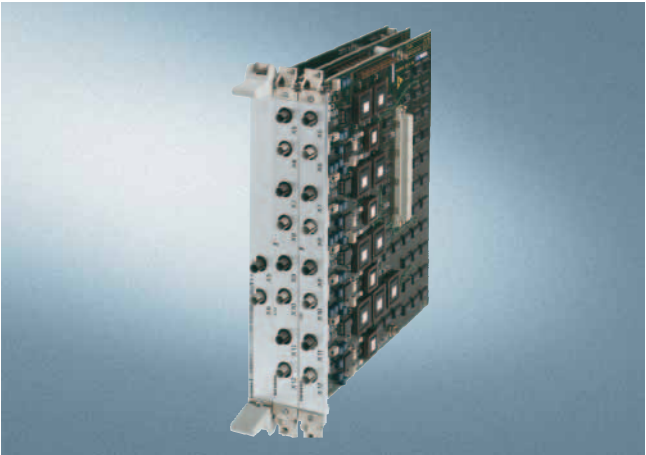
Current consumption	+ 5 V/4 A + 15 V/100 mA
Space requirement	2 slots (40.64 mm)
Weight	0.8 kg

#### Selection and ordering data

	Order No.
<b>CS13 master module</b> for 4 slaves	<b>6DD1 660-0BB0</b>

### CS14 Master Module

#### Overview



Master module of a fiber-optic cable connection to connect 8 additional subbracks through an appropriate number of CS22 slave modules.

#### Selection and ordering data

	Order No.
<b>CS14 master module</b> for 8 slaves	<b>6DD1 660-0BC0</b>

#### Design

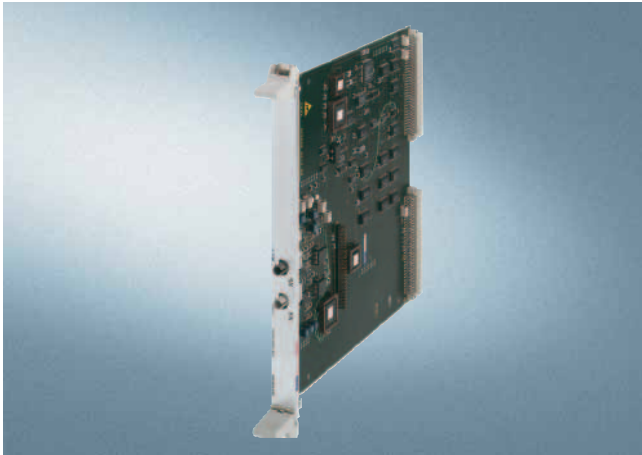
The CS14 comprises a CS12 master module upon which two ICS1 modules are mounted. These ICS1 modules have FO cable connections for the 8 slave modules.

The two FO cable connections of the CS12 master module cannot be used in this configuration.

#### Technical specifications

Current consumption	+ 5 V/5,5 A + 15 V/150 mA
Space requirement	3 slots (60.96 mm)
Weight	1.1 kg

#### Overview



Slave module for a fiber-optic cable connection (a full duplex point-to-point coupling) to a master module CS12, CS13 or CS14.

#### Technical specifications

Length of glass FO cable, max.	200 m
Current consumption	+ 5 V/1,5 A + 15 V/50 mA
Space requirement	1 slot (20.32 mm)
Weight	0.4 kg

#### Selection and ordering data

	Order No.
<b>CS22 slave module</b>	<b>6DD1 660-0BD0</b>
for a full duplex point-to-point coupling	

#### Options

Standard SIMATIC components are used for the fiber-optic cable subrack coupling (refer to Catalog IK PI).

Presently, only glass-fiber-optic cables with a max. length of 200 m are released!

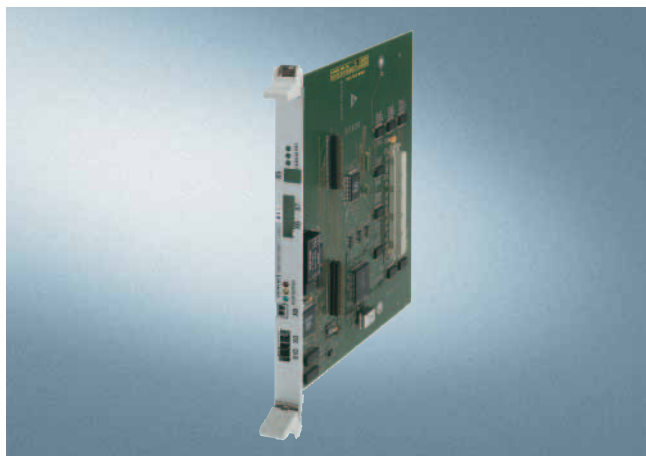
- Pre-assembled:
  - 6XV1 820-5B... or
  - 6XV1 820-6B... or
  - 6XV1 820-7B
- Fiber-optic cable sold by the meter, e.g.
  - 6XV1 820-5AH10 or
  - 6XV1 820-6AH10
- Connections for fiber-optic cables with BFOC plug connectors, e.g. 6GK1901-0DA20-0AA0

# SIMADYN D Control System

## Communication Modules

### ITSL SIMOLINK Module

#### Overview



SIMOLINK interface for CPU modules (PM5, PM6) - can either be used as master or slave

#### Application

SIMOLINK is used above all in conjunction with the SIMOVERT MASTERDRIVES MC AC drive converters (as slaves).

#### Function

SIMOLINK is an extremely fast serial fiber-optic cable coupling which can also be synchronized (this is an important feature) in a ring-type topology for Siemens drive units.

Data is clocked, in the form of a large shift register, through the fiber-optic cables and the connected nodes (slaves).

Up to eight data words (each 32 bit) are assigned to each node in the shift register; when receiving, the node can read these data words and when sending, can write into them.

- For each node, up to eight 32-bit words can be sent and received
- Telegrams can be sent, synchronized to the base sampling time; beyond this, additional synchronizing types are possible
- 3 diagnostic LEDs
- Free slot for additional, optional MASTERDRIVES SIMOLINK module SLB (Order No.: 6SE7090-0xx84-0FJ0)

#### Technical specifications

Data transmission rate	11 Mbit/s
Data transmission time	6.36 $\mu$ s/32-bit word
Number of bus nodes	200
Number of net data per telegram	max. 1000 32-bit words
Telegram cycle jitter	< 1 $\mu$ s
Length of FO-cable, max.	40 m
Length of FO-cable (e.g. Siemens LY-1V015200/230, 10 A), max.	300 m
Current drain without SLB module	+ 5 V/0.5 A $\pm$ 15 V/6 mA
Current drain with SLB module	+ 5 V/0.7 A $\pm$ 15 V/22 mA
Space requirement	1 slot (20.32 mm)
Weight	0.3 kg

#### Selection and ordering data

	Order No.
ITSL SIMOLINK module	6DD1 663-0AB0

#### Options

Ordering information and instructions regarding fiber-optic cables: Refer to Catalog DA 65 (SIMOVERT MASTERDRIVES).