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SIEMENS

SIMADYN D

Hardware

Manual

Edition 04.2011

Safety guidelines

This Manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the Manual by a warning triangle and are marked as follows according to the level of danger:

DANGER

indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTICE

used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesireable result or state.

Correct usage

Note the following:

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

Marken

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Frauenauracher Straße 80
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Siemens Aktiengesellschaft

Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Editions

SIMADYN D

Manual

Hardware

Edition 04.2011

NOTE

Please note that the current edition of this documentation contains different editions of the individual chapters. The following overview tells you when a chapter was revised the last time.

Overview (chapter editions)

Chapter		Edition
	Foreword	Edition 12.2004
1	General technical data	Edition 08.2005
2	Subracks	Edition 04.2011
3	CPU module	Edition 03.2001
4	Coupling memory module	Edition 03.2001
5	Input/output modules	Edition 12.2004
6	Communications support modules	Edition 12.2004
7	Technology subrack	Edition 03.2001
8	Program memory modules / Interface modules	Edition 04.2011
9	Plug-in cables	Edition 06.2002
10	Operator control panel OP2	Edition 03.2001

Foreword

Purpose of this Manual

This Manual explains the principle use and functions of the STEP 7 automation software with the main focus on the appropriate technological and drive control components T400, FM 458-1 DP, SIMADYN D, SIMATIC TDC or D7-SYS.

TDC: Technology and Drives Control

Basic knowledge required

This Manual addresses programmers and commissioning engineers. General knowhow regarding automation technology is required in order to understand the contents of the Manual

Validity of the Manual

This Manual is valid for SIMATIC D7-SYS Version 6.2.

Additional support

If you have questions relating to the use of the products described in the Manual, which cannot be answered here, then please contact your local Siemens office. You can also call the Hotline:

- **Tel.:** +49 (180) 5050-222
- **Fax:** +49 (180) 5050-223
- **e-mail:** adsupport@siemens.com

Training Center

Appropriate training courses are available in order to make it easier to get to know the SIMADYN D automation system. Please contact the central Training Center in D-Erlangen (I&S IS INA TC):

- **Tel.:** +49 (9131) 7-27689, -27972
- **Fax:** +49 (9131) 7-28172
- **Internet:** www.siemens.de/sibrain
- **Intranet:** http://info-tc.erlm.siemens.de/

NOTE

This user part of the Manual does not include any detailed information/instructions with individual descriptions, but is only intended to provide a basic procedure. More detailed information on the dialog boxes in the software and how they are handled is provided in the appropriate online help.

Information overview

This manual is part of the overall documentation for the technological and drive control components T400, FM 458, SIMADYN D, SIMATIC TDC and SIMATIC D7-SYS:

Title	Content
System and communications configuring D7-SYS	**The first project in a few steps** This Section provides an extremely simple entry into the methodology when assembling and programming the SIMATIC TDC/SIMADYN D control system. It is especially conceived for first-time users of a control system. **System software** This Section provides basic know-how about the structure of the operating system and an application program of a CPU. It should be used to obtain an overview of the programming methodology, and basis for configuring user programs. **Communications configuring** This section provides you with basic know-how about the communication possibilities and how you configure links to the communication partners. **Changeover from STRUC V4.x to D7-SYS** Essential features are included in this section, which have changed over STRUC V4.x with the introduction of SIMATIC D7-SYS.
STEP 7 option packages for D7-SYS	**Basis software** This section explains the essential use and the functions of the STEP 7 automation software. For first users, it provides an overview on configuring, programming and commissioning a station. When working with the basis software, you can access the online help which provides you with support when it comes to detailed questions on using the software. **CFC** The CFC language (Continuous Function Chart) allows you to graphically interconnect blocks. When working with the particular software, you can also use the online help which can answer detailed questions regarding the use of the editors/compiler. **SFC** Configuring sequence controls using SFC (Sequential Function Chart) of SIMATIC S7. In the SFC editor, you generate a sequence chart using graphic resources. The SFC elements of the chart are then positioned according to specific rules.
Hardware	The complete hardware spectrum is described as reference in this Manuals.
Function blocks	These Reference Manuals provide you with an overview of selected function blocks for the associated technological and drive control components T400, FM 458-1 DP, SIMADYN D and SIMATIC TDC.

Guide

As first time user, we recommend that this Manual is used as follows:

- Please read the first section on using the software in order to get to know some of the terminology and basic procedure.
- Then use the particular sections of the Manual if you wish to carry-out certain processing steps (e.g. loading programs).

If you have already executed a small project, and have gained some experience, then you can read individual sections of the Manual in order to get up to speed about a specific subject.

A&D Technical Support

Can be accessed globally at any time of the day:

World-wide (Nürnberg) **Technical Support** Local time: 0:00 to 24:00 / 365 days Phone: +49 (180) 5050-222 Fax: +49 (180) 5050-223 E-Mail: adsupport@siemens.com GMT: +1:00		
Europe / Africa (Nürnberg) **Authorization** Local time: Mo.-Fr. 8:00 to 17:00 Phone: +49 (180) 5050-222 Fax: +49 (180) 5050-223 E-Mail: adsupport@siemens.com GMT: +1:00	**United States** (Johnson City) **Technical Support and Authorization** Local time: Mo.-Fr. 8:00 to 17:00 Phone: +1 (423) 262 2522 Fax: +1 (423) 262 2289 E-Mail: simatic.hotline@sea.siemens.com GMT: -5:00	**Asia / Australia** (Peking) **Technical Support and Authorization** Local time: Mo.-Fr. 8:00 to 17:00 Phone: +86 10 64 75 75 75 Fax: +86 10 64 74 74 74 E-Mail: adsupport.asia@siemens.com GMT: +8:00
Technical Support and Authorization speak generally German and English.		

Contens

1 General technical data

Overview

1.1 Installation and EMC guidelines

NOTE

The information in this Manual does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, please contact your local Siemens office.

Further, the contents of this Manual shall not become a part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties nor modify the existing warranty.

1.1.1 Definitions

1.1.1.1 Qualified personnel

For the purpose of this Manual and product labels, a „Qualified person" is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications, for example:

1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.
3. Trained in rendering first aid

1.1.1.2 Danger and warning information

DANGER For the purpose of this Manual and product labels, „Danger“ indicates death, severe personal injury and/or substantial property damage will result if proper precautions are not taken.

WARNING For the purpose of this Manual and product labels, „Warning“ indicates death, severe personal injury or property damage can result if proper precautions are not taken.

CAUTION For the purpose of this Manual and product labels, „Caution“ indicates that minor personal injury or material damage can result if proper precautions are not taken.

NOTE For the purpose of this Manual, „Note“ indicates information about the product or the respective part of the Instruction Manual which is essential to highlight.

CAUTION This board contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics board, your body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet components, socket protective conductor contact).

WARNING Hazardous voltages are present in this electrical equipment during operation.

Non-observance of the safety instructions can result in severe personal injury or property damage.

It is especially important that the warning information in all of the relevant Operating Instructions/Instruction Manuals are strictly observed.

1.1.2 Introduction

What is EMC ?

Electromagnetic compatibility (EMC) is the ability of an electrical device to function, fault-free in a specified electromagnetic environment without influencing the environment in an inadmissible fashion.

This design- and EMC guideline supplements the documentation on the individual components.

The SIMADYN D control system consists of individual components (e. g. subracks, modules, interface modules, operator control panels, position transmitters). The components can be installed in the widest range of system configurations according to individual requirements. When the components are arranged in a distributed fashion (decentral topology) a noisy environment cannot be neglected. Thus, specific requirements are placed on the design and EMC of the system.

EMC represents a quality feature for

- **Intrinsic noise immunity:** Immunity against internal electrical noise and disturbances
- **External noise immunity:** Immunity against external electromagnetic noise
- **Noise emission level**: Influencing the environment due to electromagnetic radiation

Operational reliability and noise immunity

In order to achieve the highest possible operational reliability and safety and noise immunity for a complete system (closed-loop control and drive motor) the control manufacturer and user (including end customers) must take certain measures.

Perfect functioning of SIMADYN D can only be guaranteed and the legal requirements fulfilled (89/336/EC) if all of these measures are observed.

1.1.3 Use and operation

SIMADYN D components are designed for use in industrial environments in accordance with EN 50081-2 and
EN 50082-2. They may not be operated or connected to the public low-voltage network.

1.1.4 Machinery Directive

In accordance with the Machinery Directive 89/392/EC, it should be ensured that if SIMADYN D fails or executes an incorrect function, that this does not result in the machine/system going into a potentially hazardous condition. This must always be taken into account when configuring the machine/system.

The system may not be commissioned until it has been proven that the final product is in conformance with the Directive.

Low-Voltage Directive

The Low-Voltage Directive 73/23/EC is only applicable for products with supply voltages of ≥ 50 V AC and/or > 75V DC.

For SIMADYN D, this involves the following components:

- SP 7 6DD 1683-0BB0
- SP 8.5 6DD 1683-0BC0
- SP 9.5 6DD 1683-0BE5
- SP 22.5 6DD 1683-0CC5
- SP 23.5 6DD 1683-0CD5
- SB 60 6DD 1681-0AF4
- SB 70 6DD 1681-0AG2
- SRT 400 6DD 1662-0CG0

These components correspond to the requirements of the Low-Voltage Directive.

WARNING

Open equipment
SIMADYN D is regarded as open equipment. This means that you must always install SIMADYN D in a cubicle, cabinet or electrical control room that can only be accessed using a key or tool. Only trained or authorized personnel are allowed access to such cubicles, cabinets or electrical operating rooms.

1.1.4.1 SIMADYN D outputs

DANGER

When the equipment is powered-up or powered -on, the outputs have undefined statuses while the power supply voltages are running-up. This fact must be taken into account when designing the system.

1.1.4.2 Professionally-trained and knowledgeable personnel

Only professionally-trained, knowledgeable personnel may configure, install, commission and operate SIMADYN D.

1.1.4.3 CE Mark

SIMADYN D components have **no** CE Mark for the following reasons:

- they cannot be practically used autonomously
- they are not generally available
- they can only be used by specially-trained personnel

NOTE If a CE Mark is required, this is the responsibility of the manufacturer of the machine/complete system.

1.1.4.4 Connecting external voltages

If external voltages (e. g. pulse encoders) are connected to SIMADYN D inputs, which are supplied from an external power supply, then this external supply must also be shutdown when the SIMADYN D power supply is shutdown or fails.

1.1.5 Mounting

SIMADYN D components must be mounted in a metal cabinet, enclosed on all sides.

1.1.6 Cables

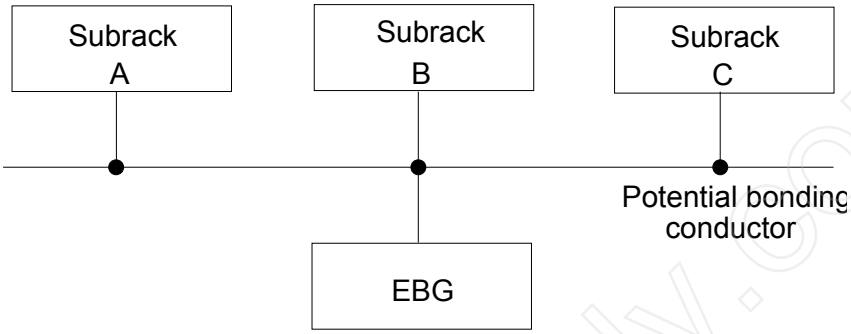
All signal cables which are connected to SIMADYN D must be screened.

1.1.7 Potential bonding

In order to ensure disturbance-free operation, the components which are connected and communicate with one another may not be at different potentials. This means that all components must be connected with one another through potential bonding cables.

1.1.8 Principle when connecting components

All of the components (subracks, power supplies etc.), which are connected using signal cables, must also be connected with potential bonding cables (exception: Components with fiber-optic cable connections).

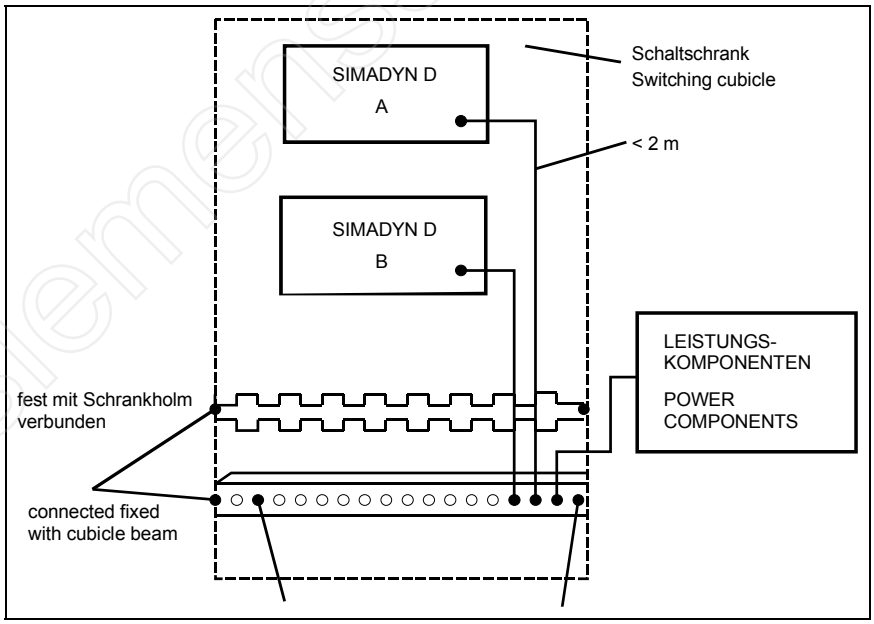


1.1.9 Potential bonding rail

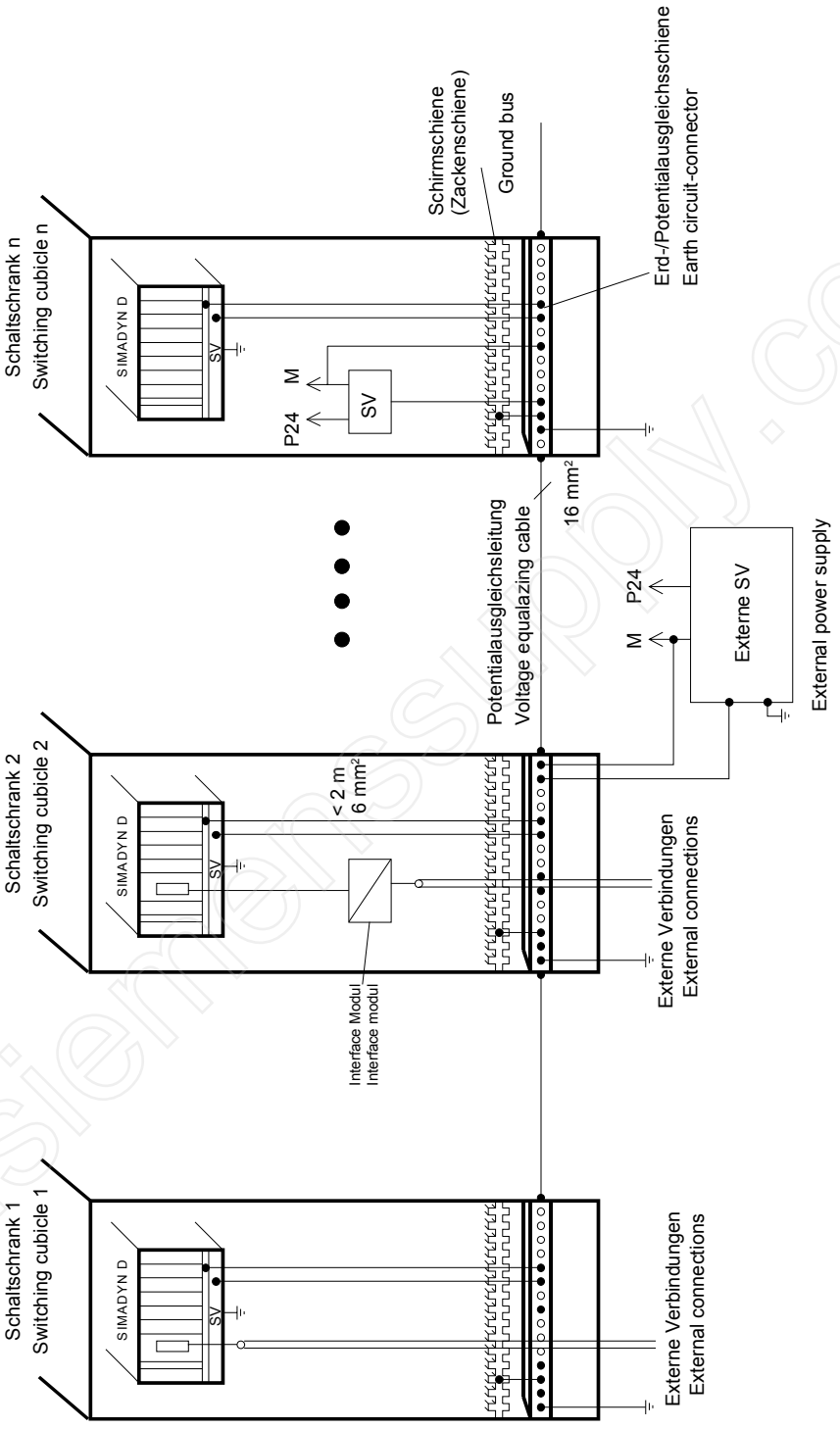
A potential bonding- or grounding rail must be provided in each cabinet to allow simple wiring.

All of the internal and external components must be connected to this potential bonding- and grounding rail.

Basic circuit



1.1.10 Actual example of a multi-motor drive



1.1.11 Protective grounding

The protective ground is connected via the protective conductor (PE) at the cabinets and components. For SIMADYN D, the potential bonding conductor/cable does not have a protective conductor function. For SIMADYN D it is required for reliable operation and noise suppression.

The protective conductor must be routed in accordance with DIN VDE 0100 and DIN VDE 0160.

For subracks, the protective conductor cross-section must be $\geq 6\ mm^2$ and for cabinets, $\geq 10\ mm^2$.

1.1.12 Radios

It is not permissible to use radios > 2W close to SIMADYN D.

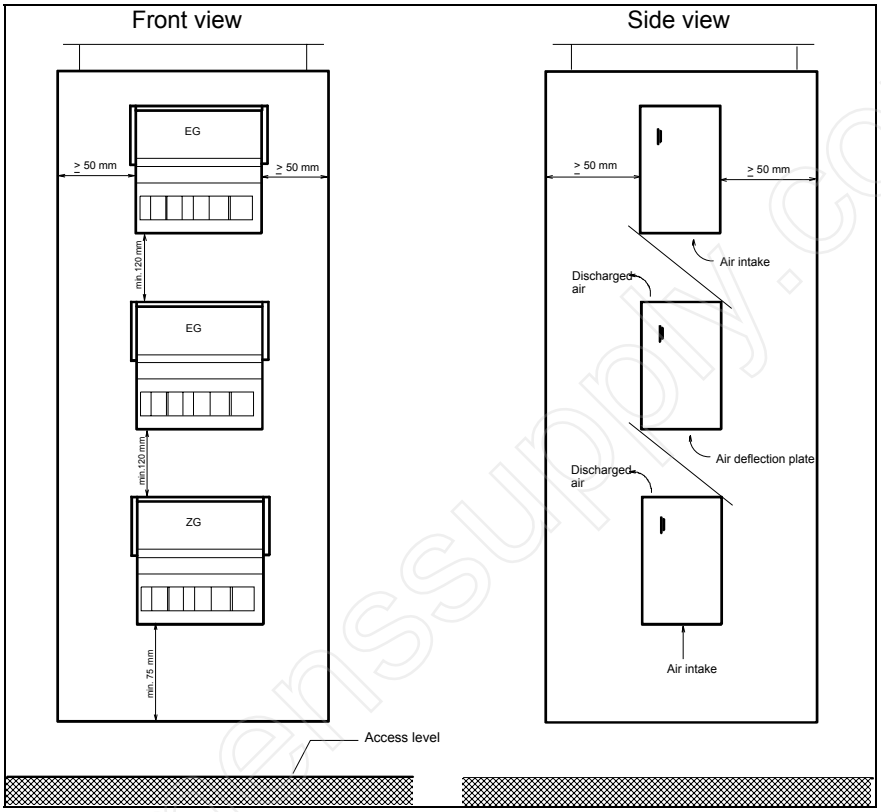
For low-rating radios, a distance of > 1m must be maintained between the radio and SIMADYN D.

1.1.13 Cabinet

- All SIMADYN D components must be mounted in a metal cabinet
- Each cabinet must have a ground/potential bonding rail, which is connected to the cabinet frame at both ends.
- All SIMADYN D subracks must be connected to the grounding/potential bonding rail through a 6 mm^2 cable which should be as short as possible. The connection via the PE connection of the power supply is not sufficient.
- Non-damped contactors may not be used in a cabinet with SIMADYN D components.
- If non-damped contactors are used in a cabinet next to SIMADYN D, then the cabinets must be separated by a metal partition.
- All of the cabinets associated with multi-motor SIMADYN D drives must be connected through a potential bonding conductor with at least a 16 mm^2 cross-section (the customers PE connection is not sufficient).
- Each cabinet in which SIMADYN D components are installed/mounted must have a screen rail. Serrated rails are suitable. The screen rail must be connected directly to the cabinet frame.
- No gas discharge lamps may be used in the cabinet.
- The screens of incoming cables must be connected directly to the screen rail.
- The cabinets must be designed so that air can circulate freely within them.

1.1.14 Mounting clearances

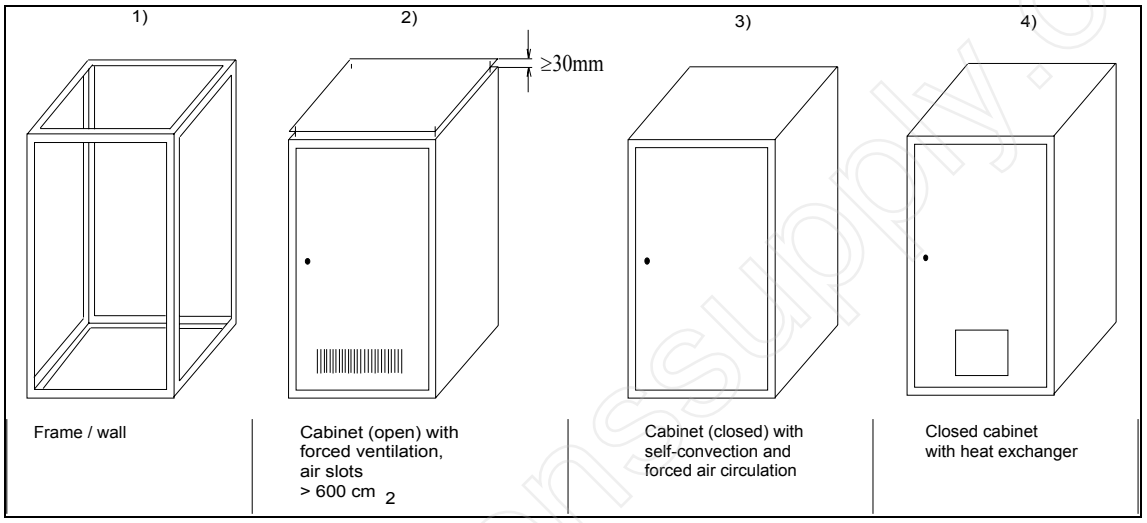
The following minimum clearances must be maintained if SIMADYN D subracks are mounted one on top of the other:
(For 2200 × 600 × 600 mm cabinets)



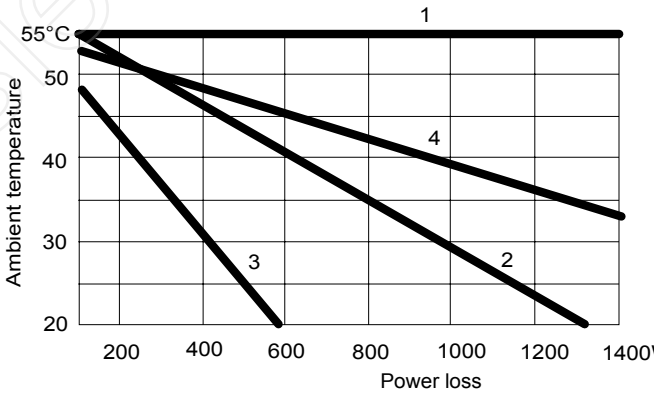
1.1.15 Power loss in the cabinet

Different maximum temperature values are obtained for the SIMADYN D components, depending on the installation type

- open rack
- cabinet with air mesh
- closed cabinet with forced convection
- closed cabinet with heat exchanger



The power loss dissipated from a cabinet depends on the cabinet design, its ambient temperature and the arrangement of the various devices in the cabinet.



Nominal values for permissible ambient temperatures of a cabinet with the dimensions 600 mm × 600 mm ×2200 mm as a function of the installed power loss can be taken from the figure above.

1. Open unit / wall
2. Cabinet with air slots
3. Closed cabinet with self-convection and forced air circulation using an equipment fan
4. Closed cabinet with heat exchanger

If a cabinet is ventilated from below via the cable duct, more favorable conditions are obtained as illustrated under 2).

For mounting types 1) and 2), it is assumed, that there is a minimum of 1m clearance between the cabinet and the ceiling.

1.1.16 Power supply

Measures against noise voltages

The following instructions to suppress noise in systems/plants must be observed so that noise voltage spikes on the supply cable in the cabinet are eliminated.

Suppressing supply cables

When the equipment is supplied from a 115/230 V supply, a line filter must be installed in the cable as close as possible to where the cable enters the cabinet (e. g. 250 V AC/ 10 A). The ground connection of the line filter must be connected to the central grounding point in the cabinet through the shortest possible path.

Discharge capacitors for DC supplies

If a cabinet is connected to a central 24 V supply, noise voltages can be coupled-into the cabinet via the supply cable.

We recommend that noise suppression capacitors are installed where the 24 V supply cable enters the cabinet. These capacitors can be mounted on the cabinet ground or the screen rail.

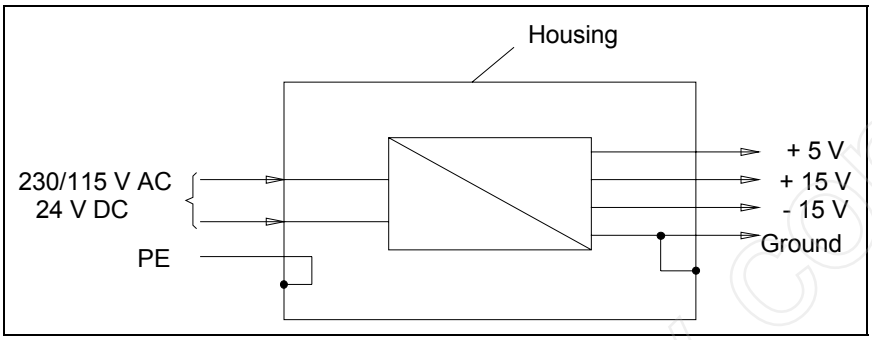
If several 24 V power supplies are used in networked systems, then the grounds of the power supplies must be connected with on another via the grounding / potential bonding rail and connected to the subrack.

In order to diminish the effects of noise and disturbances, a line filter should be provided for the 24V DC power supply of the digital inputs and outputs (e.g. line filter SIFI-B, Order No. B84112-B-.... from Epcos / line filter NF 1-1 from Phönix Contact). This should be located as close as possible to the terminal block. The shield connection of the line filter must be connected to ground through the shortest possible distance.

WARNING Protective separation in accordance with VDE 0160 must be guaranteed for all power supply units which are used to supply SIMADYN D units and modules.

Power supply potentials

For SIMADYN D, the grounds of all secondary voltages must be connected together and connected to the subrack housing and grounded; this enhances the discharge of noise signals and voltages.



Using clocked power supplies

If a clocked power supply is used for the 24V supply, the rated output of the clocked power supply units must be designed for the inrush current of SIMADYN D (the factor is 200 % of the rated current). Otherwise, the clocked power supply can ramp-up along the short-circuit current limiting and undefined conditions can occur.

1.1.17 Subracks

- The subracks must be connected to the grounding/potential bonding rail using the shortest possible 6mm^2 cable.
- All of the boards must be screwed into subracks. This is also required during the commissioning phase!
- Empty slots must be provided with SIMADYN D slot covers.
- If modules are inserted in an adapter during the commissioning phase, the front panel must be electrically connected to the housing through the shortest possible path.
- Modules may neither be removed nor inserted under voltage.
- The connectors for serial interfaces must be screwed to the front panel.
- The maximum temperature of the air drawn-in by the subrack is 55ºC. The subrack must be mounted so that air can freely circulate. It must be ensured that heat cannot build-up (no hotspots).
- The air drawn-in by the subrack must be as dust-free as possible.

1.1.18 Cables

Cables from the outside (e. g. to the terminal modules) may not be routed in a common cable duct with internal cables in the cabinet.

For incoming screened cables (analog and binary), the screen must be connected to the screen rail where the cable enters the cabinet. The cable must then be routed, still screened up to the terminal module/module. Screens are not connected to terminal modules/modules.

Serial connecting cables must be screened. The screen must be connected to a metallized connector housing. Further, it must also be connected to the screen rail. The cable screen may not be connected to pin 1 of the connector.

Screening using just the front panels of the modules is not effective

The screen cables must be connected at both ends to the screen rails in the cabinets.

All analog signal cables must be screened, both in the cabinet as well as outside the cabinet.

Single-ended grounding of cable screens

For analog signal cables, which only conduct low signal levels (mV or μA), the cable screen is connected to the cable rail at one side in the cabinet.

Screening, permissible cable lengths

All of the signal cables must be provided with screen.

Module	Cable length, screened
Outputs	1000 m
Inputs, 230 V AC	1000 m
Inputs, 24...60 V DC	1000 m

Below 500 V AC, a minimum clearance of > 10 cm must be maintained between signal cables and power cables; for power cables above 1 kV AC, a clearance > 30 cm must be maintained.

1.1.19 Mounting SIMADYN D unit in drive converters

When mounting SIMADYN D modules in drive converters, the following should be observed:

- The tachometer cables of the pulse encoders should have double screens for lengths >10m.
- Only terminal modules and cables in the SIMADYN D program may be used.
- All cable screens must be connected through the largest possible surface area to the screen rail. The screen rail must be grounded using the shortest possible 10mm^2 cable.

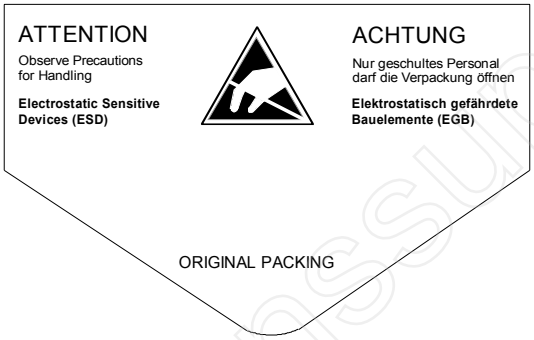
- Avoid installing the drive converters close to radio transmitter antennas
- The drive converters must always be mounted in enclosed metal cabinets.

1.2 ESD guidelines

1.2.1 What is ESD?

Almost all of the SIMADYN D modules have highly-integrated devices. These devices are, from their very nature, extremely sensitive to overvoltage conditions, and therefore also to electrostatic discharge.

ESD The abbreviation stands for electrostatic discharge



Modules, which use these devices have the following warning label on the component side:

Electrostatic sensitive devices can be destroyed by voltage- and energy level which lie far below the perception levels of human beings. Voltages such as these occur when personnel touch a component or a module without having first being previously electrostatically discharged. Components, which have been subject to such overvoltage conditions, can generally not be immediately identified as being faulty, as this is only manifested after a somewhat longer operating time.

1.2.2 Handling ESD modules

- As a general rule, electronic modules should only be touched if this is absolutely necessary.
- Components may only be touched if the person
  - is continuously grounded through an ESD bracelet, or
  - is wearing ESD shoes or ESD shoe grounding strips.

- Before touching an electronics module, you must electrically discharge your body. This can be simply done by touching a conductive, grounded object immediately beforehand (e. g. bare metal cabinet parts, water pipe etc.)
- Modules may not come into contact with highly insulating materials which can be statically charged. This includes plastic foils, insulating desktops, clothing manufactured out of man-made fibers.
- Modules may only be placed down on conductive surfaces (desktop with ESD surface, conductive ESD foam rubber, ESD packing bags, ESD transport containers, cardboard- or paper surfaces).
- Modules may not be brought close to data terminals, monitors or television sets.

1.2.3 Measuring and making changes on ESD modules

- It only permissible to make measurements at the modules, if
  - the measuring unit is grounded (e. g. via protective conductor) or
  - before making measurements with an electrically-isolated measuring device, the probe is briefly discharged (for example by touching a bare metal control housing).

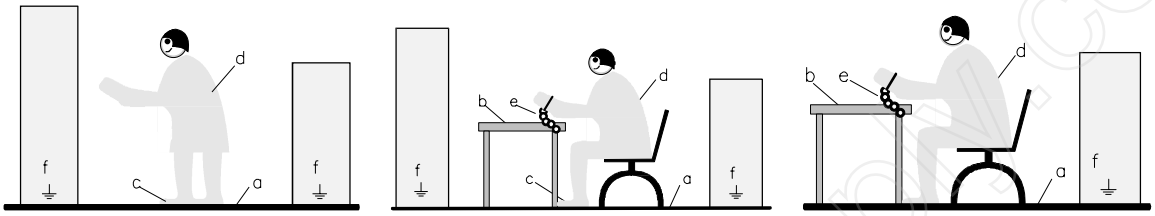
When carrying-out soldering work on modules, ESD soldering irons must be used or at least the soldering iron tip grounded.

1.2.4 Transporting modules

Modules and components may only be stored and transported in conductive packing materials (e. g. metallized plastic boxes, metal containers).

If the packaging is not conductive, then the modules must first be wrapped in conductive packaging materials. This can include, for example conductive foam rubber or normal household aluminum foil.

The necessary ESD protective measures are clearly shown in the following diagram.



a = conductive flooring surface

d = ESD coat/jacket

b = ESD desk = ESD chain

c = ESD shoes

f = grounding connection for the cabinets

1.3 Ambient conditions

The following **safety regulations** must be applied:	VDE 0160
	Electric power equipment with electronic devices
	Data for „Protective separation“ of 115/230 V AC power supply parts with respect to PELV circuits
	Data for „Protective separation“ of 25V AC/ 60V DC signal voltages with respect to PELV circuits
	VDE 0106 Part 1
	Data regarding shock protection
Protective class according to VDE 0106 Part	I (with protective conductor) for 115/230V supply voltage
	II (safety extra-low voltage) for 24V supply („protective separation“)
Air intake temperature for self- or forced cooling It should be observed whether the module is designed for natural air cooling or forced ventilation	0 degrees C up to + 55 degrees C
Storage temperature	-25 degrees C up to +70 degrees C
Mechanical specifications: Testing in accordance with SN 29050	
in operation	Severity grade, class 12
during transport	Severity grade, class 22
certification	Manufacturers certification for EMC (in accordance with the EC Directive)

2 Subracks

Overview

2.1 Subracks SR6, SR6V

Description

The subracks accommodate SIMADYN D modules with the format (H×D) 233.4 × 220 mm².
An integrated power supply provides the necessary voltages for the modules via the backplane bus (**L bus**) and permits data transfer between them.

No. of slots

SR6/SR6V: **6**
The slots are identified by a labeling strip.

2.1.1 Power supply

The power supply (type SP7, 6DD1683-0BB0) plugs into the SIMADYN D ES 902 C subrack system in the righthand subrack slot.
It is secured using a screw locking so that it cannot slide out and guarantees natural air cooling (SR6) or unrestricted forced ventilation with mounted fan (SR6V) of the subrack.

Power

The current demand of the modules may not exceed the available output currents of the 5 V and +/-15 V supplies (refer to the Chapter „Technical data“). Otherwise, a larger subrack must be used, e. g. SR12.x.

Front panel elements

- green LED green: Error-free operation
- red LED: Fault condition
- reset button to restart modules
- connection for the supply voltage (screw/plug-in terminal X1)
- connection for an external back-up battery (screw/plug-in terminal X2)
- test sockets to check the 3 output voltages 5 V, +/-15 V (short-circuit protection is provided via protective resistors)

Supply connection

The 230 V supply voltage is fed-in via the 4-pole screw/plug-in terminal X1. The connection assignment is printed on the front panel:

Connector X1, Pin	Significance
1	L phase conductor
2	N neutral conductor
3	*Not connected*
4	PE protective conductor

NOTES

It must be a slightly accessible circuit breaker in the supply circuit.

The connector X1 is not permissible as a circuit breaker.

The connector X1 is permissible only for the internal wiring and may be plugged only in the voltageless state or be split.

The connector X1 must not be used for a power cable removable of the terminal user.

The protective conductor must be connected at connector X1, pin 4. It is not sufficient to connect a protective conductor.

Fuses

The following fuses are located on the power supply PC board

F 1:	T800 mA H	250 V (supply)
F 2:	T800 mA H	250 V (supply)
F:	T50 mA H	

NOTE

Caution: bipolar fuse

An external fuse must be dimensioned according to the following operating data:

Input current (at 230 V):	In = 600 mA
Fuse link:	I^2t = 0.5 A^2s
Peak inrush current:	Is = 25 A

NOTE

The power supply PC board is suitable for the connection to IT systems.

2.1.2 Voltage monitoring functions

Input voltage

The input voltage is monitored for undervoltage and overvoltage conditions.

Input voltage (V_{rated} = 1-ph. 230 V AC)	**Response**
Undervoltage: < 170 ...175 V	Green OK LED goes dark The output voltages are shutdown; CPU stop (DSAVE signal) The system automatically restarts when the input voltage increases to approx. 190 V.
Overvoltage > approx. 265 V	Red fault LED is lit; The output voltages are shutdown, CPU stop (DSAVE signal) No automatic restart (the line supply voltage must be disconnected)

Output voltage

All of the output voltages are monitored for an undervoltage condition (e. g. as a result of overload/short-circuit).

Undervoltages at the output	Response
V (5 V) < 4.7 ... 4.85 V (for t>100-200 µs)	Red fault LED is lit The output voltages are shutdown (CPU stop) No automatic restart (the line supply voltage must be disconnected)
V (+ 15 V) < approx. 14 V **V (- 15 V)** > approx. -14 V	Red fault LED is lit 5V voltage remains System failure message

System failure message

The associated module („STOP“ tab) is configured in HWConfig under „Object properties“ to define how the module behaves when a system failure message is output (bus signal *RDYIN=low):

- Modules can reset their binary and analog outputs
- CPU modules can go into the „STOP“ condition („H“)

2.1.3 Battery back-up

The SR6 subrack does not have its own back-up battery.

Battery connection

A back-up battery can be connected at the screw/plug-in terminal X2 to save configured values (application software) during a power failure (using function block SAV). The connection assignment is printed on the front panel:

Connector X2, Pin	Designation	Comment
1	0 V	Battery ground
2	BATAL	Battery monitoring („alarm“ for logical 0)
3	V_{CC}	+ 3.0 ...4.5 V battery voltage

External battery

Current load: Approx. 10 µA depending on the particular CPU module

It is recommended that the battery is changed every year.

When using a Lithium battery, a series resistor of 39 Ω must be provided to prevent an inadmissibly high charging current when a fault condition develops (5V of the power supply is applied to the battery via a defective diode - which could be a potential explosion hazard).

The monitoring CPU module in SR6(V) does not initially identify when there is no back-up battery or the back-up battery is discharged (no flashing „b“).

Battery voltage monitoring

The SE60 interface module (6DD1681-0GA0, information will be provided on request) includes the battery and supplies a monitoring signal, which is connected at X2, pin2 „BATAL“. This TTL signal outputs a „0“ when the battery voltage falls below 3.0 V.

WARNING

For safety reasons, it is not permissible that lithium batteries are in the equipment when it is transported unless the battery manufacturer permits this expressly using an appropriate declaration.

DANGER

- When the equipment is stored and shipped, the batteries must be individually and separately packed in a non-conductive material.
- There is a danger of explosion if they are not correctly handled. We can accept no liability for incorrectly handled batteries.
- Used batteries must be disposed of in compliance with national and European legislation and regulations.
- The lithium batteries must be removed from the battery holder before the subrack or power supply is disposed of.

2.1.4 Backplane bus

All of the inserted modules receive their voltages and exchange data via a parallel backplane bus (**L bus**).

Daisy chain jumpers

The bus uses the daisy chain principle where a CPU module accepts the token signal and then transfers it to the next CPU module.

Thus, a daisy chain jumper must be **inserted** in all backplane bus PC board slots where there is **no CPU module** (or EPx signal processor module).

If another module is inserted, the jumper is unimportant.
The jumpers must be correctly inserted up to the last (righthand) CPU module.
A jumper is required if a module is not located at that connector slot!

The two pins to insert the jumpers are located to the right of the backplane bus connector (96-pin socket connector).

All of the jumpers are inserted **when the equipment is shipped**.

Signal assignment, backplane connector

X201 to X206 96-pole socket connector DIN 41612 Type C

Pin No.	Row a	Row b	Row c
1	5V	5V	5V
2	AUX2	AB20	AB22
3	AUX1	AB21	AB23
7 4	+15V	+15V	+15V
5	AUX0	-15V	-15V
6	*LOCK	*CSPER	*CSINI
7	5VEXT	5VEXT	*RSERQ
8	Vcc	AB12	AB0
9	*BATAL	0V	AB1
10	*DSAD	AB13	AB2
11	*DSAVE	PLC0	AB3
12	AB19	AB14	AB4
13	*OUTDS	PLC1	AB5
14	*RESET	AB15	AB6
15	*BHE	PLC2	AB7
16	*BRQ	AB16	AB8
17	*BGIN	PLC3	AB9
18	*BGOUT	AB17	AB10
19	*BCLR	PLC4	AB11
20	*IR0	AB18	DB0
21	*IR1	0V	DB1
22	*IR2	DB11	DB2
23	*IR3	0V	DB3
24	*RDYIN	DB12	DB4
25	*RDY	PRIVAT	DB5
26	*WR	DB13	DB6
27	*RD	0V	DB7
28	CLK	DB14	DB8
29	*CLK.M	0V	DB9
30	*DEN	DB15	DB10
31	*HWE	RES	SBR
32	DT/*R	0V	SBT

2.1.5 Ventilation/cooling

The subrack **SR6** is designed for natural air cooling.
The **SR6V** has a fan on the top panel to operate CPU modules which require forced ventilation.
The fan has a connecting terminal for its 1-ph. 230 V AC supply voltage. The fan is not monitored.

Discharged air

The subrack must be able to discharge hot air:

- The discharged air may not be restricted by mounted components
- When mounting equipment or other components, a minimum clearance of 60 mm must be maintained above and below the subrack

If the subrack is mounted in a cabinet, the cabinet must have air ventilation slots. If the cabinet is enclosed, the subrack must be force-ventilated (an SR6V must be used).
If two subracks are mounted one on top of the other, there must be a minimum 120 mm clearance between the two subracks, whereby the upper subrack must be separated from the lower subrack by an air deflection plate.

2.1.6 Mounting guidelines and noise immunity

EMC

- The subrack must be connected to the grounding rail via the connecting studs through a min. 6 mm² cable which should be kept as short as possible.
  Potential bonding using the PE pin of line connector X1 is not sufficient!
- All of the cabinets associated with networked SIMADYN D drives must be connected with one another through a potential bonding conductor having a minimum cross-section of 16 mm².
- Empty slots must be provided with SIMADYN D slot covers (SR81, SR82, SR83).
- All modules must be tightly screwed into the subrack.
- No undamped contactors may be used in a cabinet together with SIMADYN D.
- If undamped contactors are mounted in a cabinet next to SIMADYN D, the cabinets must have a metal partition between them.
- The protective contactor is connected at the subrack and at the power supply. Both components must be at protective conductor potential.
- Before removing the power supply, the connecting cables must be disconnected. The connecting cables must first be disconnected from the supply so that they are in a no-voltage condition!
- The screens of screened cables must be directly connected to the grounding- or screen rails and fed to the interface modules, still screened.

NOTE

Additional information regarding EMC and the ambient conditions, refer to the Section „General technical data“!

2.1.7 Technical data

Input voltages

AC power supply according to DIN IEC 38

Input voltage V_{in}	230 V (+ 10% / - 15%)
Input frequency	47.5 ... 62.5 Hz

Non-periodic overvoltages according to DIN VDE160, A5.3.1.1.2	
Voltage	460 V
Duration	1.3 ms
Recovery time, min	0.1 s
Events per hour	max. 10

Brief voltage dips according to DIN VDE 0160, A5.3.1.1.3	
Voltage	0
Duration	5 ms
Recovery time, min	0.1 s
Events per hour	max. 10

Output voltages

Output voltage 5 V	+5.1 V +/- 0.1 V
Output current	1.5 to **7 A**
Ripple	< 50 mV_{pp}
Commutating spikes	< 5% (of 5V)
Base load	1.5 A when a CPU module is inserted
Overvoltage protection	with suppressor diode to protect the modules
Stabilization time	< 80 ms after V_{in}= 230 V; <1 ms after load step (0.5 ->1)*I_{rated}

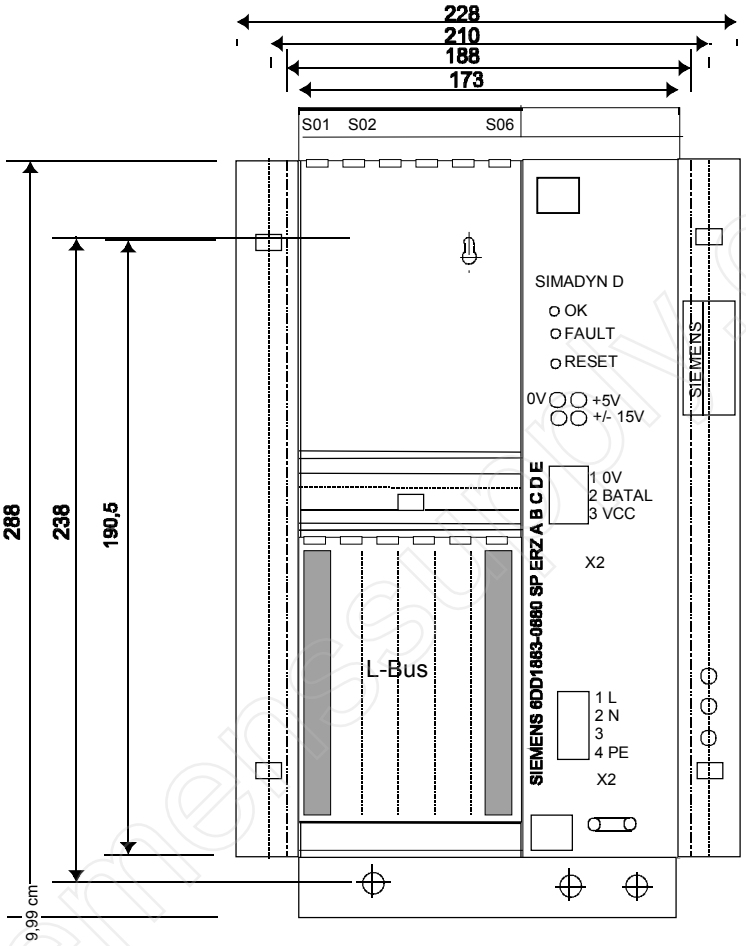
Output voltage +15 V	+15 V +/- 0.3 V
Output current	0 to **0.7 A**
Ripple	< 150 mV_{pp}
Base load	Guaranteed by an inserted module which requires this voltage

Output voltage -15 V	-15 V +/- 0.3 V
Output current	0 to **0.6 A**
Ripple	< 150 mV_{pp}
Base load	Guaranteed by an inserted module which requires this voltage
Time to establish the output voltages	Approx. 200 ms after the power supply voltage has been applied

General data

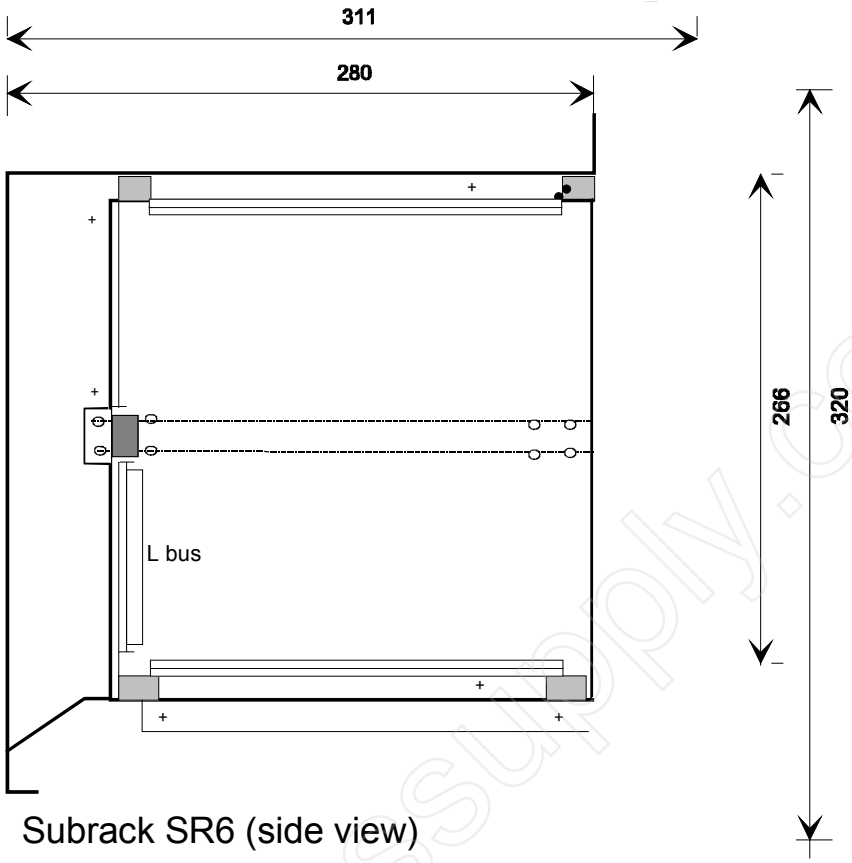
SR6 dimensions in mm (W x H x D)	225 x 320 x 280
Dimensions of the SP7 power supply in mm (W x H x D)	45.72 x 233.4 x 220
Weight	4 kg
Radio interference suppression level	Limit value class B according to VDE 0871
Ventilation	SR6: Natural air cooling SR6V: Fan on the top panel
Screw/plug-in terminal X1	Phönix, type MSTB 2.5/4-ST/5,08, cable cross-section 2.5mm²
Screw/plug-in terminal X2	Phönix, type MSTB 2.5/3-ST/5,08, cable cross-section 2.5mm²

2.1.8 Dimension drawings

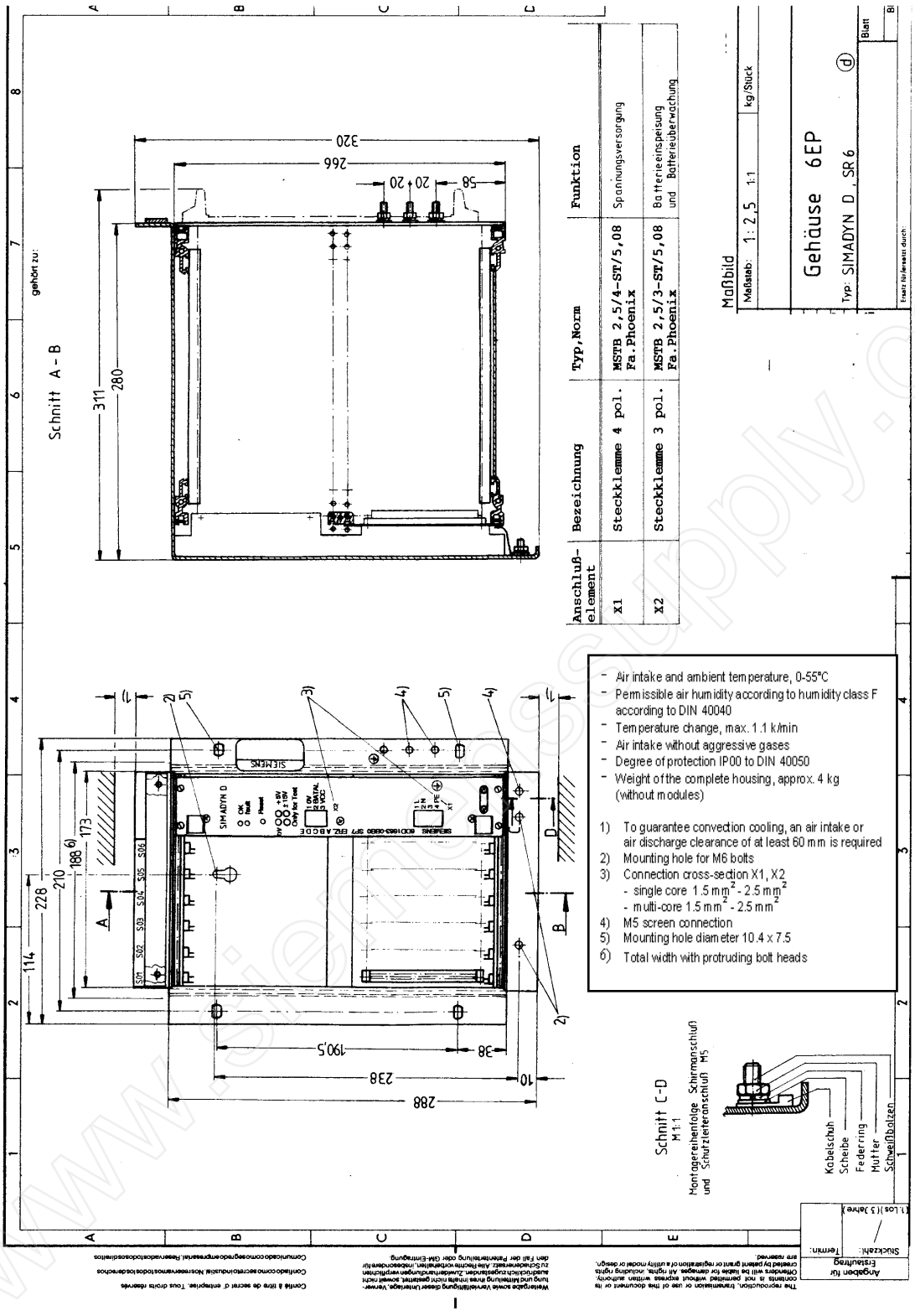


Explanation: Subrack SR6 (front view)

I Cable retention



Subrack SR6 (side view)


Schnitt A - B
Schnitt C-D
M1:1
Maßbild
Maßstab: 1:2,5
Gehäuse 6EP
Typ: SIMADYN D _SR6
Anschluß-element
Bezeichnung
Typ,Norm
Funktion
X1
Steckklemme 4 pol.
MSTB 2,5/4-ST/5,08 Fa.Phoenix
Spannungsversorgung
X2
Steckklemme 3 pol.
MSTB 2,5/3-ST/5,08 Fa.Phoenix
Batterieeinspeisung und Batterieüberwachung
- Air intake and ambient temperature, 0-55°C
- Permissible air humidity according to humidity class F according to DIN 40040
- Temperature change, max. 1.1 k/min
- Air intake without aggressive gases
- Degree of protection IP00 to DIN 40050
- Weight of the complete housing, approx. 4 kg (without modules)
1) To guarantee convection cooling, an air intake or air discharge clearance of at least 60 mm is required
2) Mounting hole for M6 bolts
3) Connection cross-section X1, X2
- single core 1.5 mm² - 2.5 mm²
- multi-core 1.5 mm² - 2.5 mm²
4) M5 screen connection
5) Mounting hole diameter 10.4 x 7.5
6) Total width with protruding bolt heads
Kabelschuh
Scheibe
Federring
Mutter
Schraubbolzen

2.2 Subracks SR12 and SR24

Order No.

Subracks SR12.x and SR24.x are available for different supply voltages and with or without fan.

	Order No.	Supply voltage	Fan	Power supply type
SR12.1	6DD1682-0CC0	24 V DC	yes	SP22
SR12.2	6DD1682-0CD0	24 V DC	no	SP23
SR12.3	6DD1682-0BC3	115/230 V AC	yes	SP22.5
SR12.4	6DD1682-0BC4	115/230 V AC	no	SP23.5

SR24.1	6DD1682-0BC0	24 V DC	yes	SP8
SR24.2	6DD1682-0BE0	24 V DC	no	SP9
SR24.3	6DD1682-0CE3	115/230 V AC	yes	SP8.5
SR24.4	6DD1682-0CE4	115/230 V AC	no	SP9.5

Description

The subracks accommodate SIMADYN D modules with the format (H×T) 233.4 × 220 mm².
An integrated power supply provides the necessary voltages for the modules via 2 backplane buses **(L bus, C bus)** and permits data transfer between them.

Number of slots

SR12.x: **12**
SR24.x: **24**
The slots are identified by a labeling strip.

2.2.1 Power supply

The power supply plugs into the SIMADYN D rack.

Line filter

The power supply has a line filter which limits the radio interference voltage to limit value class A in accordance with VDE 0871.

Front panel elements

- Green LED: Error-free operation
- Red LED: Fault condition
- Compartment for the back-up battery
- Supply voltage connection (screw/plug-in terminal X1)
- Connection for an external back-up battery via screw/plug-in terminal X3 (this is optional to a back-up battery which can be inserted in the subrack itself)
- Reset (cold restart of the modules) by
  - Depressing the reset button
  - Jumpering pins 1 and 2 at connector X4

- Test sockets to check the 3 output voltages 5 V, +/-15 V (short-circuit proof)

Supply connection

The line supply voltage is connected through the 3-pole screw/plug-in terminal X1.
The connection assignment is printed on the front panel:
Above the voltage selector switch (Slide switch) can be switched to between an input nominal voltage from 230 V and 115 V.

The in each case valid value becomes visible with transfer of the switch.

	SR12.1 and SR12.2 **SR24.1 and SR24.2**	**SR12.3 and SR12.4** **SR24.3 and SR24.4**
Input voltage	**24 V DC**	**230 V AC** (default setting of voltage selector switch) 115 V AC (change over voltage selector switch)
X1 Pin 1	+24 V	Phase conductor L
X1 Pin 2	Ground (0 V)	Neutral conductor N
X1 Pin 3	Protective ground conductor PE	Protective conductor PE
External fuse (rating)	For SR12.x: In = 16 A max.. I^2t= 6 A^2s Is = 32 A (inrush peak) For SR24.x: In = 32 A max.. I^2t= 10 A^2s Is = 64 A (inrush peak)	For SR12.x: (AC230V) In = 1.2 A max.. I^2t= 0.6 A^2s Is = 6 A (inrush peak) For SR24.x: (AC230V) In = 2.7 A max.. I^2t= 1 A^2s Is = 9 A (inrush peak)
X2 pins 1 - 4	Monitoring the power supply and fan assembly (relay)	
X3 pins 1 - 2	Feed for an external back-up battery	
X4 pins 1 - 2	Reset: A reset is initiated by jumpering the contents (optional to using the reset button)	

The specified current In is the current that can occur at a maximum insertion of the subrack. The power supplies are in part oversized, and have a higher maximum input current (Chapter: Technical dates).

NOTES

The **protective conductor** must be connected at connector X1, pin 3.
It is not sufficient to connect a protective conductor at the subrack.

It must be a slightly accessible circuit breaker in the supply circuit.

Interface modules with binary output function **SB70, SB71** should be powered-up approximately 200 ms before the modules are powered-up to prevent power-on effects.
This is achieved by **simultaneously powering-up** the subrack power supplies (this requires approximately 200 ms to establish the voltages) and the interface modules.

There are following fuses on the printed circuit board of the power supplies:

Power supply	Fuse	Type	Voltage rated value
SP22.5/SP23.5	F601	T4A H	250 V
SP8.5	F400	T8A H	250 V

NOTE The power supply PC boards are suitable for the connection to IT systems.

2.2.2 Voltage monitoring functions

Input voltage

The input voltage is monitored for undervoltage and overvoltage conditions.

Input voltage	Response
Undervoltage: SRx.1/SRx.2: **< 20 V** or SRx.3/SRx.4: **< 170 ...175 V**	Green OK-LED goes dark The output voltages are shutdown; CPU stop (DSAVE signal) The system automatically restarts when the input voltage increases to approx. 196 V.
Overvoltage SRx.1/SRx.2: **> 32 V** or SRx.3/SRx.4: **> approx. 265 V**	Red fault LED is lit; The output voltages are shutdown, CPU stop (DSAVE signal) Automatic restart

Output voltage

All of the output voltages are monitored for an undervoltage condition (e.g. as a result of overload/short-circuit)

Undervoltages at the output	Response
V (5 V) < 4.7 ... 4.85 V (for t>100-200 µs)	Red fault LED is lit The output voltages are shut down; (CPU stop) No automatic restart (the line supply voltage must be disconnected)
V (+ 15 V) < approx. 14 V **V (- 15 V)** > approx. -14 V	Red fault is lit 5V voltage remains System failure message

System failure message

The associated module (under the „STOP“ tab) is configured in HWConfig under "object properties" to define how the module behaves when a system failure message is output (bus signal *RDYIN=low):

- Modules can reset their binary and analog outputs
- CPU modules can go into the "stop" condition ("H")