

SCU

Control unit



Read this manual before installing, operating or maintaining this actuator. Failure to follow safety precautions and instructions could cause actuator failure and result in serious injury, death or property damage.

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Basic principles

The following chapters are part of the basic principles:

- 1. Introduction, page 4
- 2. Safety, page 7
- 3. Construction and Function, page 11

1. Introduction

This chapter contains information on the organization and structure of the operation manual. It makes the operation manual easier to handle and enables quick access to the desired information.

Operation manual

SKF Actuation System manufactures state-of-the-art electric actuators, control units and operating equipment.

The purpose of this operation manual is to introduce you, as the user and the entity doing the further processing, to correct utilization and safe use.

For this goal to be achieved, it is essential that you very carefully read the chapter on safety (2. Safety, page 7) and follow the instructions in this manual.

Validity

The instructions in this manual refer to the linear actuator SCU control unit with the following identification:

- Manufacturer: SKF Actuation System (Liestal) AG
- Product name: SCU control unit
- Type designation: SCUxx-xxxxxx-xxxx
- Year of manufacture: from 2006
- CE Mark: according to technical documentation
- Serial number: from L04330000

Target audience and obligation to read

The operating manual is intended for technical personnel and authorized users who use the SCU control unit in their products and work with them. The operating authority determines who is authorized as a user.

We distinguish between different user groups, as the requirements on the users vary, depending on the activity they perform.

Please note: You can find definitions of user groups along with their corresponding requirements in the chapter on safety (2. Safety, page 7). You can assume one or more of these user groups provided you meet the applicable requirements.

Introduction

The organization and implementation of the operation manual takes into account the different user groups.

Summary of contents

The operation manual serves as a reference work. The information therein is organized into four task- and theme-related parts:

<i>Basic Principles</i>	The Basic Principles section gives the basic knowledge that every user should have.
<i>Normal Operation</i>	The Normal Operation section contains information needed for operating the product under normal conditions, i.e. undisrupted operation for use according to its intended application.
<i>Special Operations</i>	The Special Operations section describes all jobs deviating from normal operation, such as installation, initial start-up, maintenance, fixing faults and doing repairs.
<i>Appendix</i>	The Appendix contains information that the user has to be able to access at any time. This includes information on using the operation manual (indexes) as well as data concerning the product itself (technical data).

Aids for accessing information

This manual has access aids that make it easier for you to quickly access the desired information:

- You can most easily find all information on a given topic in the Table of Contents, as a result of the task and theme-related organization of the operation manual.
- Information on a specific activity or a special topic can be found most quickly through the Index.
- Within the chapters of the operation manual, you can orient yourself with the help of the margin notes.

Organizational measures

If you have any questions that cannot be answered through this operation manual, contact the manufacturer directly.

Location of the operation manual

The operation manual can only benefit you if you have it available at all times. For this reason, always keep the operation manual where the equipment is being used.

Manufacturer address

SKF Actuation System (Liestal) AG
Oristalstrasse 97
CH-4410 Liestal
Tel.: +41 / 61 / 925 41 11
Fax: +41 / 61 / 921 37 04
E-mail: actuators.switzerland@skf.com

Contact address

Your local SKF representative.


Conventions


In this manual we use a few abbreviations and markings to label sections of text or notes. In the following sections you will find these conventions explained.

Warnings and usage hints

Please note the meaning of the following warnings and usage hints:

Please note: indicates usage information that helps the user to use the product correctly and efficiently or to understand the properties of the product.

	CAUTION
	Caution: warning to inform the user of hazards that remain due to the incomplete effectiveness of protective measures for property damage or personal injury; pointer to any special training and personal protective equipment that may be required.

	WARNING
	Warning: warning of irreparable property damage or personal injury that remains based on hazard analysis. With reference to protective measures and any special training and personal protective equipment that may be required.

Position numbers and references

Position numbers
Cross-references to text passages

We number diagram parts clockwise in serial order and unambiguously. Cross-references to chapters or diagrams are given in parentheses. They contain the corresponding chapter or diagram number

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2. Safety

This chapter targets all the users of the SCU control unit. It contains information on its safe use and optimal utilization.

Safety program

The safety program from SKF Actuation System spells out who is entitled to use it and the responsibility of individual users.

The SCU control unit was designed and built in accordance with the latest technical standards and accepted safety rules.

EU-conformity is documented with the technical documentation.

Purpose of use of the SCU control unit

The SCU control unit has been designed and constructed for use in accordance with its intended purpose-conformant use. If you use the SCU control unit for any use other than the use described, the manufacturer cannot be held liable for damage that results therefrom.

Intended Use

The authorized use of the SCU control unit is to:

- Control a maximum of six actuators for pressure or tension-stressed strokes.

Please note: The control can only be parametrized for the actuators of SKF Actuation System. Please contact customer services to find out which actuators are approved for the SCU control unit (refer to Manufacturer Address, page 6).

Please note: For the operations data, please see the Appendix of this operating manual (see Operating data, page 34).

Unauthorized use

Any use other than the intended use without the manufacturer's written agreement or operation beyond the technical limits is considered unauthorized.

The technical usage limits can be found in the appendix to this operation manual. Technical Data, page 33) and on the type plate of the SCU control unit.

Please note: in case of improper use of the SCU control unit, damage to persons and property may result. Always adhere to the instructions of this manual.

Safety

User groups

To ensure safety, we place requirements on the users of the SCU control unit that must be adhered to under all circumstances. Only persons who meet the requirements are entitled to use the SCU control unit.

We refer to all persons who operate, use, commission the control unit, process it further or pass it on for further processing as user groups. As the requirements of these user groups strongly depend on their role, we distinguish between the following user groups:

<i>Operating Authority</i>	The operating authority is the contractual partner of the person doing the further processing or the reseller. They can impose legal conditions on the operating authority when purchasing the control unit. The operating authority ensures that the user is instructed in the authorized use of the equipment.
<i>Processor</i>	The processor is the contractual partner of the reseller or the manufacturer. He assembles the control unit into a total device. He is authorized by the manufacturer of the SCU control unit to use the control unit in accordance with the regulations and has the necessary expert knowledge.
<i>Technician</i>	The technician has the professional technical training to implement the SCU control unit according to its authorized use. Apart from the chapter on Safety, he is also familiar with the chapter on Special operating modes. He will find the required technical data in the Appendix.
<i>Reseller</i>	The reseller forwards the machine.
<i>Operator</i>	Every other person who uses the SCU control unit we define as an operator. The operator must have read the Safety chapter in this manual before using the machine. Moreover, he must be instructed about the normal operation by the operating authority.

Types of operation

<i>Intermittent</i>	The SCU control unit is exclusively intended for intermittent operation (see Technical Data, page 33).
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Danger zones

We differentiate between two danger zones that must be observed, depending on user role.

<i>Persons</i>	The danger zone covering persons also includes, in addition to the actual user, third persons (other personnel, visitors, patients etc.). In case of injury, the operating authority is liable.
<i>Device</i>	The danger zone device comes under the user group Executor and Technician and covers the SCU control unit and all the mounted-on devices.

Safety

Areas of responsibility

Different areas of responsibility, corresponding to the different user groups, arise.

Operating Authority

The Operating Authority has the responsibility for the danger zone covering Persons and ensures that only authorized and instructed users work with the SCU control unit. He or she is responsible for the following:

- Determining the persons who may use the SCU control unit (authorized persons)
- Instruction of the users
- Complying with all relevant legal conditions and regulations

Please note: The Operating Authority may only authorize such persons for using the SCU control unit, who conform to the requirements for the user roles.

Processor

The processor is responsible for the following:

- Generation of a CE-conformant operation manual of the device in which the SCU control unit has been integrated
- Adherence to the safety regulations in accordance with this operating manual

Reseller

The reseller is responsible for the following:

- Passing on this operating manual and the SCU control unit to the executor or the
- Passing on of a CE-conformant operating manual and the device in which the SCU control unit has been integrated to the Operating Authority.

Technician

The technician is responsible for the following:

- Observing the manufacturer's instructions and the safe set-up of interfaces with other equipment.
- Installation and use of the SCU control unit in accordance with its intended purpose-conformant use
- Installation of optional modules and connecting cables

Operator

The operator ensures that nobody is endangered owing to the operation of the SCU control unit. He or she is, in particular, responsible for:

- Operation of the SCU control unit in normal operation
- Immediate and appropriate reaction to malfunctions

General safety notice

The SCU control unit is only suitable for interior applications and must not be subjected to weathering, strong UV radiation or corrosive or explosive air (see Ambient conditions, page 34 in the 8. Appendix, page 33).


The SCU control unit may only be operated with the safety protective cover closed.


Other hazards


The manufacturer has constructively, and with protective measures, minimized the effects of existing residual hazards. Pay attention to the residual hazards and the potential countermeasures given in the following chapters.

Residual hazards to people, objects and property

Keep in mind the following residual dangers and the possible countermeasures in handling the SCU control unit:

	WARNING
	<p>Warning regarding electrical shock owing to damaged plugs or damaged network cables. Never touch a damaged network plug or a damaged network cable when the SCU control unit is running, since the SCU control unit are supplied 120 VAC or 230 VAC.</p> <ul style="list-style-type: none">• Ensure, before you pull a defective plug out of the plug socket, that the current fuse is cut off.• Check the power cable regularly for damage.

	CAUTION
	<p>Take care not to damage the SCU control unit from water jets. The SCU control unit is protected against spraying water according to IPX4, but not against water jets. Prevent the SCU control unit from being subjected to water jets.</p>

	CAUTION
	<p>Please be aware of damage to people or property as the result of incorrect operation. Incorrect operation can endanger people in the danger zone or objects.</p> <ul style="list-style-type: none">• Before pressing a button on the operating unit ensure that you press the right button.• Take appropriate measures to ensure that the operating unit can not be operated unintentionally.

3. Construction and function

This chapter targets all the users of the SCU control unit. It shows its construction and explains its function.

Construction

The following figures will give you an overview of the SCU control unit, its connections and operating devices.

Overall view and connections SCU control unit

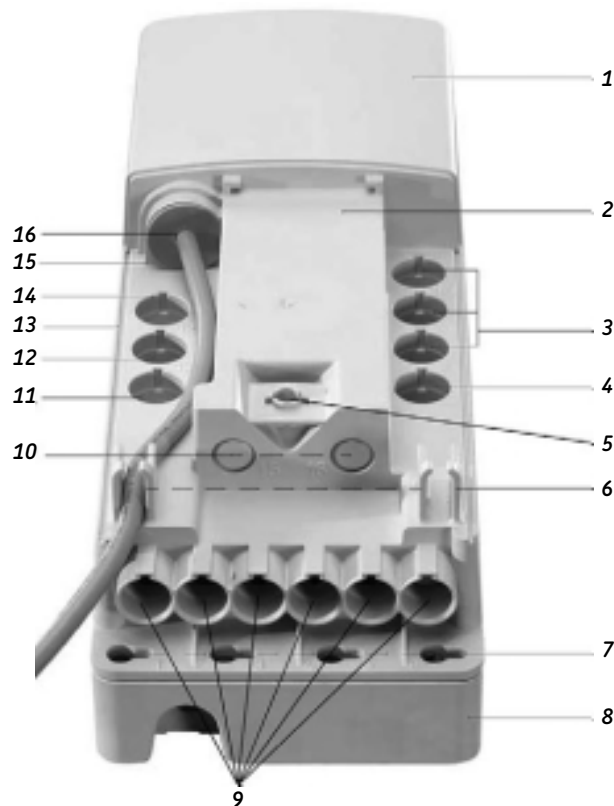


Fig. 3-1 Overall view SCU control unit from above with under-floor rechargeable battery, without safety protective cover (in image: DC design with connection cable)

- 1 Housing
- 2 Space for software data label
- 3 Connection for operating elements (sockets 8, 9, 10)
- 4 Connection for 4 external end switches (socket 7)
- 5 Fastening for safety protective cover
- 6 Cable guides
- 7 Installation holes (4)

Construction and function

- 8 Under-floor rechargeable battery
- 9 Connection for operating elements (sockets 1 to 6)
- 10 Not occupied (sockets 15, 16)
- 11 Not occupied (socket 14)
- 12 Optional rechargeable battery connection (socket 13)
- 13 Operational voltage indicator (not visible on this image)
- 14 Communication interface (socket 12)
- 15 Operational earthing bolt (not visible on this image)
- 16 Mains connection or connection for source of DC voltage (socket 11)



Fig. 3-2 Side view with under-floor rechargeable battery and closed safety protective cover

- 17 Safety protective cover
- 18 Locking button for safety protective cover

Operating elements

Following operating elements are suitable for the SCU control unit:

- EHA 3, manual switch
- STJ, foot switch
- STE, table switch

Function

The description of the function will make it possible for you to understand the tasks of the SCU control unit, its operating devices and its options.

Please note: Please note that the functions, plug layouts and options of the control unit are configured ex-works according to the requirements and cannot be changed subsequently.

Construction and function

Functional principles

The principle of functioning of the SCU control unit is based on controlling a maximum of six connected actuator units. The functions present in the control program are actuated by means of manual switches or other operating devices. The SCU control unit is configured by the manufacturer.

tor
The SCU control unit must be equipped with one operating device and at least one actuator unit. The DC design requires a source of DC voltage.

Operating voltage indicator
The operating voltage indicator (see position 13, Fig. 3-1, page 11) indicates whether the device is being supplied energy.

Failsafe safety
In the standard configuration the SCU control unit is failsafe. Here the device checks safety-relevant electronic system parts and if a defect occurs moves to the safe status in which no actuator movements are possible until the defect has been removed (refer to Malfunctions, page 26). The maximum error tolerance period is one second.

Please note: If a connected actuator does not have an internal end switch or an internal thermo-switch this reduces the system's failsafe system. Actuators without internal end switches are switched off with over-current. If an actuator does not have an internal thermo-switch and there is a defect, the actuator could overheat and be damaged.

Please note: The system's failsafe mechanism is reduced if an operating unit without failsafe is connected.

Functional single error security
The SCU control unit has functional single error security, i.e. the operation of the SCU control unit is monitored. Apart from a few exceptions this also affects all the functions of the SCU control unit.

DC voltage source
Only for DC design: A smoothed power unit can be used as a DC voltage source. But it must be noted that during operation (actuator is moving) the nominal voltage permitted for the drives may not be exceeded (please note the other details in the annex). (refer to Device Data, page 33).

Safety protective cover
The safety protective cover protects the cable connections from being pulled out accidentally.

Lock function
The SCU control unit has a lock function. When using an appropriate operating unit with corresponding functional buttons it is possible to lock or release individual control unit functions. The signal is passed on to the control unit - the lock function of the SCU control unit takes on the locking or unlocking function. This ensures that there is no risk from several operating devices used at the same time. If necessary locked functions are indicated by a yellow LED.

Over-current cut-off
The software with its integrated over-current cutoff switches off the SCU control unit in case of overload and protects the connected actuator units. The factory must parameterize the appropriate power-down values for the connected actuator.

Overtemperature heating protection
The software with integrated overtemperature protects several components from over- by stopping the running of the actuators and thus prevents the control units from being damaged.

Options and accessories

Options

Options can be recognized from the type designation on the type plate.

Battery connection

The SCU control unit may be fitted with a battery connection (refer to item 12, Fig. 3-1, page 11) or a pre-installed under-floor battery. The unused battery connection is equipped with a sealing stopper by the factory. Rechargeable batteries are available as accessories (see Accessories, page 14).

Please note: without an external battery the connection socket must be equipped with the factory-supplied sealing stopper for IPX4 protection to be guaranteed. Please note the special requirements for handling rechargeable batteries. Only batteries authorized by the manufacturer may be used.

End switches

The connection for the end switch is available for all versions of the SCU control unit. But this option must be set by the manufacturer in the factory. Here the end switches can take on various functions. The connection socket is equipped with a sealing stopper by the factory.

Please note: without an end switch the connection socket must be equipped with the factory-supplied sealing stopper for IPX4 protection to be guaranteed.

Ground terminal

SCU5/SCU9: protection class I; three-core mains supply cable with ground terminal on the housing (see position 15, Fig. 3-1, page 11). Marked with the following signal:



SCU16: functional earth terminal on the housing (see position 15, Fig. 3-1, page 11). Marked with the following signal:



Accessories

Rechargeable battery

The authorized batteries¹⁾ or under-floor batteries are screwed to the underside of the SCU control unit. The SCU control unit can only be operated with a battery if the corresponding option has been selected (refer to Options, page 14).

Operating unit

In addition to the hand switch other operating units are available as accessories on request from a reseller. The operating units create a function in the control unit. The function depends on the type of control unit (parameterization) and usually allows the actuator to move in or out.

The operating units are not contained in the supply schedule and must be ordered separately. Only operating units that have been authorized for the SCU control unit can be used²⁾.

Mains cable

Order the mains cable with the plugs that are correct for your country and the appropriate protective class for your unit. In order to guarantee the protective class of the SCU

¹⁾ Authorized batteries can be ordered from the reseller.

²⁾ If the SCU is to be operated by a super-ordinate control unit, the control unit must be configured as appropriate. Please refer to the manufacturer on this matter.

Construction and function

control unit it is only permitted to use original SKF mains cables with the label ZKA-160xxx-xxxx.
The connection cable is provided for the DC version.

4. Normal operation

This chapter is directed at the user groups operator and operating authority. It contains all the information that is required for the safe and problem-free use of the SCU control unit in normal operation.

In normal operation the SCU control unit analyses signals from one operating device in order to actuate the printing or stroke movements with the appropriate actuator.

Preconditions for operation

The SCU control unit controls one to six actuator units. The safety protective cover must be closed and the power supply ensured (energy supply lamp glows). The optional rechargeable battery facilitates operation without connection to the power supply (refer to Options, page 14).

Rechargeable battery operation

The rechargeable must be adequately charged for operation using it. The following table gives you an overview:


Tab. 4-1 Status of the rechargeable battery in various operating modes with the corresponding LED indicator.


Operating mode	LED indicator	Rechargeable level
Control powered by mains or DC feed	Lights up green	full
	Flashes green	charging mode
Control fed separately from mains via rechargeable battery	Lights green when you press a button on the operating unit	full
	Lights orange when you press a button on the operating unit; an acoustic signal also rings for 5 s.	weak, a full stroke with an actuator drive is still possible (approx. 2 minutes)
	Flashes orange when you press a button on the operating unit; an acoustic signal also rings	very weak, only one movement in counter-load direction possible

Check the following points and ensure that

- no cable is squashed during operation
- installation is completed correctly
- all operating units are in the proper locations
- no people are located in the danger zone
- the system is initialised (see initial start-up page 25)
- the function check is done (see function check page 26)

SCU control unit powering on

	WARNING
	<p>Warning regarding electrical shock owing to damaged plugs or damaged network cables. Never touch a damaged network plug or a damaged network cable when the SCU control unit is running, since the SCU control unit are supplied 120 VAC or 230 VAC.</p> <ul style="list-style-type: none">• Ensure, before you pull a defective plug out of the plug socket, that the current fuse is cut off.• Check the power cable regularly for damage.

	CAUTION
	<p>Please be aware of damage to people or property as the result of incorrect operation. Incorrect operation can endanger people in the danger zone or objects.</p> <ul style="list-style-type: none">• Before pressing a button on the operating unit ensure that you press the right button.• Take appropriate measures to ensure that the operating unit can not be operated unintentionally.

The preconditions for operation must be fulfilled (see Preconditions for operation, page 16). Operation takes place using an operating device (see Options and Accessories, page 14).

Please note: You can move the actuator units in and out by pressing the appropriate button on the operating unit. If the movement does not stop as soon as you release the button you must press the button for the opposite direction immediately to stop it.

Please note: The connection to the operating unit (5 VDC) and the actuator unit (24 VDC) is made via safety low voltage.

SCU control unit shutting down

- 1 Shut the SCU control unit down by pulling the plug of the control unit from the socket.

Operating processes

Process: Move drives synchronously

Responsibility: Operator

Requirements:

- Parameterize SCU control unit appropriately
- Drives of the same type
- Establish preconditions for operation

- 1 Control several drives synchronously using the SCU control unit operating unit.

Please note: If the drives are not of the same type the synchronous movement is not guaranteed. The synchronization is undertaken by analyzing the pulse generator signals that are integrated into the drives.

Please note: The SCU control unit compensates for different drive speeds that occur for example at different loads by supplying the faster drive with less power (PWM regulation).

Please note: If a drive is overloaded all the drives assigned this function stop immediately. If the maximum total power for the SCU control unit is exceeded all drives stop.

Please note: The drive synchronization (speed regulation) is not secure against single errors. The drives are stopped by releasing the function button and this also works if an error occurs.

Process: Save memory positions

Responsibility: Operator

Requirements: Suitable operating device

- 1 Move all drives to the desired position.
- 2 Press the save button and the desired memory button within the next two seconds.

Please note: The current stroke for all connected and initialized drives is saved in the control unit. The control unit accepts this process with a short beep.

Please note: The control unit can manage up to 4 operating devices and each operating devices can handle up to 4 memory positions.

Please note: After the memory positions have been saved, you must check them. To check the saved position it is necessary to move all drives away from the saved position. Then move them to the memory position (see following process).

Normal operation

Process: Move to memory positions

Responsibility: Operator

Requirements: Suitable operating device

- 1 Press the relevant memory button until all connected and initialized drives are at the saved position.

Please note: Drives that reach the correct stroke measurement stop independently.

Please note: At high loads for several drives the SCU control unit may stop as a result of the high total power.

- 2* If the maximum total power is exceeded: Move the most loaded drives individually in the load direction via the desired stroke measurement.

- 2.1 Then press the memory position button. The drives now move with lower total power against the direction of the load until they reach the relevant memory position.

Please note: Blocked, not initialized or missing drives are not considered when moving to memory positions.

Please note: Moving the drives to memory positions is not secure against single errors. The drives are stopped by releasing the function button and this also works if an error occurs. Even if an error occurs, only the drives that are assigned this function move.

5. Special operations

The following chapters are part of the special operations:

- 5. Installation and Initial Start-Up, page 20
- 6. Maintenance, Clearing Malfunctions, Repairs, page 26
- 7. Removing from service, dismantling and disposal, page 31

Installation and initial start-up

This chapter is intended for technicians and those doing the further processing. It contains all the information that is required for the erection, connection and commissioning of the SCU control unit.

Preparation

Good preparation is part of efficient installation and start-up. This includes, among other things, clarifications regarding the locations and the preparation of the energy supply.

Transport

Please note: The control unit must be examined for cracks in the housing when it is delivered. Immediately report any transportation damage that is found in writing to the freight-forwarding company and the manufacturer (see Manufacturer Address, page 6).

The SCU control unit is delivered packed as one unit in a cardboard box or in palettes. Entrust a freight forwarder with the dispatch of the SCU control unit.

Return to the manufacturer

Prepare the SCU control unit for transport as follows:

- 1 Dismantle the SCU control unit (see Dismantling, page 31).
- 2 Pack the SCU control unit carefully.

Please note: You will find weight, dimensions and the environmental requirements in the technical data in the appendix (Technical Data, page 33).

Check the supply schedule

The SCU control unit consists of:

- a complete control unit
 - with safety protective cover
 - DC design with connection cable
 - 2 sealing stoppers (pre-assembled by factory; Art. ZDV--160307-0008)
 - 3 or 4 (with optional rechargeable battery connection) sealing stoppers (preassembled by factory Art. ZDV-160308-0015)
 - optional 1 under-floor rechargeable battery

Power supply

The SCU control unit only requires electrical energy for operation. Observe the connection values in the appendix of this manual (chapter Device Data, page 33).

Installation and connections

The erection and alignment of the SCU control unit, as well as the interfaces and connections are shown in the following sections.


Erection and alignment

The following points must be kept in mind as regards the erection and alignment of the SCU control unit.

Make sure that

- the mains plug of the connection cable remains accessible at all times,
- the mains, DC and rechargeable battery cables can not be bent or squashed.
- the connecting cables to the actuators cannot get crushed or squashed.
- the SCU control unit is set up on a level surface (if the casing is bent during setup the IP protection is no longer guaranteed)
- the SCU control unit is set up properly and can not loosen itself through impacts and vibrations.

Interfaces and Connections

	CAUTION
	Warning regarding damage to the control unit owing to tilted plugs or damaged cables. Ensure that the plugs remain freely accessible and all cables remain safe and hidden.

You can find the nominal values in appendix (section Technical Data, page 33). Check the following interfaces and connections and carry out the following processes:

- 1 Carry out the Connect the operating device(s), page 22 process.
- 2 Carry out the Connect the actuator unit(s), page 22 process.
- 3 Carry out the Connect the mains cable to the control unit, page 22 process.
- 4* Optional: Carry out the Connect end switches, page 22 process.
- 5* Optional: Carry out the Connect rechargeable battery, page 23 process.
- 6 Carry out the Mount the safety protective cover, page 23 process.
- 7 Follow the warnings on the type plate.
- 8* Protection class I unit: Carry out the Connect ground wire, page 23 process.
- 9a For AC design: Insert the mains cable plug into the mains plug.
- 9b For DC design: Close the stranded wires of the DC cable to a suitable voltage source (DC feed must be protected against short-circuiting etc.). Polarity: red + and blue -.

Process: Connect the operating device(s)

- 1 Connect the HD15 plug of the operating device carefully and in the correct position to the corresponding socket of the SCU control unit (see item 3 in Fig. 3-1, page 11).
- 2 Check that you have used the correct connection socket.
- 3* Repeat step 1 if necessary for a second or third operating unit.

Comment: Please note the additional instructions in section Accessories, page 14. The IPX4 protection is only guaranteed if the connecting sockets not being used are closed with a sealing stopper.

Process: Connect the actuator unit(s)

Requirements: Only actuators with two hall encoders that have been approved by the manufacturer may be connected. Contact customer service (see Manufacturer Address, page 6) to ensure that the actuator unit used for this control unit is permitted.

- 1 Plug in the plug of the actuator in the corresponding connecting socket of the SCU control unit (see Figure Fig. 3-1, page 11).
- 2 Check whether the letter on the label clip on the actuator matches the letter on the data label (see position 2 of Fig. 3-1, page 11) of the corresponding socket.

Please note: Incorrectly inserted drives can be damaged.

- 3* Several drives of the same type: Insert the correct drive for the desired function.

Note: Motor cables may not be extended so as not to have a negative effect on the pulse generator signals.

Note: The IPX4 protection is only guaranteed if the connecting sockets not being used are closed with a sealing stopper. Two sealing stoppers are part of the supply schedule.

Process: Connect the mains cable to the control unit

Requirements: Refer to the Technical Data, page 33 chapter for the permitted values.

- 1 Insert the country-specific mains cable (refer to Accessories, page 14) in the correct direction in the corresponding connection socket of the SCU control unit.

Process: Connect end switches

Requirements: The corresponding option must be factory. Remove the sealing stoppers.

Tools: To ensure safe operation only use forced-open contacts. Closing contacts are required to provide movement.

Installation and initial start-up

- 1 Plug in the plug of the actuator in the corresponding connecting socket of the SCU control unit.

Please note: A diagram of the end switch connection is found in the appendix (refer to Plans and diagrams, page 34).

Please note: A diode is required to check the line to the end switches (initial defect safety). If parameterized appropriately 24 VDC signals (e.g. SPS) can be processed by the SCU control unit.

Process: Connect rechargeable battery

Requirements: Optional rechargeable battery connection must be available (refer to Options, page 14). Remove the relevant sealing stoppers.

- 1 Fix the rechargeable battery to the control unit.
 - 1.1a Under-floor rechargeable battery: Screw the under-floor rechargeable battery to the underside of the SCU control unit.
 - 1.1b Other permitted rechargeable battery packages: Screw the rechargeable batteries in the right direction to a suitable location.
- 2 Check the plug of the rechargeable battery for damage.

Please note: Bent plug pins could result in a short circuit and damage the battery.

- 3 Plug in the battery plug in the corresponding connecting socket of the SCU control unit.

Process: Mount the safety protective cover

Requirements: All plugs required are connected and all unused connections blocked with sealing stoppers.

- 1 Plug the safety protective cover to the rear side of the device SCU control unit till the fastening of the safety protective cover meshes.

Please note: If it is not possible to place the safety protection cover properly the plugs may not be inserted properly.

Please note: You can remove the safety protective cover only with a tool (see Shutting down, page 30).

Process: Connect ground wire/ Functional earth terminal


Requirements: Only for SCU5/SCU9 (ground wire) and SCU16 (functional earth terminal)

- 1 Connect the cable shoe to the earth connection using the nut from the ground wire screw.

Important: The ground wire must be firmly connected with an adequately small contact resistance that should under no circumstances come loose.

Important: The nut may not be tightened too much because this could cause damage to the housing and the IPX4 protection could no longer be guaranteed. The 1-2 Nm torque should not be exceeded.

Installation

	WARNING
	<p>Warning regarding electrical shock owing to damaged plugs or damaged network cables. Never touch a damaged network plug or a damaged network cable when the SCU control unit is running, since the SCU control unit is supplied with 120 VAC or 230 VAC.</p> <p>Ensure, before you pull a defective plug out of the plug socket, that the current fuse is cut off.</p>

Bolting

The SCU control unit must be screwed with the application. Fix the control unit such that the minimum of four fixing screws required can not loosen and slip through the screw holes.

Initial Start-Up

Before you make the SCU control unit operational, carry out the installation inspection.

Installation inspection

Check the following points before the initial start-up:

- Operating device connected (see Connect the operating device(s), page 22)
- Actuator unit connected (see Connect the actuator unit(s), page 22)
- Connect the mains cable to the control unit (refer to Connect the mains cable to the control unit, page 22)
- Optional: End switches connected (see Connect end switches, page 22)
- Unused connecting plugs closed with stopper plugs (see Connect the actuator unit(s), page 22)
- Safety protective cover installed (see Mount the safety protective cover, page 23)
- For AC design: Energy supply to mains plug guaranteed
- For AC design: Mains cable connected
- For DC design: DC cable connected to appropriate DC voltage source
- Free access to the mains plug ensured
- Operating voltage indicator lights up

Please note: Ensure that all unoccupied connection sockets that are not equipped with an appropriate plug have a sealing stopper. Otherwise IPX4 protection cannot be guaranteed.

Commissioning

After the installation inspection, you must carry out the system initialization and a comprehensive function check.

Please note: Ensure that the plugs for the operating units and the end switches are identical. Ensure they are working properly by undertaking the function check.

Process: Initialize system

Responsability: technicians and those doing the further processing

- 1 Move all drives connected to the SCU control unit to the zero value.

Please note: The zero value varies with the drive type. For pressurized drives the zero value is usually at the bottom.

- 2 Test the initialization by moving all drives.
- 3 Beep sounds: Select the zero position again.

Please note: The SCU control unit has a relative route measurement system that is undertaken by counting the drive pulses. To initialize the route measurement system the drives must be moved to the zero position.

Please note: On delivery the motor outputs on the SCU control unit are not initialized. When moving drives that have not been initialized a beep sounds for 3 seconds. The drives then only move at half speed and the power limitation is reduced to half. In addition certain functions are ignored.

Please note: Depending on the parameterization, it is possible to add or remove an actuator after the first initialization. Connect or disconnect the corresponding actuator to the SCU control unit and initialize the system manually (see on page 28)

Process: Carry out function check

Responsability: technicians and those doing the further processing

Requirements: Newly installed system

- 1 Whenever the system is initialized carry out a comprehensive function check.
- 2 Using the function check test correct operation and check that all operating unit functions operate correctly.

Please note: The plugs for the operating devices and end switches are identical. The function check ensures that they are correctly connected.

Please note: Check the process Initialize system manually, page 28.

Then you can commission the SCU control unit. To do so, press the corresponding actuation button of the operating device.

6. Maintenance, clearing malfunctions, repairs

This chapter is intended for technicians and those doing the further processing. It contains all the information that is required for the maintenance, troubleshooting and repairs of the SCU control unit.

Maintenance

The maintenance includes all the work that serves for the upkeep of the functional SCU control unit. These operations include inspections, replacing consumables and cleaning.

Maintenance plan


The SCU control unit (excluding rechargeable battery) is maintenance-free during its entire life (the life is specified in the annex, Operating data, page 34). The connection cable, control casing and operating unit must be checked for damage regularly.

Please note: damaged casing does not provide IP protection. Damaged cables could result in a short circuit.

Rechargeable battery

The rechargeable battery must be connected to the mains or a source of DC voltage periodically for 12 hours in order to protect the battery from full discharging and therefore from destruction (this applies after 6 weeks for pre-assembled under-floor batteries with 2.7 Ah).

Cleaning and disinfection

	CAUTION
	<p>Take care not to damage the SCU control unit from water jets. The SCU control unit is protected against spraying water according to IPX4, but not against water jets. Prevent the SCU control unit from being subjected to water jets.</p>

Observe the following points when cleaning and disinfecting:

- Wash water including added chemicals must be pH-neutral.
- Acidic or alkaline wash water can destroy metallic and synthetic parts.
- Handwash disinfection exclusively with isopropyl alcohol

Please note: Any cleaners other than those mentioned will damage the SCU control unit.

Malfunctions

Malfunctions to the SCU control unit may only be resolved by the manufacturer. For this purpose, the SCU control unit must be shut down and sent to the SKF Actuation System (see section Transport, page 20).

In the following sections, you will find hints on how you can recognize, remedy or handle malfunctions.

Please note: In any case, immediately inform customer service (see Manufacturer Address, page 6) if the fault cannot be rectified on the basis of the following instructions.

Fault rectification

Symptom 1:

Actuator does not move any more.

Hypothesis 1-A:

No supply voltage, or wrong supply voltage, or missing plug contact or supply indicator lamp does not glow.

- 1 Check the operating voltage specification on the type plate and check whether the mains voltage of the socket corresponds to this value.
- 2 Check the mains plug of the SCU control unit and insert it if required into a mains socket.
- 3 Check the supply voltage and if required, change the fuse.
- 4 Check the HD15-plug of the operating device and if required, insert it into the SCU control unit (see Process Connect the operating device(s), page 22).
- 5 Check the DIN8 plug of the actuator and if required, insert it into the SCU control unit (see Process Connect the actuator unit(s), page 22).

Finding:

Are the supply voltage and the plug contacts intact?

Yes. 4. Normal Operation, page 16

No Hypothesis 1-B

Hypothesis 1-B:

The actuator was not automatically detected

- 1 The SCU has not detected all connected actuators.

Finding:

Was the actuator added or removed?

system

Yes:

Initialize the system (Process: Initialize manually page 28)

No:

Hypothesis 1-C

Hypothesis 1-C:

Control unit functions are blocked

- 1 Unlock the function with an operating unit with an unlocking key.

Finding:

Was the control unit function blocked?

Yes. 4. Normal Operation, page 16

No Hypothesis 1-D

Maintenance, clearing malfunctions, repairs

Hypothesis 1-D: SCU control unit is overheated or the supply indicator lamp does not glow.

- 1 Pull the mains plug of the SCU control unit out of the mains socket and wait for about 30 minutes.
- 2 Insert the mains plug into the mains socket.

Finding: Was the SCU control unit overheated?

Yes. Report to the customer service (see
Manufacturer Address, page 6)
Hypothesis 1-E

No

Hypothesis 1-E: Actuator faulty.

- 1 Troubleshoot the actuator (refer to relevant operation manual).

Finding: Is the actuator defective?

Yes. Replace the actuator and report to the
customer service (see Manufacturer
Address, page 6) and carry out Diagnose 1 A
Hypothesis 1-F

No

Hypothesis 1-F: Life exceeded.

- 1 Check whether the SCU control unit is older than 10 years or has gone through more than 100000 double-strokes.

Finding: Has the life been exceeded?

Yes. Manufacturer Address, page 6

No Hypothesis 1-G

Hypothesis 1-G: The actuator cannot be made to move again by any of the aforementioned measures.

- 1 Contact the manufacturer immediately(Manufacturer Address, page 6).

Diagnosis 1-A: Drives must be exchanged.

Process: Initialize system manually

Responsibility: Operator

Requirements: Drive position does not match control unit's counter (e.g. after changing a drive)

- 1 Press the up and down buttons on function 1 at the same time for 5 seconds. An intermittent beep sounds for confirmation.
- 2 Carry out process Initialize system, page 25.
- 3 When using the memory positions after initialization check whether the saved positions still match the drive's stroke height.
- 4 Carry out process Carry out function check, page 25.

Symptom 2: Control unit works but it is not possible to operate it without connecting to the mains.

Hypothesis 2-A: SCU control unit is not equipped for rechargeable battery operation.

- 1 Remove the safety protective cover.
- 2 Check whether the connection socket 13 is in place (refer to position 12 Fig. 3-1, page 11).

Finding: Is the control unit equipped for rechargeable battery operation?

Yes. Hypothesis 2-B
No Operation when not connected to the
mains is not possible for this control unit
(refer to Manufacturer Address, page 6)

Maintenance, clearing malfunctions, repairs

- Hypothesis 2-B:** Rechargeable battery is not inserted correctly.
- 1 Check whether the cable of the rechargeable battery is correctly inserted into the socket 13 connection.
 - 2* If unsure: Remove the sealing ring to reduce the insertion effort. After the attempt re-assemble the sealing ring.
- Finding:** Is the rechargeable battery correctly inserted?
Yes. Hypothesis 2-C
No Insert plug correctly and resume normal operation
- Hypothesis 2-C:** Rechargeable battery is empty.
- 1 Connect the control unit to the mains voltage (operating LED lights up).
 - 2* Operating unit with LED indicator flashes green, the rechargeable battery is being charged: Leave the control unit plugged in for at least 12 hours until the LED lights up green permanently.
- Finding:** Was the battery empty?
Yes. 4. Normal Operation, page 16
No Hypothesis 2-D
- Hypothesis 2-D:** Rechargeable battery is defective.
- 1 Check the life span of the rechargeable battery.
- Finding:** Has the life span of the battery been exceeded?
Yes. Buy a new battery (see Manufacturer Address, page 6)
No Contact customer services (see Manufacturer Address, page 6).
- Symptom 3:** Drive only moves slowly and the SCU control unit beeps when the drive moves.
- Hypothesis 3-A:** Drive is not initialized.
- 1 Carry out the process Initialize system, page 25.
- Finding:** Does the drive move normally again and the SCU control unit no longer beeps?
Yes. 4. Normal Operation, page 16
No Contact customer services (see Manufacturer Address, page 6).
- Symptom 4:** SCU control unit carries out the wrong function or no function at all.
- Hypothesis 4-A:** Parameter set of the SCU control unit is not correct for the actuator unit.
- 1 Check the type plate of the SCU control unit and the parameter set SCP.
 - 2 Check the type plate of the actuator unit.
 - 3 Contact the manufacturer (see Manufacturer Address, page 6).

Repair

Repairs may only be carried out by the manufacturer. In any case, contact customer service. (Manufacturer Address, page 6).

7. Removing from service, dismantling and disposal

This chapter is intended for technicians and those doing the further processing. It contains all the information that is required for the shutdown, dismantling and disposal of the SCU control unit.

Shutting down

The SCU control unit must be shut down in the following sequence.

- 1a AC design: Render the SCU control unit voltage-free (isolate it) by pulling the plug of the control unit from the socket.
- 1b DC design: Remove the DC feed cable from the source of DC voltage.
- 2 Remove the safety protective cover.
- 2.1 Use a coin or large screwdriver to turn the locking button to the open position.
- 3 Pull out the plug for the connected components from the SCU control unit.

You can then dismantle or re-install the SCU control unit (refer to Installation, page 24

Dismantling

Before you start dismantling, shut down the SCU control unit (see Shutting down, page 31).

The SCU control unit should be dismantled in the following sequence:

- 1 Loosen and remove the fastening screws.

You can then prepare the SCU control unit for the transport (see section Transport, page 20), or store or dispose of it as described in the sections that follow.

Storage

For disposal, pack the SCU control unit in its original packing. Observe the following values when selecting a storage location:

- Ambient temperature: +5 °C to +40 °C
- Atmospheric humidity: 5 % to 85 %

Important: Rechargeable batteries can discharge even when stored and can be destroyed if discharged completely. Please ensure that you connect the battery to the mains occasionally. When stored the underground battery with 2.7 Ah must be connected to the mains for 12 hours every four months.

Disposal

The SCU control unit must be disposed of in a technically proper manner and in accordance with the local specifications.

Please refer in particular to the disposal regulations for the rechargeable batteries.

Please find dismantling instructions and shipping requirements in the relevant sections.

8. Appendix

This chapter makes it possible for the user to find technical data and directories quickly.

Technical data

Device data

SCU control unit:

Designation	Type SCU 1	Type SCU 4 / 5	Type SCU 8 / 9
Voltage	24 VDC ^{a)}	120 VAC	230 VAC
Frequency		60 HZ	50 HZ
Current consumption	30 A	6,5 A	3,4 A
Output voltage	24 VDC	24 V DC	24 VDC
Output current	30 A ^{b)}	18 A	18 A
Motor connection	Qty 6	Qty 6	Qty 6
Operating element connection	Qty 3	Qty 3	Qty 3
End switch connection	1 (for 4 end switches)	1 (for 4 end switches)	1 (for 4 end switches)
Battery connection	1 (optional)	1 (optional)	1 (optional)
Mains connection	0.24 V feed	Qty 1	Qty 1
Method of protection	IPX4	IPX4	IPX4
Protection class	-	SCU 4: II SCU 5: I	SCU 8: II SCU 9: I
Dimensions (W x H x D) without battery:	141 x 87 x 365 mm		
with battery:	141 x 125 x 365 mm		
Weight			
SCU control unit:	1,2 kg	3 kg	3,8 kg
Under-floor rechargeable battery:	3 kg	3 kg	3 kg

^{a)} When idle the voltage of 40 V may not be exceeded and the load may not fall short of 22 V.

^{b)} When a battery is connected 23 A

Operating data

Designation	Type SCU 1	Type SCU 4 / 5	Type SCU 8 / 9
Duration of powering on:			
Intermittent	1 min / 9 min	1 min / 9 min	1 min / 9 min
short-term operation	2 min	2 min	2 min
Lifetime	10 years or min. 100 000 double-strokes		

Ambient conditions

- Temperature range: +5 °C to +40 °C
- Atmospheric humidity: 5% to 85%

The SCU control unit is only suitable for inside applications and must not be subjected to weathering, strong UV radiation or corrosive or explosive air.

Plans and diagrams

To view the plans and diagrams, please contact the manufacturer (see Manufacturer address, page 6).

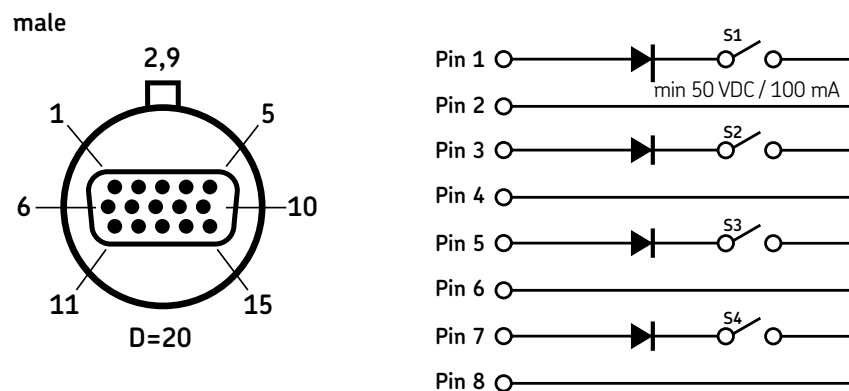


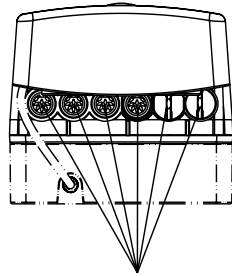
Fig. 8-1 Connection for end switches

- | | |
|------------|---|
| 1, 3, 5, 7 | 24 VDC (common) |
| 2 | Switch 1 |
| 4 | Switch 2 |
| 6 | Switch 3 |
| 8 | Switch 4 |
| 9 | Optional external power supply for binary outputs |
| 10 | Binary output 1 (22-40 VDC/1 A) |
| 11 | Binary output 2 (22-40 VDC/1 A) |
| 12 | GND for binary outputs |
| 13 | 20-40 VDC, max. 50 mA |
| 14 | 5 VDC pulsed |
| 15 | GND |

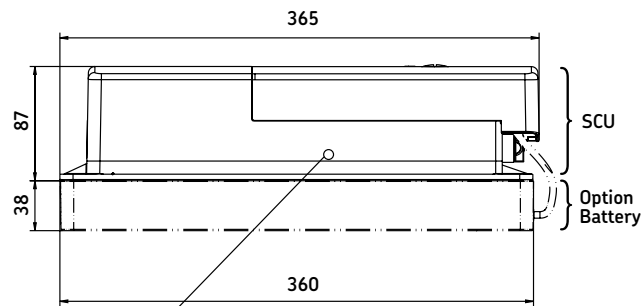
Note: Use forced opener contacts to stop a movement with external end switches and closer contacts to start a movement.

Connection diagram for optional external limit switches

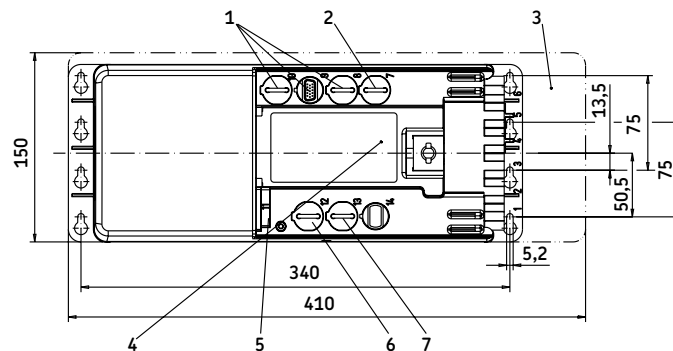
Single fault safe wiring requires diodes in series to the switches. NC contacts have to be used to stop a movement; NO contacts are used to start movements. Switch connection data: 50 VDC min., 100 mA min. (eff. switching current approx. 10 mA)



Up to 6 connections with DIN8 plugs
And 2 hall-sensors



Operating voltage display (LED)



1. Two connections for HD15 operating devices
2. HD15 limit switch connection
3. Additional space for mounting
4. Data plate software
5. Mains connection
6. Communication interface (optional)
7. D-Sub9 battery connection (optional)

Standards applied



Declaration of manufacturer



Under EU Directives 98/37EC and 93/42/EEC we hereby declare that the products listed below are components intended for installation in a machine, unit or system. Their installation should not be approved until the user has ensured that the provisions of the CE Directives applicable to the end product in question have been fulfilled.

Product	Accessory
Electrical Control Unit SCU	Hand control switch EHA1/3, EHV; foot switch STF, STJ, table switch, STA, STE, Battery-pack ZBA 160207, Battery-pack ZBA 160209, Battery-pack ZBA 160208

The products are in conformity to Directives 89/336/EEC and 73/23/EEC and the applicable requirements have been tested to the following standards.

Titel	Reference-No	Ausgabe	
Medical Electrical Equipment: General Requirements for Safety	EN 60601-1 IEC 60601-1 UL 60601-1 First Edition CAN/CSA-C22.2 No601.1-M90	1990 +A1+A2 1988 +A1+A2 2003 Updates 1 und 2 incl.	
Electromagnetic compatibility	EN 61000-6-1 Residential EN 61000-6-3 Residential EN 61000-6-2 Industrial EN 61000-6-4 Industrial EN 61000-1-2 Medical	2001 2001 2001 2001 2001	
Emission	Interference Voltage	EN 55011 CISPR11 EN 55022 CISPR22 CIA/B	2003 2004 1998 +A1+A2 2005 +A1
	Interference Current	EN 55022 CISPR22	1998 1A1+A2 2005 +A1
	Radiated electromagnetic field	EN 55011 CISPR11 EN 55022 CISPR22	2003 2004 1998 +A1+A2 2005 +A1
	Harmonics	EN 61000-3-2 IEC 61000-3-2	2001 2000 +A1+A2
	Voltage fluctuations	EN 61000-3-3 IEC 61000-3-3	1995 +A1 1994 +A1
Immunity	Electrostatic discharges	EN 61000-4-2 IEC 61000-4-2 2-4-8 kV air, 2-4-6 kV contact A*	1995 +A1+A2 1995 +A1+A2
	Electromagnetic fields	EN 61000-4-3 IEC 61000-4-3 80-800 MHz 10V/m A* 800-2500 MHz 20 V/m A*	2002 2002
	Fast electric transients (Burst)	EN 61000-4-4 IEC 61000-4-4 Supply 2 kV A* Signal 1kV	2004 2004

Fig. 8-3 Declaration of manufacturer page 1

Titel	Reference-No	Ausgabe
Surge	EN 61000-4-5 IEC 61000-4-5 230 VAC line to line 1 kV A* 24 VDC line to line 1 kVA*	1995 +A1 1995 +A1
Conducted Interferences	EN 61000-4-6 IEC 61000-4-6 0.15 – 80 MHz, 10V _{enr} A*	1996 +A1 1996 +A1
Magnetic Fields (Industrial frequencies)	EN 61000-4-8 IEC 61000-4-8 30 A/m , 50 Hz A*	1993 +A1 1993 +A1
Voltage dips and interruptions	EN 61000-4-11 IEC 61000-4-11 Reduction 30% 10 ms A* Reduction 30% 500 ms B* Reduction 60% 100 ms B* Reduction 60% 1000 ms B* Reduction 100% 10 ms A* Reduction 100% 5000 ms B*	2005 2004

***Performance criteria**

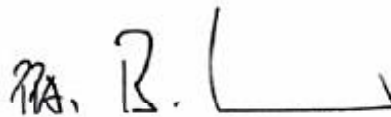
- A During and after the test
The apparatus shall continue to operate as intended. No degradation of performance or loss of functional is allowed
- No unintentional movements of controlled actuators
 - No interruption of intended movements
 - No change of operation mode
 - No loss of data
 - Variation of motor speed is allowed
- B The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed. During the test, degradation is however allowed. No change of actual operating state ore stored data is allowed.
- During the test: Interruptions of intended movements of controlled actuators are allowed, provided that the functionality is guaranteed after the tests, if necessary with a reactivation of the control switch.
 - After the test: Same as criteria A
- C Temporary loss of function is allowed, provided the functionality is self recoverable or can be restored by the operation of the controls.
Interruptions of intended movements of controlled actuators are allowed, provided that the functionality is guaranteed after the tests, if necessary with a reactivation of the control switch

The products were tested with the listed accessories under laboratory conditions and the same results cannot be guaranteed once installed in end products.

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Head of Regulation



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Quality Manager

Fig. 8-4 Declaration of manufacturer page 2

For further information, please contact the manufacturer (see Manufacturer address, page 6).



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