SIEMENS

SIMADYN D

Hardware

Manual

Edition 04.2011

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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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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

1 General technical data

Overview

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1.2	ESD guidelines	1-15
1.3	Ambient conditions	1-18

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

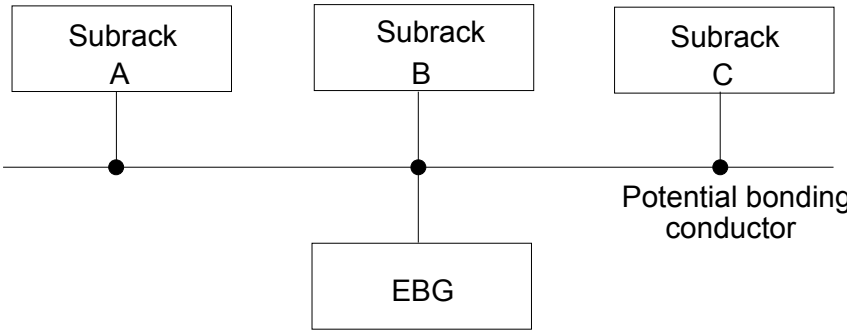
All signal cables which are connected to SIMADYN D must be screened.

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).

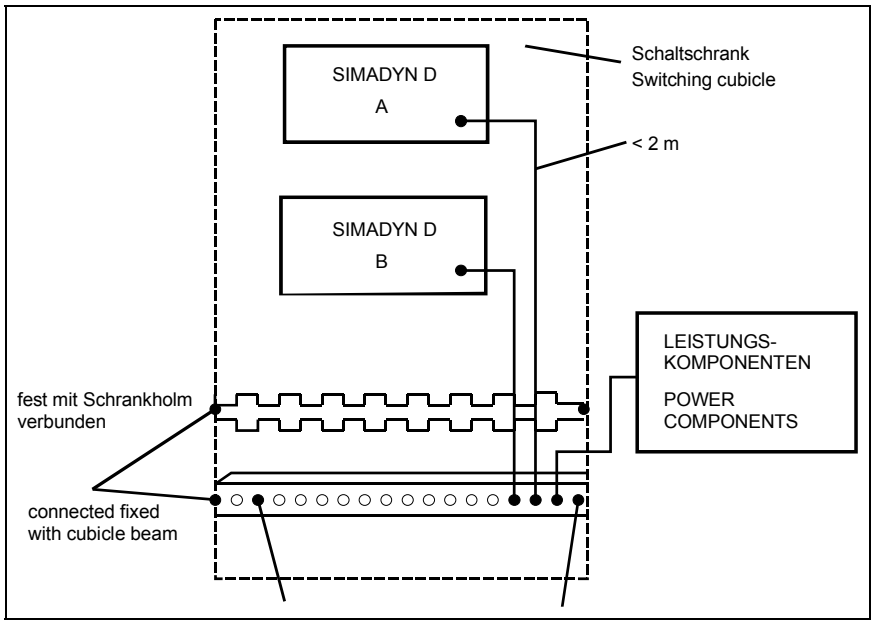


1.1.9 Potential bonding rail

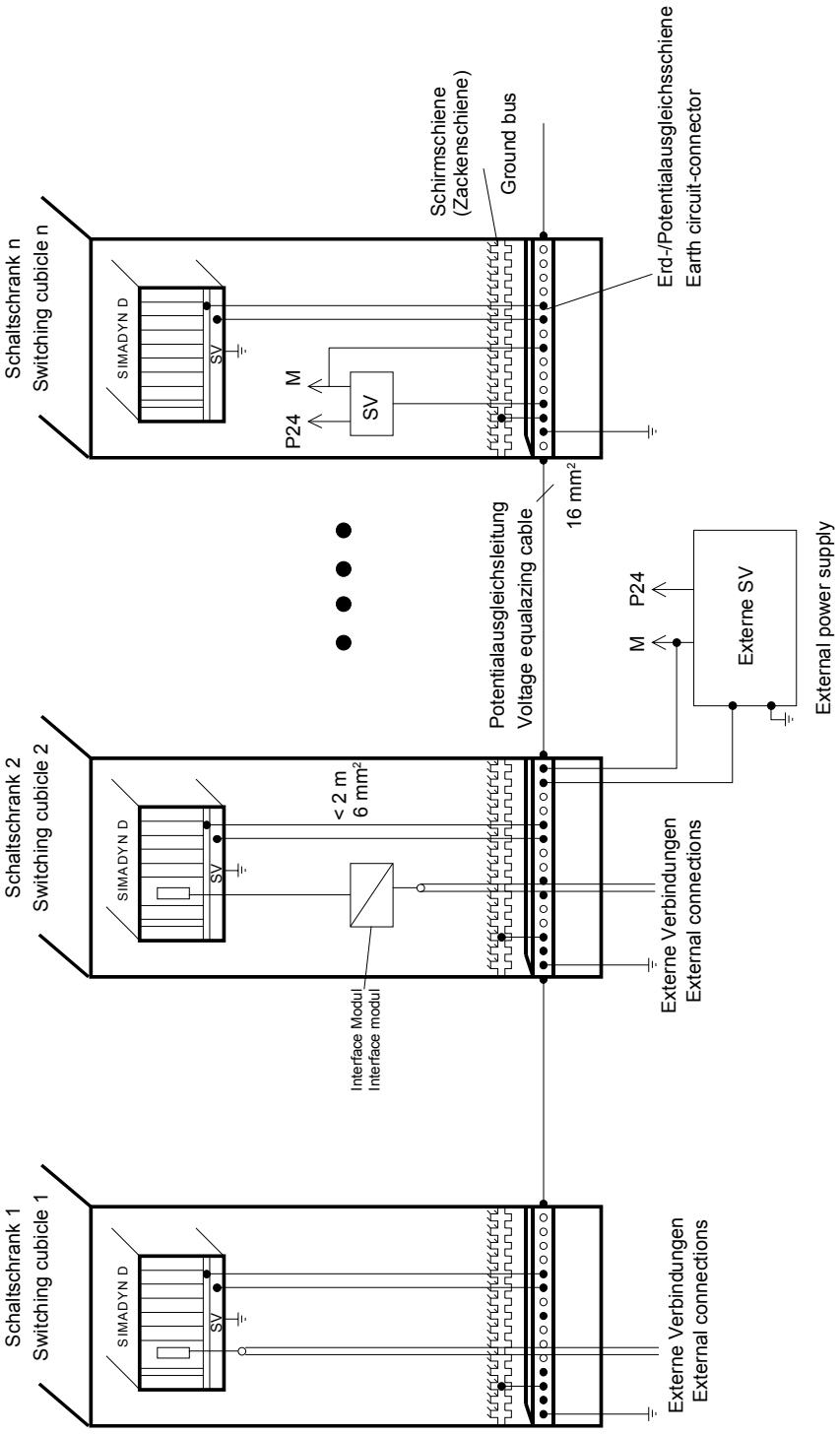
A potential bonding- or grounding rail must be provided in each cabinet to allow simple wiring.

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.

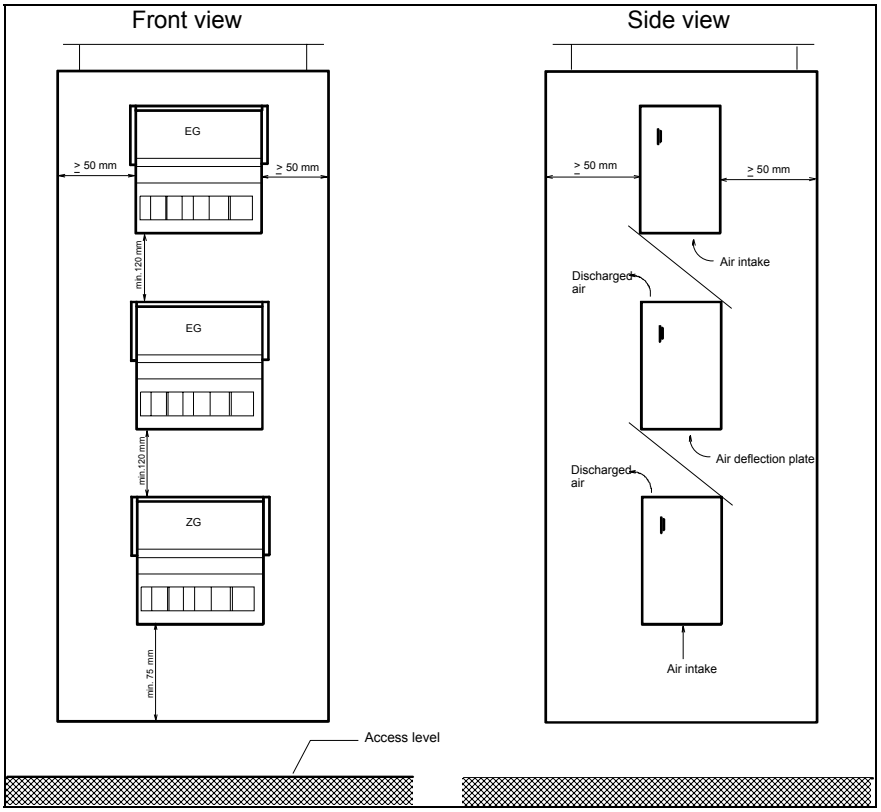
For low-rating radios, a distance of > 1m must be maintained between the radio and SIMADYN D.

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

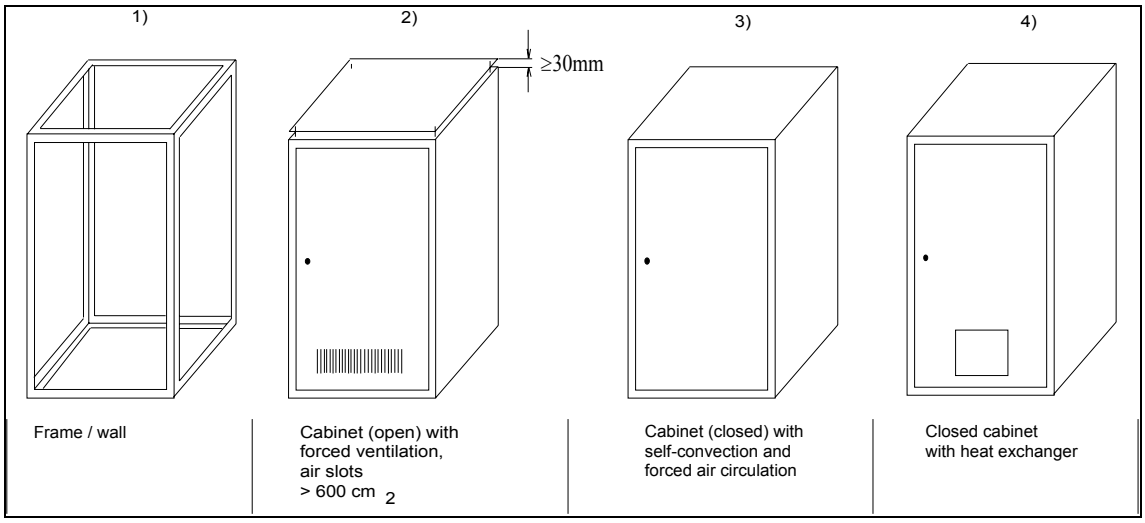
The following minimum clearances must be maintained if SIMADYN D subracks are mounted one on top of the other:
(For 2200 × 600 × 600 mm cabinets)



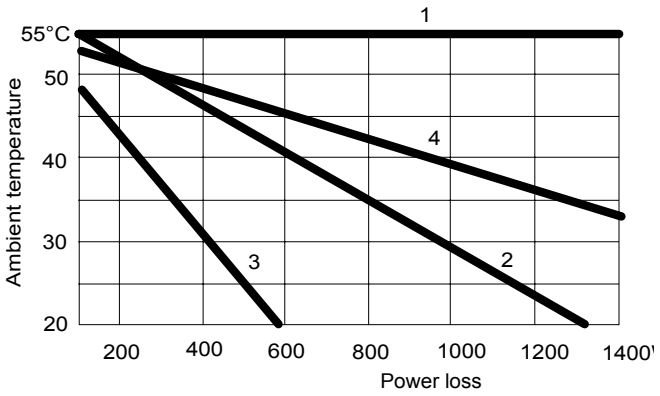
1.1.15 Power loss in the cabinet

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.

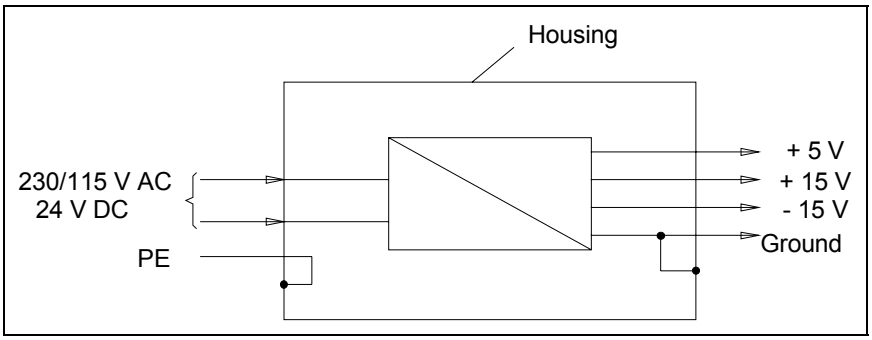
In order to diminish the effects of noise and disturbances, a line filter should be provided for the 24V DC power supply of the digital inputs and outputs (e.g. line filter SIFI-B, Order No. B84112-B-.... from Epcos / line filter NF 1-1 from Phönix Contact). This should be located as close as possible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

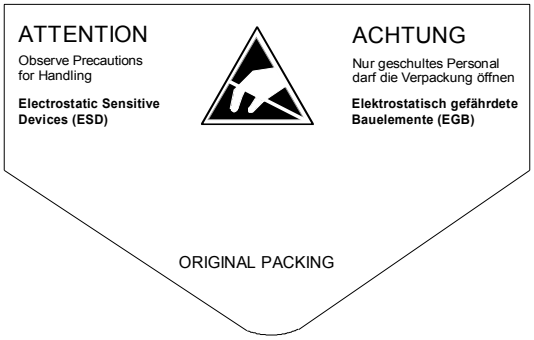
- Avoid installing the drive converters close to radio transmitter antennas
- The drive converters must always be mounted in enclosed metal cabinets.

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).

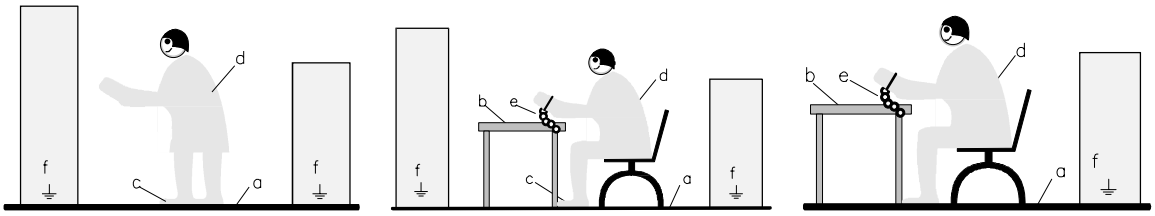
When carrying-out soldering work on modules, ESD soldering irons must be used or at least the soldering iron tip grounded.

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	2-2
2.2	Subracks SR12 and SR24	2-13
2.3	Subrack SRT400	2-26

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

5.4 Expansion module IT42

Order No. 6DD1606-4AB0

Description The IT42 expansion module provides analog and binary inputs and outputs
The expansion module is inserted on a CPU module (PM5, PM6). A maximum of 2 expansion modules ITxx can be inserted on a CPU module. An ITxx occupies 1 slot (in addition to the mounting slot of the CPU module itself).

Inputs and outputs

- 4 analog outputs
- 4 integrating, high-resolution analog inputs (V/fc voltage/frequency conversion)
- 4 analog inputs (ADU)
- 16 binary outputs
- 16 binary inputs

Block diagram

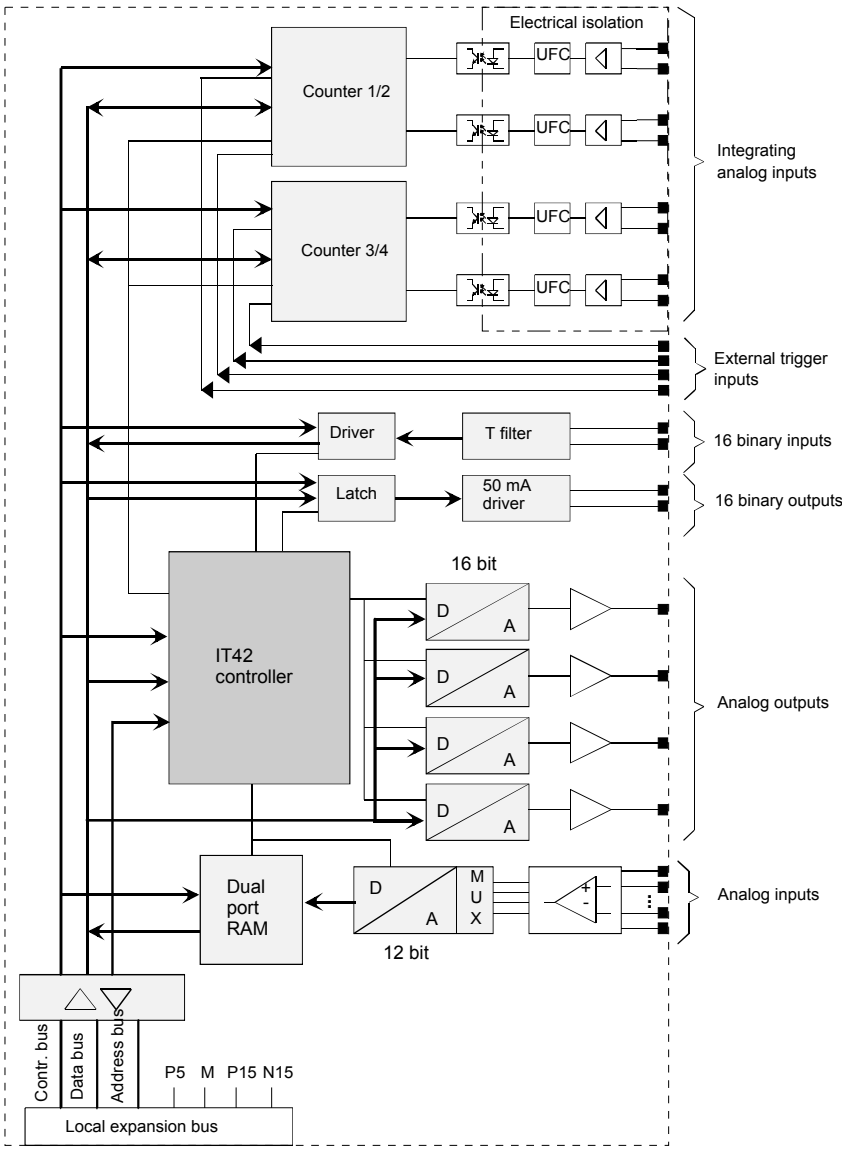


Fig. 5-8 Block diagram of IT42

5.4.1 Supplementary components

Interface modules with terminals

All of the cables for the input / output signals are not directly connected to the module, but are connected via interface modules. The interface modules serve as mechanical connection element (**screw/plug-in terminals**) and to electrically adapt the plant/system signals (optional).

Interface module	Function
SB10	Direct connection (1:1 connection) of 8 binary inputs/outputs, LED, no signal conversion
SB60	8 binary **inputs**, converted from 230V to 24V (signal level on the module), LED, electrical isolation (floating)
SB61	8 binary **inputs**, converted from 48V to 24V, LED, electrical isolation (floating)
SB70	8 binary **outputs**, converted from 24V to 230V (changeover relay), LED, electrical isolation (floating)
SB71	8 binary **outputs**, converted from 25V to 48V (transistor)
SU10	25 signals are directly connected, no signal conversion
SU12	10 signals are directly connected, no signal conversion

Table 5-26 Interface modules which can be connected to the module

Cables

The module is connected to the interface modules using the matching plug-in cables. The plug-in cables for large connectors have several cable ends, to which the appropriate number of matching interface modules can be connected.
Either interface modules with or without signal conversion (e. g. signal level conversion, electrical isolation) and LED display can be connected at connectors with binary inputs and outputs.
The selected cable depends on the type of interface module:

Connector IT42	Signals	Cable	Interface module
X6	Integrating analog inputs	SC50	SU10
X7	Analog outputs/inputs	SC51	SU10
X8	Binary outputs/inputs; trigger inputs for integrating analog inputs	SC49 or SC54	2 x SU10 or 5 x SB10 SB60 SB61 SB70 SB71 SU12

Table 5-27 Cables available for use with the module

5.4.2 Connector assignment X6

Connector X6 (15-pin, sub D) connects the signals for

- 4 integrating analog inputs

An **SU10** interface module can be connected via plug-in cable **SC50** ("1:1 connection from the module to the terminals:

Integrating analog inputs at X6 with SU10

IT42 X6	Significance	SU10	Connector designation when configuring
1	UFC analog input 1+	1	X6A
9	UFC analog input 1-	2	
2	Ground, input 1	3	
10	Ground, input 2	4	X6B
3	UFC analog input 2+	5	
11	UFC analog input 2-	6	
4	UFC analog input 3+	7	X6C
12	UFC analog input 3-	8	
5	Ground, input 3	9	
13	Ground, input 4	10	X6D
6	UFC analog input 4+	11	
14	UFC analog input 4-	12	
7	Not connected	13	
15	Not connected	14	
8	Not connected	15	
-	Not connected	16 - 26	

Table 5-28 Pin assignment IT42, connector X6 and terminal assignment SU10

5.4.3 Connector assignment X7

Connector X7 (25-pin, sub D) connects the signals for

- 4 analog outputs
- 4 analog inputs

An **SU10** interface module can be connected via plug-in cable **SC51**.

Analog inputs/outputs at X7 with SU10

IT42 X7	Significance	SU10	Connector designation when configuring
1	ADU analog input 1+	1	X7A
14	ADU analog input 1-	2	
2	ADU analog input 2+	3	X7B
15	ADU analog input 2-	4	
3	ADU analog input 3+	5	X7C
16	ADU analog input 3-	6	
4	ADU analog input 4+	7	X7D
17	ADU analog input 4-	8	
5	Reference ground for differential ADU analog inputs (due to push-pull)	9	
18	Reference ground for differential ADU analog inputs (due to push-pull)	10	
6	Analog **output** 1+	11	X7E
19	Ground, inductively de-coupled	12	
7	Analog output 2+	13	X7F
20	Ground, inductively de-coupled	14	
8	Analog output 3+	15	X7G
21	Ground, inductively de-coupled	16	
9	Analog output 4+	17	X7H
22	Ground, inductively de-coupled	18	
10	Ground	19	
23	Ground	20	
11	Not connected	21	
12	Not connected	22	
13	Not connected	23	
24	Not connected	24	
25	Not connected	25	
-	Not connected	26	

Table 5-29 Pin assignment IT42, connector X7 and terminal assignment SU10

5.4.4 Connector assignment X8

Connector X8 (50 pin, sub D) connects the signals for:

- 2*8 binary inputs and 2*8 binary outputs
- 4 trigger signals for integrating analog inputs

The assignment of the 16 binary inputs and outputs corresponds to those of **IT41**, connector X7.

5.4.4.1 Connector assignment X8 for SC49

SU10 terminal assignment at SC49, end A

IT42 X8	Significance	SU10 at SC49, cable end A	Connector designation when configuring
1	Binary output 1	1	X8A
34	Binary output 2	2	
18	Binary output 3	3	
2	Binary output 4	4	
35	Binary output 5	5	
19	Binary output 6	6	
3	Binary output 7	7	
36	Binary output 8	8	
20	External P24 voltage	9	
4	External ground	10	
37	Binary output 9	11	X8B
21	Binary output 10	12	
5	Binary output 11	13	
38	Binary output 12	14	
22	Binary output 13	15	
6	Binary output 14	16	
39	Binary output 15	17	
23	Binary output 16	18	
7	External P24 voltage	19	
40	External ground	20	
24	Binary input 1	21	X8C
8	Binary input 2	22	
41	Binary input 3	23	
25	Binary input 4	24	
9	Binary input 5	25	

Table 5-30 SU10 terminal assignment for SC49, cable end A

SU10 terminal assignment at SC49, end B

IT42 X8	Significance	SU10 at SC49, cable end B	Connector designation when configuring
42	Binary input 6	1	X8C
26	Binary input 7	2	
10	Binary input 8	3	
43	External P24 voltage	4	
27	External ground	5	
11	Binary input 9	6	X8D
44	Binary input 10	7	
28	Binary input 11	8	
12	Binary input 12	9	
45	Binary input 13	10	
29	Binary input 14	11	
13	Binary input 15	12	
46	Binary input 16	13	
30	External P24 voltage	14	
14	External ground	15	
47	Trigger input 1	16	
31	Trigger input 2	17	
15	Trigger input 3	18	
48	Trigger input 4	19	
32	Not connected	20	
16	Not connected	21	
49	Not connected	22	
33	Not connected	23	
17	External P24 voltage	24	
50	External ground	25	

*Table 5-31 SU10 terminal assignment for SC49, cable **end A***

5.4.4.2 Connector assignment X8 for SC54

Only certain signal types are available at the particular cable ends where only the matching interface modules can be used:

Terminal assignment, interface modules

Interface module	Screw terminal *(x=1...8)*	Significance
SB10		**1:1 screw terminal connection**
	x	Signal
	5x	Reference potential (ground or P24)
SB60		**Binary inputs 115/230 V**
	x1	Ground
	x2	Binary input 115 V
	x4	Binary input 230 V
SB61		**Binary inputs 24/48 V**
	x	Binary input 24 V
	1x	Binary input 48 V
	5x	Reference
SB70		**Binary outputs (relay)**
	x1	Common (center contact)
	x2	NC contact
	x4	NO contact
SB71		**Binary outputs (transistor)**
	x	Signal
	5x	Ground

Table 5-32 Terminal assignment of the interface modules

Terminal assignment at SC54, end A

IT42 X8	Significance X8A	SU12	SB10	SB60	SB61	SB70	SB71
1	Binary output 1	1	1/51			12/11/14	1/51
34	Binary output 2	2	2/52			22/21/24	2/52
18	Binary output 3	3	3/53			32/31/34	3/53
2	Binary output 4	4	4/54			42/41/44	4/54
35	Binary output 5	5	5/55			52/51/54	5/55
19	Binary output 6	6	6/56			62/61/64	6/56
3	Binary output 7	7	7/57			72/71/74	7/57
36	Binary output 8	8	8/58			81/82/84	8/58
20	External P24 voltage	9	1P			1P	1P
4	External ground	10	1M			1M	1M

*Table 5-33 Terminal assignment, interface module at connector X8, SC54 - cable **end A***

Terminal assignment at SC54, end B

IT42 X8	Significance X8B	SU12	SB10	SB60	SB61	SB70	SB71
37	Binary output 9	1	1/51			12/11/14	1/51
21	Binary output 10	2	2/52			22/21/24	2/52
5	Binary output 11	3	3/53			32/31/34	3/53
38	Binary output 12	4	4/54			42/41/44	4/54
22	Binary output 13	5	5/55			52/51/54	5/55
6	Binary output 14	6	6/56			62/61/64	6/56
39	Binary output 15	7	7/57			72/71/74	7/57
23	Binary output 16	8	8/58			81/82/84	8/58
7	External P24 voltage	9	1P			1P	1P
40	External ground	10	1M			1M	1M

*Table 5-34 Terminal assignment, interface module at connector X8, SC54 - cable **end B***

Terminal assignment at SC54, end C

IT42 X8	Significance X8C	SU12	SB10	SB60	SB61	SB70	SB71
24	Binary input 1	1	1/51	14,12/11	1,11/51		
8	Binary input 2	2	2/52	24,22/21	2,12/52		
41	Binary input 3	3	3/53	34,32/31	3,13/53		
25	Binary input 4	4	4/54	44,42/41	4,14/54		
9	Binary input 5	5	5/55	54,52/51	5,15/55		
42	Binary input 6	6	6/56	64,62/61	6,16/56		
26	Binary input 7	7	7/57	74,72/71	7,17/57		
10	Binary input 8	8	8/58	84,82/81	8,18/58		
43	External P24 voltage	9	1P	1P	1P		
27	External ground	10	1M	1M	1M		

*Table 5-35 Terminal assignment, interface module at connector X8, SC54 - cable **end C***

Terminal assignment at SC54, end D

IT42 X8	Significance X8D	SU12	SB10	SB60	SB61	SB70	SB71
11	Binary input 9	1	1/51	14,12/11	1,11/51		
44	Binary input 10	2	2/52	24,22/21	2,12/52		
28	Binary input 11	3	3/53	34,32/31	3,13/53		
12	Binary input 12	4	4/54	44,42/41	4,14/54		
45	Binary input 13	5	5/55	54,52/51	5,15/55		
29	Binary input 14	6	6/56	64,62/61	6,16/56		
13	Binary input 15	7	7/57	74,72/71	7,17/57		
46	Binary input 16	8	8/58	84,82/81	8,18/58		
30	External P24 voltage	9	1P	1P	1P		
14	External ground	10	1M	1M	1M		

*Table 5-36 Terminal assignment, interface module at connector X8, SC54 - cable **end D***

Terminal assignment at SC54, end E

IT42 X8	Significance X8E-X8H	SU12	SB10	SB60	SB61	SB70	SB71
47	Trigger input 1	1					
31	Trigger input 2	2					
15	Trigger input 3	3					
48	Trigger input 4	4					
32	Not connected	5					
16	Not connected	6					
49	Not connected	7					
33	Not connected	8					
17	External P24 voltage	9					
50	External ground	10					

*Table 5-37 Terminal assignment, interface module at connector X8, SC54 - cable **end E***

5.4.5 Mounting

The Itxx module is mounted outside the subrack on a PMx CPU module or is inserted on an Itxx module already mounted on a PMx (using the 96-pin plug connector on the module).

Distance pieces

All of the modules must be bolted together using the distance pieces provided (3 are provided)!

For the first ITxx

The first ITxx, located directly on a CPU module, must be retained using the **metal distance pieces** (these are included in the scope of supply of the PMx). This establishes the electrical contact which is required to identify the first expansion board.
The metal distance pieces are first retained on the PM4 using the M3 screws, washers and spring washers supplied.
If only **one ITxx** module is used, then it is screwed to the metal distance pieces using the M4 nuts provided (and washers).

For the second ITxx

If a second ITxx module is used, the first ITxx must be screwed using **plastic** distance pieces (these are included in the scope of supply of the ITxx modules).
The second ITxx module can then be inserted and retained using the M4 nuts provided (and washers).
The complete module assembly is then inserted in the subrack.

5.4.6 Application information and noise immunity

- operation **without fan** is possible
- noise-immune operation is only possible if the module is tightly screwed into the subrack

Other information

Further information on EMC and ambient conditions, refer to Section "General technical data"

5.4.7 Technical data

General data

No. of slots occupied	1
Dimensions W x H x D [mm]	20.14 x 233.4 x 220
Weight	Approx. 0.5 kg

Power supply

Rated voltage	min.	max.	**Typ. current drain**
+5 V	+4.75 V	+5.25 V	420 mA
+15 V	+14.4 V	+15.6 V	450 mA
-15 V	-15.6 V	-14.4 V	140 mA
24 V (external)	20 V	30 V	100 mA + binary output currents

Integrating analog inputs

No.	4
Integrating analog inputs	Differential inputs, floating, V/f conversion
Integration time	• sampling time of the AFC function block or • the time between 2 positive edges of the external trigger signal
Input voltage range	-10 V to +10 V
Input resistance	470 kOhm
Input filter	-3 dB transition frequency : 2 kHz
Resolution	Up to 17 bits, depending on the integration time:
	13 bits at 1 ms integration time
	15 bits at 4 ms integration time
	17 bits at 20 ms integration time
Relative accuracy	Typ. 14 bits

Sampling analog inputs

No.	4
Type	Differential inputs, non-floating
Input voltage range	-10 V to +10 V
Input resistance	470 kOhm
Input filter	-3 dB transition frequency : 1.5 kHz
Resolution	12 bits
Absolute accuracy	Typ. 10 bits over the complete temperature range
Max. conversion time	45 µs.

Analog outputs

No.	4
Type	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	+/- 10 mA
Resolution	16 bits
Monotony	14 bits over the complete temperature range
Absolute accuracy	Typ. 13 bits over the complete temperature range
Short-circuit protection to ground	Yes

Binary inputs

No.		16 non-floating
Input voltage		24 V DC rated voltage
	for 0 signal	-1 V to +6 V or open-circuit inputs
	for 1 signal	+13 V to +33 V
Input current		
	for 0 signal	0 mA
	for 1 signal	3 mA typ.
Delay time for +24 V input signal		50 µs

Binary outputs

No.		16, non-floating
Power supply voltage		From external
	nominal value	24 V DC
	perm. range	+20 V to 30 V including ripple
it	briefly	+35 V, max. 0.5 s
Output current for an 1 signal		
	nominal current	50 mA (also corresponds to the max. value)
Short-circuit protection		Electronically and thermally
Limiting inductive switch-off voltages		Supply voltage + 1 V
Residual current		20 µA for 0 signal
Signal level		
	for 0 signal	Max. 3 V
	for 1 signal	Supply voltage - 2.5 V
Switching delay		Max. 15 µs

5.4.8 Connecting diagram

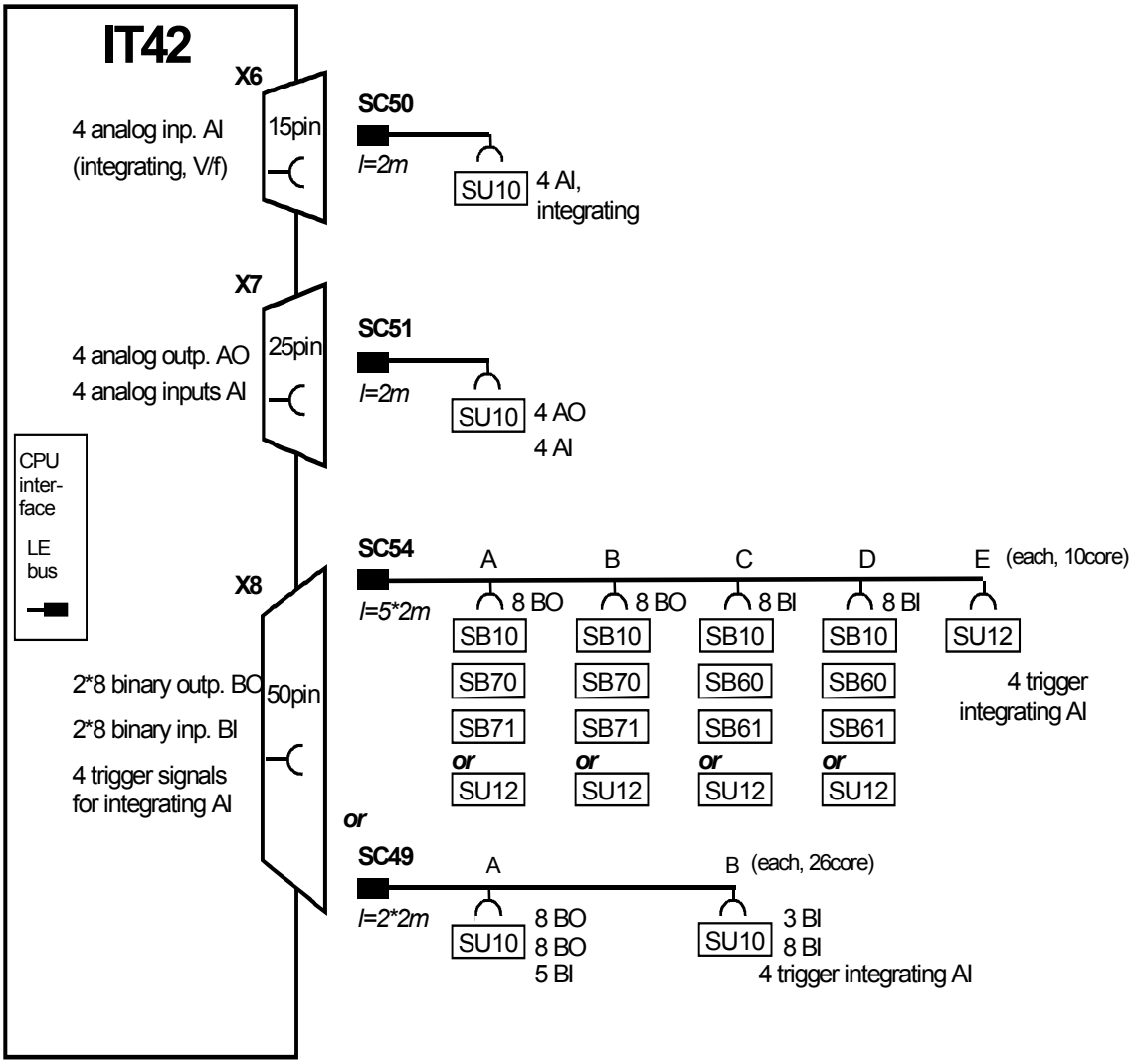


Fig. 5-9 Connecting cables and interface modules