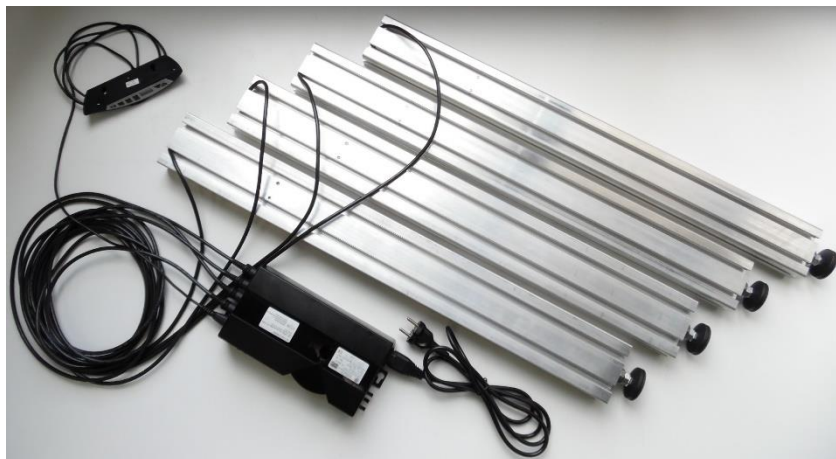


## Installation Instructions

English

SUSPA Movotec SMS-I-40x80  
SUSPA Movotec SMS-B-45x90



Read installation instructions carefully before initial use!

Follow the safety notices!

This partly completed machinery is intended to be incorporated into other machinery, other partly completed machinery/equipment or to be joined with another framework so as to form a complete machine as specified under the Machinery Directive. A conformity assessment procedure must be carried out on the whole completed machine in accordance with the Machinery Directive before it can be put into operation.

No revision service applies to this documentation.

February 2018

Distributed by Tri-State Equipment Company Inc.

[sales@tsoverheadcrane.com](mailto:sales@tsoverheadcrane.com)

[www.tsoverheadcrane.com](http://www.tsoverheadcrane.com)

Tel: (314) 869-7200

These installation instructions are a component of the technical documentation of the system in accordance with the EC Machinery Directive.

These installation instructions correspond to the "Directive 2006/42/EC of the European Parliament and the Council for Adjustment of Legal and Administrative Regulations of Member States for Machinery" (Machinery Directive), Appendix I, Item 1.7.4.

These installation instructions are addressed to the person in charge, who must pass it on to the personnel responsible for connection, use, and maintenance of the machine. The person in charge must ensure that the installation instructions and the information contained in the accompanying documents have been read and understood.

These installation instructions must be kept in a well-known and easily accessible location and read in case of any doubt.

The manufacturer is not liable for injuries to people or animals, and damage to objects or to the machine itself arising from the improper/unauthorized use or by ignoring the safety criteria contained in these installation instructions or by modification of the machine or use of unsuitable spare parts.

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SUSPA GmbH

Eisenhammerstrasse 3

92237 Sulzbach-Rosenberg

GERMANY

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Status: February 2018

1	Information Concerning this Document .....	5
1.1	Structure of the Warnings .....	5
1.2	Signal Words and Signal Colors .....	5
1.3	Symbols .....	6
1.3.1	Warning Notice .....	6
2	Identification and Notes .....	7
2.1	Designation .....	7
2.2	Manufacturer .....	7
2.3	Intended Use .....	8
2.4	Reasonably Foreseeable Misuse .....	9
2.5	General Information .....	10
2.5.1	Warranty and Liability .....	10
2.5.2	Objectives of the Installation Instructions .....	11
2.5.3	Target Audience of the Installation Instructions .....	11
3	Safety Notices .....	13
3.1	Obligations .....	13
3.1.1	Operating Company's Obligations .....	14
3.2	Residual Risk .....	14
3.3	Safety Equipment .....	14
3.4	Additional Instructions .....	14
4	Design and Function .....	15
4.1	Technical Specifications .....	15
4.2	Design and Function of the Height Adjustment System .....	16
5	Transport .....	18
5.1	Safety Notices for Transport .....	18
5.2	Transportation Procedure .....	18
6	Installation .....	19
6.1	Unpacking .....	19
6.1.1	Disposal of Transport and Warehouse Packaging .....	19
6.1.2	Checklist of All Components Included in the Delivery .....	20
6.2	Operating Conditions .....	20
6.3	Install Components .....	22
6.3.1	Installation in General .....	22
6.3.2	Installing the Lifting Elements .....	23
6.3.3	Installing the Electrical Controller .....	30
6.3.4	Installing the Manual Switch .....	32
6.3.5	Overall Installation .....	34
6.3.6	Laying of Electric Wires and Cables .....	35
6.4	Space Requirements .....	37
6.5	Component Alignment .....	37
7	Operation .....	39
7.1	Warning Notices for Operation .....	39

7.2	Tests Prior to Switching the Machine On.....	39
7.3	Duty Cycle.....	40
7.4	Manual Switch.....	40
7.4.1	Function of the Manual Switch.....	41
7.4.1.1	Simple Manual Switch UBM-F/2-p.....	41
7.4.1.2	Programmable Manual Switch UBS/6-LCD (Optional).....	41
7.5	Perform Reset.....	42
7.6	Faults and Error Indications.....	42
7.6.1	Fault and Operational Messages.....	43
7.6.1.1	Manual Switch Error Messages.....	43
7.6.1.2	Important Display Codes and their Meanings.....	43
7.6.2	Troubleshooting.....	44
7.6.2.1	Malfunctions in the Cycle Procedure.....	46
8	Service and Maintenance.....	47
8.1	General.....	47
8.2	Instructions for Maintenance.....	48
8.2.1	Cleaning.....	48
8.3	Maintenance.....	48
8.3.1	Changing Load Conditions.....	49
8.3.2	Contamination.....	49
8.3.3	Damages to Electrical Wires.....	49
9	Decommissioning.....	50
9.1	Component Storage.....	50
9.2	Disposal of Components.....	50
10	Appendix.....	51
10.1	Index of Tables.....	51
10.2	Index of Figures.....	52
10.3	Incorporation.....	53

## 1 Information Concerning this Document

### 1.1 Structure of the Warnings

The combination of a signal word in conjunction with a pictogram classifies the respective warning. The symbol can vary depending on the type of danger.

**⚠ THE WARNING IS GIVEN BELOW A SIGNAL WORD THAT INDICATES THE EXTENT OF THE EXISTING DANGER.**

**The first line after the signal word describes the type and source of the potential danger.**

The following section describes the consequences if no measures are adopted to safeguard against the danger.

The last paragraph describes the measures to avoid the danger.

### 1.2 Signal Words and Signal Colors

The following signal words are based on DIN EN 82079-1 and ANSI Z 535.4, and are used in this documentation. The safety colors have been adopted from the standard ISO 3864-1.




Signal word	Use	Explanation
 <b>DANGER</b>	Warning	Indicates a dangerous situation, which if ignored, leads to death or severe injuries.
 <b>WARNING</b>	Warning	Indicates a dangerous situation, which, if ignored may lead to injuries and damage to property
 <b>CAUTION</b>	Warning	Indicates a dangerous situation, which, if ignored may lead to minor injuries and damage to property
<b>IMPORTANT</b>	Note	Refers to ways to facilitate and simplify operation and to cross-references. It excludes the danger of damage to property and the risk of injuries.
<b>SAFETY NOTICES</b>	Safety notices	Indicates certain safety-related notices or procedures.

Table 1 Signal words and signal colors

## 1.3 Symbols

Some of the following special safety symbols according to DIN EN ISO 7010: 2011 are used in the corresponding sections of these installation instructions and require particular attention depending on the signal word and symbol combination:

Symbol	Use	Explanation
	Note	Important information for understanding the device or for optimized operations.

Table 2 Symbols

### 1.3.1 Warning Notice





Symbol	Explanation	Symbol	Explanation
	General warning sign		Warning against hazardous electrical voltage
	Warning against risk of hand injuries		Warning of hot surfaces

Table 3 Warning

## 2 Identification and Notes

### 2.1 Designation

SUSPA Movotec SMS-I-40x80

Consisting of:

- Sheet 004 1012 ZB Actuator SMS-I-40x80
- Sheet 198 1002 SMS controller SCT 4 (incl. power cable)
- 098 10087 manual switch UBM-F02 or 098 10088 manual switch UBS 6 LCD

SUSPA Movotec SMS-B-45x90

Consisting of:

- Sheet 004 1013 ZB Actuator SMS-B-45x90
- Sheet 198 1002 SMS controller SCT 4 (incl. power cable)
- 098 10087 manual switch UBM-F02 or 098 10088 manual switch UBS 6 LCD

### 2.2 Manufacturer



SUSPA GmbH

Eisenhämmerstrasse 3

92237 Sulzbach-Rosenberg

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[sales@tsoverheadcrane.com](mailto:sales@tsoverheadcrane.com)  
[www.tsoverheadcrane.com](http://www.tsoverheadcrane.com)  
Tel: (314) 869-7200

## 2.3 Intended Use

The SUSPA Movotec SMS (Spindle Motor System) is used to adjust the height of workplaces that are used when sitting or standing. The lifting elements are designed for compressive loads.

**IMPORTANT** Please make sure that installation or start-up or the appropriate height adjustment has been selected. Please note in this regard the technical data (see Sec. 4.1 Technical Specifications), in particular the maximum load and adjustment range information.

Any expanded use of the Height Adjustment System is considered to be usage not in the manner intended and thus improper. In this case, the safety and protective functions of the Height Adjustment System may be impaired.

This partly completed machinery is intended to be incorporated into other machinery, other partly completed machinery/equipment or to be joined with another framework so as to form a complete machine as specified under the Machinery Directive. A conformity assessment procedure must be carried out on the whole completed machine in accordance with the Machinery Directive before it can be put into operation.

SUSPA GmbH assumes no liability for damage resulting from such improper use.

Intended use also includes:

- Following all instructions in the installation instructions
- Compliance with all safety notices
- Compliance with the maintenance intervals

## 2.4 Reasonably Foreseeable Misuse

Improper use, which could result in risks for the user, third parties and the Height Adjustment System for all operating modes are considered to be the following:

- Using the Height Adjustment System and its electrical equipment contrary to its intended use
- The installation of the Height Adjustment System on components that are not approved by SUSPA GmbH for this system
- Improper installation, start-up, operation and maintenance of the system
- Operating the system beyond the physical operating limits described in the Section "Operating Conditions"
- Modifying the controller software without prior consultation with SUSPA GmbH
- Any modifications to the Height Adjustment System as well as any add-ons or conversions without prior consultation with the company, SUSPA GmbH
- Operating the Height Adjustment System contrary to the specifications provided in the operating instructions regarding safety notices, installation, operation, and malfunctions
- Operation of the Height Adjustment System with apparent malfunctions and/or defects



### **WARNING**

#### **Danger of injury due to impermissible changes**

Unauthorized modifications to the component as well as the use of spare parts from other manufacturers (not original spare parts) may pose risks.

Do not allow any unauthorized or other modifications to the component without prior approval of SUSPA GmbH.

**NOTE** This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

## 2.5 General Information

### 2.5.1 Warranty and Liability

The "General Terms and Conditions" of SUSPA GmbH always apply. These are made available to the owner upon signing of the contract at the latest.

Warranty claims and liability claims for personal injury and material damage are excluded if they are attributed to one or more of the following causes:

- Improper use of the component
- Improper installation, start-up, operation and maintenance of the component
- Disregarding the information in the installation instructions
- Unauthorized structural modifications of the Height Adjustment System
- Opening the individual components
- Inadequate implementation of the prescribed maintenance operations
- Disasters caused by external influence or force majeure
- Repairs that have not been carried out by the manufacturer's specialists

Read the installation instructions carefully before using and putting the component into operation. The installation instructions should familiarize the user with the handling of the component and instruct the user in the details associated with function and maintenance. The installation instructions must be made accessible to personnel at all times and must be kept available near the Height Adjustment System. The notes provided in the installation instructions regarding maintenance and operational safety must be observed and complied with. SUSPA GmbH would be pleased to answer any questions extending beyond the scope of these installation instructions.

## 2.5.2 Objectives of the Installation Instructions

These installation instructions serve as a support and contain all necessary instructions that must be observed and complied with for general safety, transport, installation, operation, setup, maintenance, storage and disposal.

These installation instructions with all safety notices as well as all additional documents of the assemblies provided by external suppliers must be:

- Observed, read and understood by all persons working on the Height Adjustment System; this applies in particular to the safety notices
- Must be made freely available to all persons
- Consulted even in case of slightest doubt (safety)

Objectives:

- To prevent accidents
- Increase the service life and reliability of the component
- To reduce the costs of production downtime

**IMPORTANT** The right to technical modifications in the context of continuous product improvement is reserved at all times without prior notification!

## 2.5.3 Target Audience of the Installation Instructions

At different life cycles of the Height Adjustment System, personnel with varied competences may come into contact with the Height Adjustment System.

Tasks	Operating personnel	Specialized personnel	Maintenance personnel	SUSPA	Private person
Shipping (Delivery)				X	
Transport (Dispatching)		X		X	X
Start-up / Installation		X	X	X	X
Operation	X	X	X	X	X
Error diagnosis	X	X	X	X	X
Troubleshooting by Error Code	X	X	X	X	X
Repair			X	X	
Decommissioning / Dismantling		X	X	X	X

Table 4 Target group

## Operating personnel

A person who has been instructed and, if required, trained by a specialist in the tasks assigned to them, the possible dangers of improper conduct, the required safety equipment and safety measures.

## Qualification of operating personnel

Of course, only those persons may work with the Height Adjustment System

- who are at least 18 years of age
- who are physically and mentally suitable for this purpose

Outside of the Federal Republic of Germany, the appropriate accident prevention regulations and safety regulations of the respective country apply.

## Specialists

Persons who can evaluate the work assigned to them and recognize possible dangers on the basis of their specialized training, knowledge, experience and familiarity with the relevant standards.

## Maintenance personnel

Maintenance personnel are persons with adequate technical training, knowledge and experience who are familiar with and know how to avoid mechanically or electrically induced hazards.

Maintenance personnel must meet the following requirements:

- Technical training
- Knowledge and experience
- Knowledge of applicable standards
- Ability to assess assigned works
- Ability to identify hazards

## External professional personnel (SUSPA)

The external professional personnel are specially trained for the manufacturer's products and is familiar with every life stages of Height Adjustment System. The external professional personnel conduct the transport up to the transfer to the operator.

## Private person

A person who has no previous knowledge in the installation of mechanical and electrical components.

## 3 Safety Notices



### **WARNING**

#### **Danger of injury and material damage**

There are dangers posed by ignoring the installation instructions and all safety notices provided therein.

Read the installation instructions carefully before the initial start-up. Fulfill and follow the safety conditions required. Observe and follow both the general safety notices and also the special safety notices provided in the other chapters.

The component has been constructed using state-of-the-art technology and in line with established safety regulations. In order to prevent danger to life and limb of the user, third parties, or to the component, use the component only for intended purpose and in perfect operating condition in terms of safety.

The operator of the component or the persons assigned by the same are liable for property damage and personal injury resulting from non-compliance with the instructions provided in the installation instructions.

### 3.1 Obligations



### **WARNING**

#### **Danger of injury by disregarding the safety symbols**

There is risk of injury associated with disregarding the warning notices provided in the area of the component and in the installation instructions.

Please note all warning and safety notices in these installation instructions.

The following circumstances could increase the hazard potential of the component:

- Danger posed to persons through mechanical influences
- Malfunctions that may impair the safety during operation of the component

## 3.1.1 Operating Company's Obligations

This partly completed machinery is intended to be incorporated into other machinery, other partly completed machinery/equipment or to be joined with another framework so as to form a complete machine as specified under the Machinery Directive. The machine should be put into operation only after a conformity evaluation procedure in accordance with the Machinery Directive has been carried out for the complete machine.

## 3.2 Residual Risk

**IMPORTANT** There is a residual risk posed by inadvertent movement of the drives. The following are determined as potential causes for this:

- Damaged cables
- External influences (EMC)
- Defects in the lifting elements, the controller or on the manual switch
- ➔ Take the residual risk into consideration with the construction and while preparing the operating instructions of the final product.

## 3.3 Safety Equipment

The component is fitted with various safety equipment. This equipment serves to protect persons working on the component from any danger to life and limb arising from electrical and mechanical operations and to limit material damage to the component.

## 3.4 Additional Instructions

In principle, the provisions of the accident prevention regulations of the professional association also apply to all work on the Height Adjustment System.

In addition, observe and follow the

- Applicable and binding accident-prevention regulations
- Applicable and binding regulations at the place of use
- Recognized technical regulations for safe and professional working methods
- Existing environmental protection regulations
- Other applicable regulations

## 4 Design and Function

### 4.1 Technical Specifications

Technical specifications - Height Adjustment System				
Installation dimensions (Lifting element) SMS-I-40x80				
Dimensions outer profile:	40 mm x 80 mm			
Groove width:	8 mm			
Stroke (L Stroke):	150 mm	200 mm	300 mm	400 mm
Retracted length L <sub>in</sub> :	510 mm	560 mm	660 mm	760 mm
Extended length L <sub>ext</sub> :	660 mm	760 mm	960 mm	1160 mm
Installation dimensions (Lifting element) SMS-B-45x90				
Dimensions outer profile:	45 mm x 90 mm			
Groove width:	10 mm			
Stroke (L Stroke):	150 mm	200 mm	300 mm	400 mm
Retracted length L <sub>in</sub> :	510 mm	560 mm	660 mm	760 mm
Extended length L <sub>ext</sub> :	660 mm	760 mm	960 mm	1160 mm
Controller				
Input voltage:	230 V / 50 Hz (2,7 A)			
Output rating:	28 VDC 340 VA at 10% ED (1 min one at 25° C)			
Standby use:	< 4 W (Standard); <0,4 W (Optional)			
Protection class II:	Protective insulation			
Performance data				
Traversing velocity:	ca. 8 mm/s		ca. 16 mm/s	
Max. lifting capacity and holding load per lifting element:	150 kg		75 kg	
Max. lifting capacity and holding load with 4-leg system:	600 kg		300 kg	
Duty cycle:	10% (Traversing time 2 min; Break time 18 min)			
Protection type				
Lifting elements:	IP 40 in accordance with DIN EN 60529			
Controller:	IP 40 in accordance with DIN EN 60529			
Manual switch:	IP 40 in accordance with DIN EN 60529			
Traversing cycles				
At least 5,000 cycles in compliance with maintenance				

Table 5 Technical Specifications

**IMPORTANT** The noise emission level of the Height Adjustment System is considerably less than 70 dBA.

## 4.2 Design and Function of the Height Adjustment System

The lifting elements are driven by electric motors and synchronized by a controller. The system works purely electromechanically and without the use of hydraulics. The lifting elements are optimized for OEM or retrofit applications and consist of three important subsystems:

- Electrical lifting element
- Electrical controller
- Manual switch

The following explains how the subsystems work together and make the raising and lowering of the Height Adjustment System possible.



Figure 1 Electrical controller SMS SCT4



Figure 3 Simple manual switch UBM-F/2-p



Figure 4 Programmable manual switch UBS/6-LCD (optional)

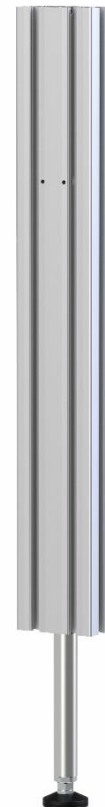


Figure 2 Electrical lifting element

The lifting elements are equipped with electro-mechanical drives. The controller converts AC power to 28V DC to operate the motors with pulse width modulation (PWM 15 kHz 0 - 100%). The controller is used to activate the raising and lowering of the lifting elements of the Height Adjustment System.

As soon as the operator presses the arrow keys (Up or Down) of the connected manual switch, the controller receives the signal to set the electro-mechanical drive of the lifting elements in motion. Depending on the direction of the arrow the motor moves the lifting elements up or down.

## 5 Transport

### 5.1 Safety Notices for Transport



#### **WARNING**

##### **Danger of falling loads**

There are risks caused by human misconduct and inadequately secured loads.

Allow only those individuals who have been specially trained to perform transportation work.  
Secure the load against changing its position.

Pay attention to the position of the center of gravity of the component during transport.

Secure the component for transport by heavy goods vehicle on the loading surfaces with suitable means.



#### **WARNING**

##### **Danger of injury due to unsecured transport routes**

There is the risk of stumbling or slipping while transporting the components.

Arrange for proper illumination of the routes, ramps and steps over which loads are moved.  
Remove obstacles and stumbling points.

#### **CAUTION**

##### **Damage caused by improper transport**

Transport with extended lifting elements may result in risk of damage to property or personal injury.

Retract the lifting element completely when transporting.

### 5.2 Transportation Procedure

The components have to be moved by suitable means. Use suitable cables, chains or straps for loading and unloading according to the load / weight.

**IMPORTANT** The shipment must be made by professional personnel of SUSPA GmbH. The further transport must be made by professional personnel and private persons. The following points must be observed for transporting / unloading of the components:

- ➔ Note the center of gravity.
- ➔ Avoid rubbing cables and lifting straps against sharp edges and corners.
- ➔ Check the delivered components for completeness, damage or any other abnormalities.
- ➔ Observe the applicable safety and accident prevention regulations during transport.

## 6 Installation



### ⚠ CAUTION

#### Danger of crushing

There is a risk of crushing due to the short distance to other objects and structures.

Make sure that the workplace has a minimum distance of 50 mm from other objects or structures. Make sure that walls, furniture, electrical wiring, or other solid structures do not impede the movement of the workplace during operation.

**IMPORTANT** The installation of the component must be carried out by professional personnel of SUSPA GmbH, other professional personnel, maintenance personnel and private persons.

**IMPORTANT** Do not lift the Height Adjustment System on the motor cables or power cords. Keep the motor cable and power cable away from heat, sharp edges, and moisture. Immediately suspend the operation of the product if you notice that the motor cable or power cord are damaged and replace the damaged components without delay. Never attempt to repair damaged motor cables or power cords.

**IMPORTANT** Check all components for any damage that may have occurred during transport or installation before operating the system. Do not try to dismantle the system or system components. Contact SUSPA GmbH in the event that components must be repaired or replaced.

### 6.1 Unpacking

Proceed with the necessary diligence and caution when unpacking the system components. Do not use any sharp-edged objects, cutters or knife blades in order to prevent damage to near electrical cables or components that may get damaged easily.

#### 6.1.1 Disposal of Transport and Warehouse Packaging

The disposal of the transport and warehouse packaging should be performed in accordance with the local disposal regulations and environmental protection laws applicable in the operator's country.

## 6.1.2 Checklist of All Components Included in the Delivery

Check the completeness of the delivery while unpacking the components. Use the appropriate delivery notes on the contents of the pallets and the manufacturer's packing list for this purpose.

Examples of scope of delivery would be:

For a 4-leg system:

- 4 x Electrical lifting elements
- 1 x Electrical controller
- 1 x Manual switch
- 1 x Cold device plug cable
- 4 x Leveling Feet (Optional)
- 4 x Fastening elements (Set Optional)

For a 8-leg system:

- 8 x Electrical lifting elements
- 2 x Electrical controller
- 1 x Manual switch
- 2 x Cold device plug cable
- 1 x Link cable
- 8 x Leveling Feet (Optional)
- 8 x Fastening elements (Set Optional)

## 6.2 Operating Conditions

Physical operating conditions	
Operating range:	Functional operation <ul style="list-style-type: none"> <li>▪ <b>Min + 5 °C</b></li> <li>▪ <b>Max + 40 °C</b></li> </ul> Relative moisture: <ul style="list-style-type: none"> <li>▪ <b>Max 80% at 32 °C, above that decreasing linearly to 50% at 40 °C</b></li> </ul>
Contamination:	No heavy contamination due to dust, acids, corrosive gases

*Table 6 Operating conditions*

- ➡ Do not operate the system outdoors. Do not expose the system to damp or wet conditions.
- ➡ Avoid environments with chemical agents or corrosive environments.
- ➡ Do not operate the system near flammable solvents, propellants and/or explosive substances (e.g. gas, vapor, dust, etc.).
- ➡ Do not expose the components of the Height Adjustment System to any vibrations and/or shock loads.
- ➡ Do not use the controller near the equipment that generates strong electromagnetic fields. This may impair the function.
- ➡ In order to prevent overheating in the controller, it should not be installed in constrained, non-ventilated or thermally insulating locations. Adequate air circulation must be ensured.

**IMPORTANT** Observe the country-specific regulations regarding setup and operation of workplaces with respect to lighting of the workstations.

For example: Lighting in accordance with ASR A3.4

The Technical Rules for Workstations (ASR) reflect the state of the art technology, occupational medicine and occupational hygiene and other sound knowledge for the setup and operation of workstations.

The values given in the table are the intensity of illumination on the reference area for visual tasks that may be horizontal, vertical or inclined.

Lighting requirements (metal machining and processing, foundries and casting)		
Working rooms, workplaces and jobs	Minimum value of the illumination intensity In lx	Minimum value of the color rendering Index Ra
Metal machining and processing, foundries and casting		
Assembly work:		
- Rough	200	80
- Medium-fine	300	80
- Fine	500	80
- Very fine	750	80

*Table 7 Lighting requirements*

## 6.3 Install Components

- ➔ Note the exact information of the installation dimensions provided in the schematic diagrams of the Height Adjustment System.

### 6.3.1 Installation in General

**⚠ CAUTION** Electrical components (lifting elements, electrical controllers, manual switches) should be connected or disconnected only with the power plug pulled out!

- ➔ Bring the lifting elements in such a manner at the workplace that the load on the system is balanced out (distributed uniformly).
- ➔ Attach the lifting elements vertically and parallel to each other, so that they do not block each other during lifting and lowering.
- ➔ Keep electrical cord away from sharp edges and moving parts.
- ➔ Avoid contact with moisture and heat.
- ➔ Attach the electrical wires and power cords to the workstation or structure using cable ties or clips.

**IMPORTANT** When routing electrical cables, make sure that the cables are not stretched or crushed. Position the cable such that stumbling is prevented. Use only accessories authorized and provided by SUSPA.

The Height Adjustment System works properly only if it has been put into operation properly and individual components are controlled correctly.

- ➔ First check whether the individual components are damaged. If this is the case, do not put the Height Adjustment System into operation, but have the damaged components replaced by your supplier.
- ➔ Also check the power cable for damage. Make sure to replace damaged power cables in any case.

## 6.3.2 Installing the Lifting Elements

- ➔ Remove the protective packaging in which the lifting elements are packaged.



*Figure 5 Unpacking*

- ➔ Align the workplace as described in the following in order to facilitate the positioning and installation of the components.



*Figure 6 Aligning the workplace (example: legs/lifting elements already mounted here)*

The lifting elements consist of a linear spindle actuator, which is installed directly in the aluminum mounting profile. Thus, these lifting elements can be attached directly to the base frame as legs, using commercially available connecting elements.

Depending on the requirements of this base frame, two common outer profile versions are available, which must be specified when ordering this system.

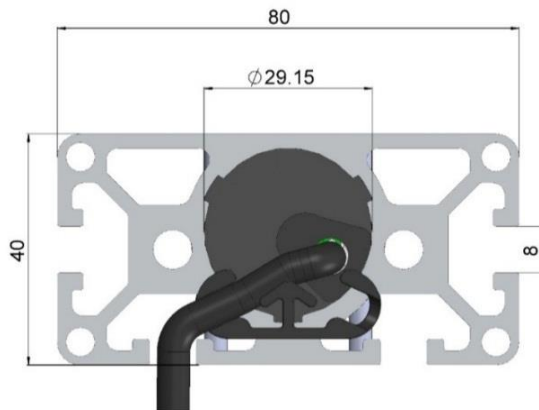


Figure 7 Lifting elements in profile (cross section) with the dimensions - SMS-I-40x80

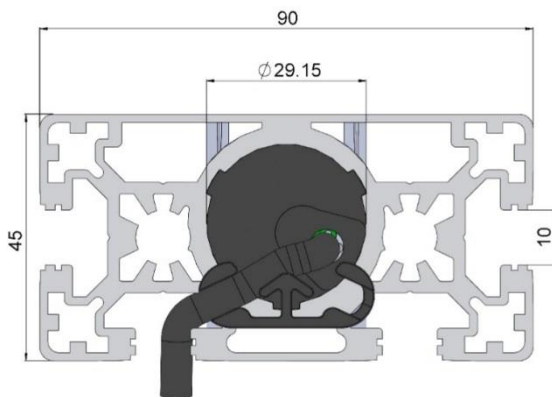


Figure 8 Lifting elements in profile (cross section) with the dimensions - SMS-B-45x90

- ➡ Attach the lifting elements directly to the base frame as legs. Use commercially available connection and fastening elements for this purpose (connecting brackets, bolt clamp connectors, etc.) and make sure that they are able to withstand the required loads.
- ➡ Check the connecting and fastening elements used on the lifting elements to ensure that they are fastened securely to the base frame. Make sure to tighten the connecting and fastening elements according to the recommended tightening torques of the respective manufacturer.

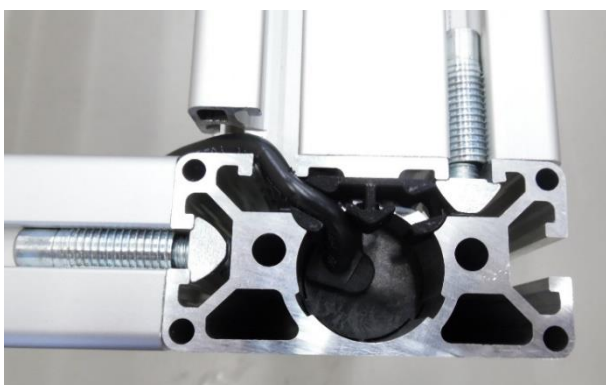
**IMPORTANT** When connecting the lifting elements to the base frame as legs, it is advantageous if the base frame rests on the frontal outer profile of the lifting elements and its load is thus supported (see also Figure 9). This reduces the load on the screw and clamp connections of the connection and fastening elements.



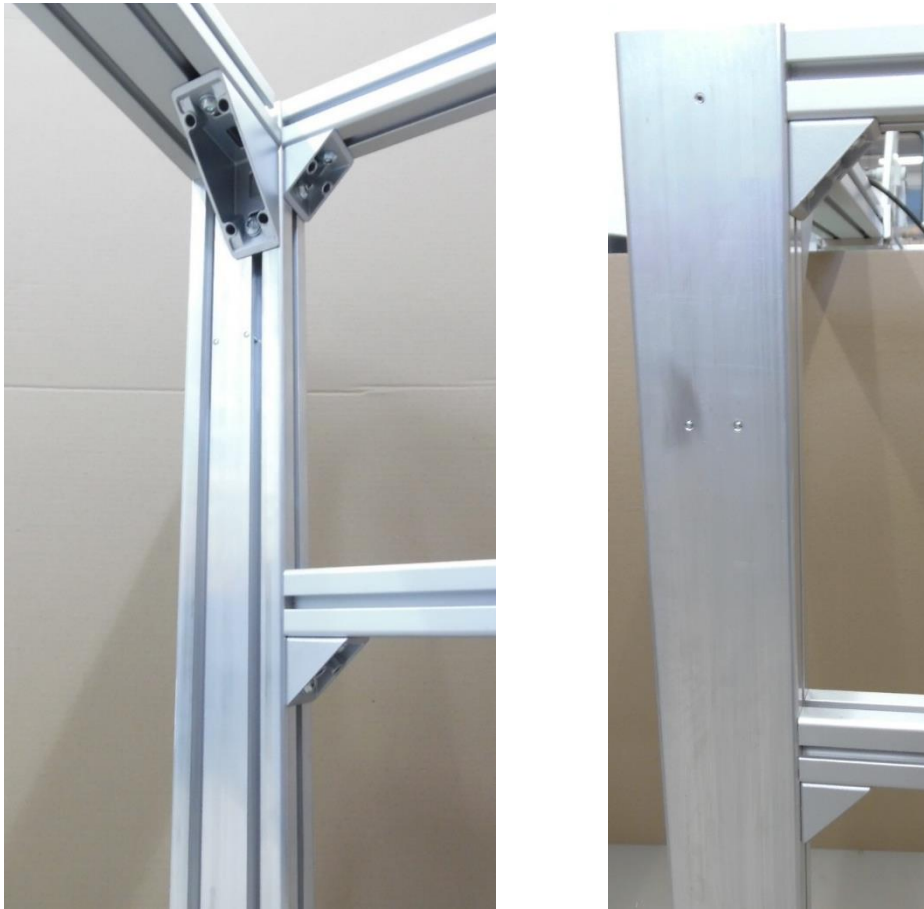
*Figure 9 Supporting connection of base frame on the frontal outer profile of the lifting elements*

The following figures show examples of connecting the lifting elements:

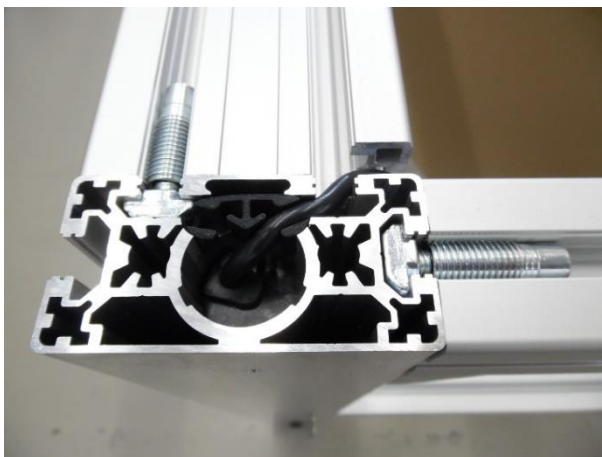
- SMS-I-40x80:                      Figure 10 and Figure 11
- SMS-B-45x90:                      Figure 12 and Figure 13



*Figure 10 SMS-I 40x80: Example for connecting the lifting element to the base frame by means of standard bolt clamp connectors*



*Figure 10 SMS-I-40x80: Examples of connecting the lifting element to the base frame by means of standard connection bracket (small/large)*



*Figure 11 SMS-B-45x90: Example for connecting the lifting element to the base frame by means of standard bolt clamp connectors*



*Figure 12 SMS-B-45x90: Examples of connecting the lifting element to the base frame by means of standard connection bracket (small/large)*

- ➔ Make sure that the electrical lines of each leg of the workplace can be laid without putting them under tension by maintaining the permissible bending radius of 57 mm (single) and 86 mm (multiple). The electrical wires to the lifting elements are each 2.5 m long.
- ➔ Screw the leveling feet (Optional) fully into the lifting elements.
- ➔ Position the workplace properly again such that the leveling feet stand on the floor.

**IMPORTANT** Take care to ensure that the workplace is not put down too abruptly in order to avoid damaging the lifting elements.

Glide  
Adapter

Page 28

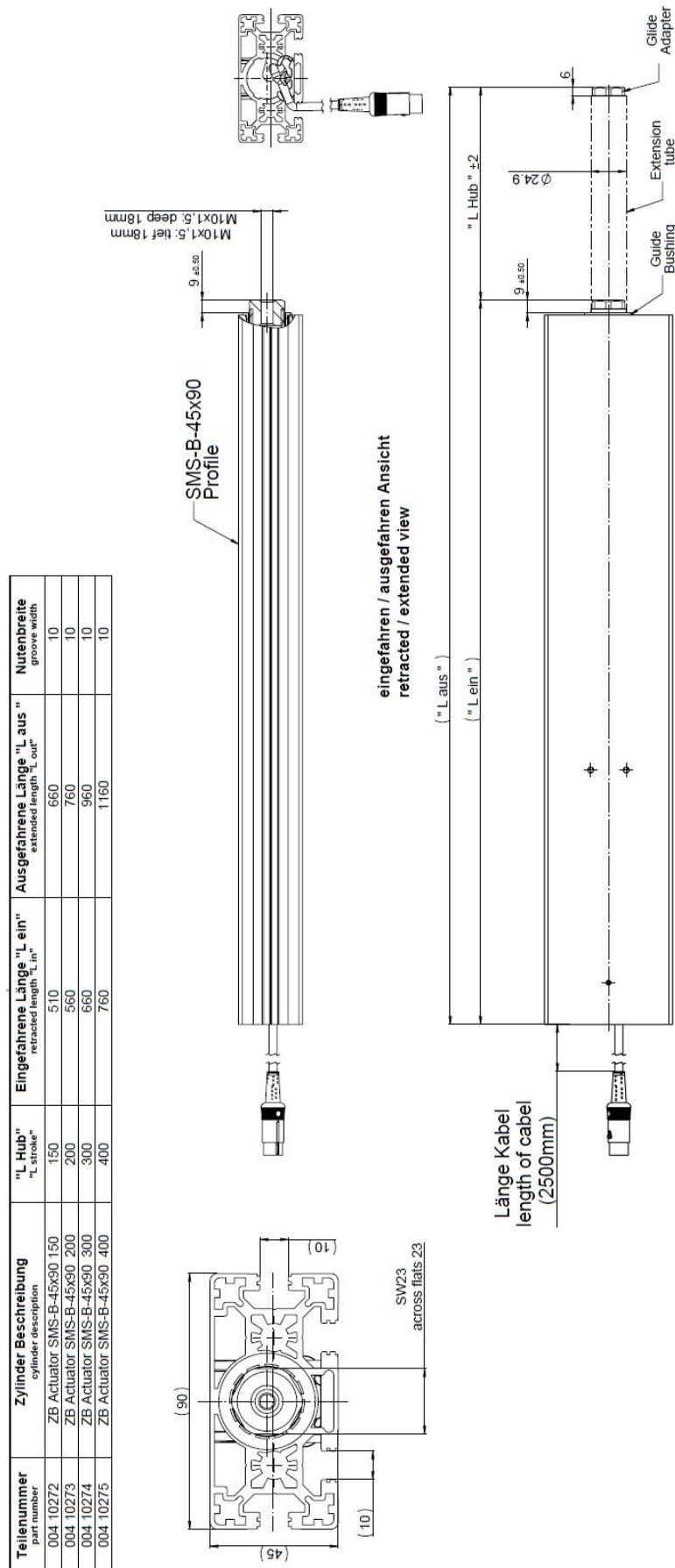


Figure 14 Dimensions lifting element SMS-B-45x90

## 6.3.3 Installing the Electrical Controller

**IMPORTANT** Ensure sufficient cable length for the lifting elements when positioning the electrical controller. The mounting material needed for this is individual and not included in the scope of delivery.

- Mount the electrical controller with four screws to the workplace.
- When attaching, insert metal washers between the screws and the electrical controller to prevent damage to the controller housing.
- Do not mount / operate the controller:
  - above or in front of heat sources (e.g. radiators),
  - at locations exposed to direct incidence of sunlight,
  - at or near easily inflammable materials or
  - near high-frequency equipment (e.g. transmitters, radiation equipment or similar devices).
- Make sure that connecting cables do not have kinks or are not exposed to mechanical stress.

For protection against over-voltage that may occur during thunderstorms, it is recommended that you install over-voltage protection. Get advice from an electrical installation engineer.

**IMPORTANT** Observe and follow the aspects given below in the course of installation:

- Select a centralized installation location. Empirical values have demonstrated that this offers the easiest option for the cabling.
- Fix the controller tightly with screws (Figure 15). In this way, you avoid malfunctions caused by loose plug-in connections or undesirable noise development.
- During installation, make sure that the controller is freely accessible even after installation. This enables ease of working in case you need to do service work.
- Ensure that there is adequate air circulation during installation. There is, in fact, little heat developed by the controller, but nonetheless, it exists.



Figure 15 Attaching the electrical controller (screw linkages: left 3x, right 1x)

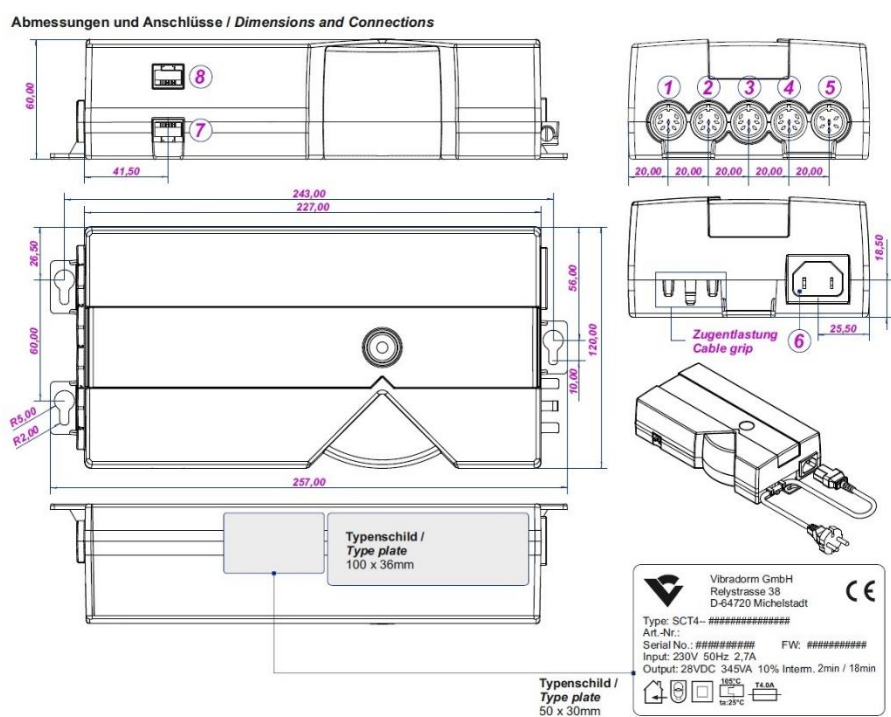


Figure 16 Electrical controller dimensions-connections

## 6.3.4 Installing the Manual Switch

- Fasten the manual switch to an appropriate position below the work surfaces.

**IMPORTANT** Ensure sufficient cable length for the electrical controller when positioning the manual switch.

- Mount the manual switch with two screws to the workplace.
- When attaching, insert metal washers between the screws and the manual switch to prevent damage to the controller housing.



Figure 17 Attaching the simple manual switch UBM-F/2-p

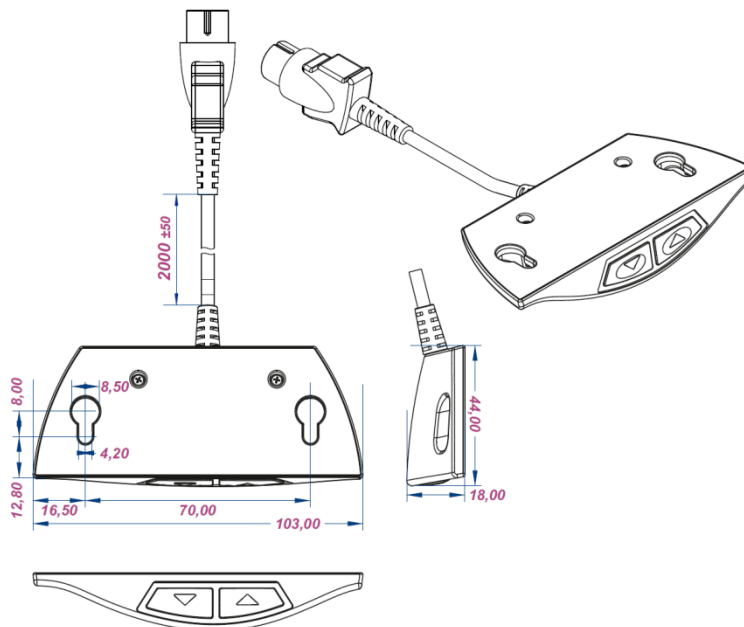


Figure 18 Dimensions of the simple manual switch UBM-F/2-p



Figure 19 Attaching of the programmable manual switch UBS/6-LCD

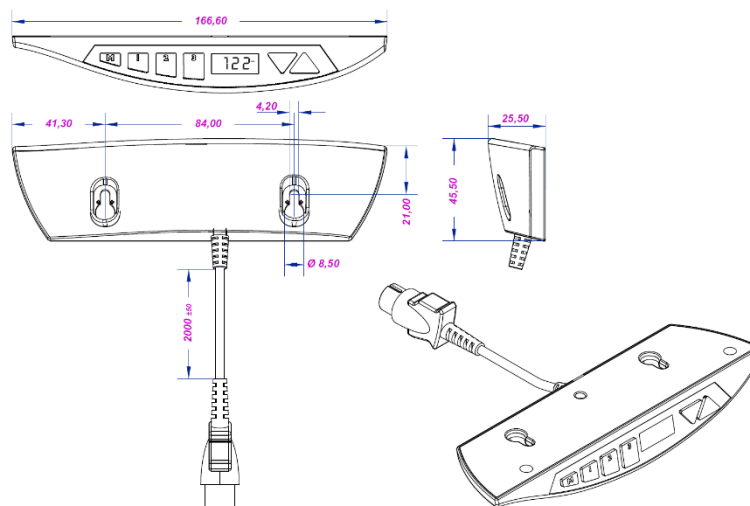


Figure 20 Dimensions of the programmable manual switch UBS/6-LCD

## 6.3.5 Overall Installation

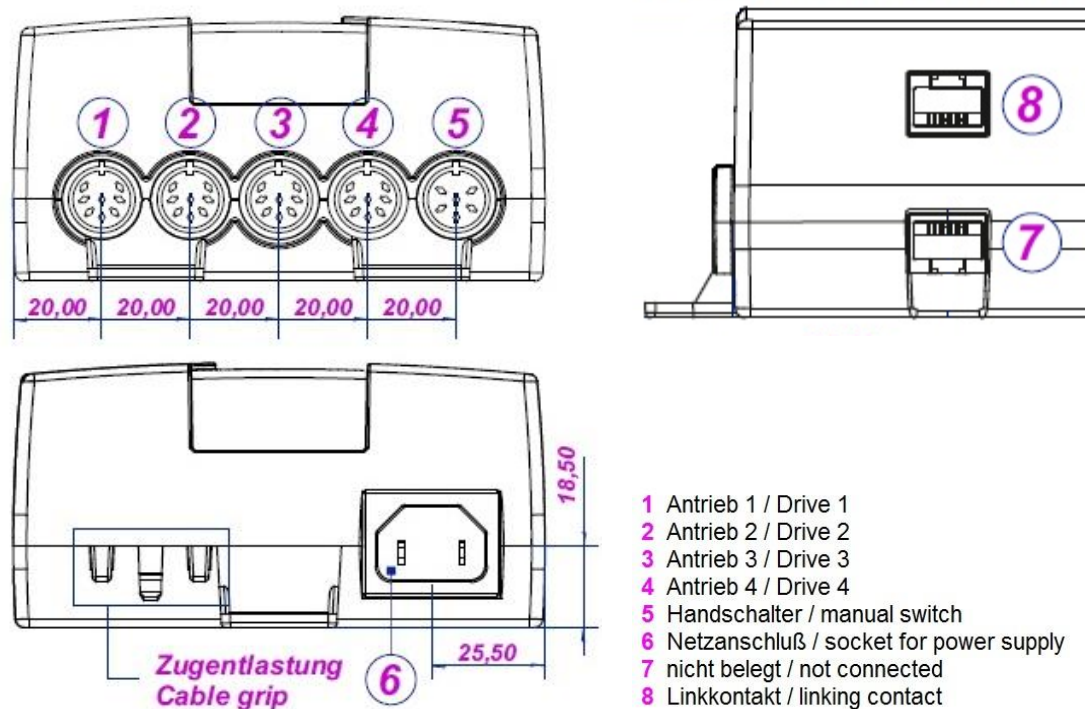


Figure 21 Connections of the electrical controller

- ➔ Connect the plug of the manual switch to the electrical controller using the appropriate input (Figure 21 Terminal No. 5)
- ➔ Connect the plug of the lifting elements with electrical controller (Figure 21 Terminal No. 1-4)
- ➔ Connect the power cord to the appropriate input of the electrical controller (Figure 21 Terminal No. 6)

**IMPORTANT** The SUSPA Movotec SMS system can be supplied in different variants. The supply variants contain 1 to 8 lifting elements. There is a different controller variant depending on the supply variant. The correct variant of the controller can be supplied only if you specify the supply variant at the time of placing the order.

If more than four lifting elements are used in a Height Adjustment System, then the two electrical controllers must be connected to the connector contacts with a link cable (Figure 21: Connection no. 8). There is no contact made with connection no. 7 and thus, it remains open.

**CAUTION** Two controllers are necessary if you are using more than four lifting elements in one Height Adjustment System. The power connector of the two controllers must be joined via a connector strip or via a distribution system provided by the customer. After the power connectors have been connected, they must be coupled to the power source (Socket).

- ➔ Never connect the two controller power connectors separately to the power supply (Socket).

## 6.3.6 Laying of Electric Wires and Cables

The electrical cables can be laid in the grooves of the upper connecting struts of the base frame. Using commercially available covers that fit directly into the grooves, the lines can be affixed.



*Figure 22 Cable guide in the groove with cover*

Optionally, the electrical cables can also be laid with cable holders that are fastened in the grooves. The cables are attached to the cable holders with cable ties.



*Figure 23 Cable guide with cable holders*

- ➡ When laying the cables, make sure that
  - they cannot get jammed
  - they are not subjected to mechanical loads or stresses (tension, pressure or bending etc.)
  - they cannot be damaged in any other way

- ➔ Fasten the cables with adequate strain relief and adequate protection against kinks.
- ➔ Wind the excess length of cables together in rolls with a diameter of approx. 150 mm and fasten them with the fastening clamps and/or cable ties to the workplace.
- ➔ Use caution so as not to damage the wires.
- ➔ Check the electrical lines and cables to ensure that they are fastened securely to the workplace and have not been damaged during the operation.



*Figure 24 Coiling of electric wires and cables*

## 6.4 Space Requirements

For detailed information on space requirements refer to the Section 4.1 "Technical specifications".

## 6.5 Component Alignment

A level will be required to ensure the entire work surface is horizontal and level.

- ➔ Create a good starting point for leveling, by completely threading the leveling feet in the lifting elements. The screw insertion depth is up to 32 mm. In the leveled state, the screw insertion dept should be at least 18mm.
- ➔ Place a level on the surface of the workplace.
- ➔ Ensure a very uniform load distribution when using several lifting elements.



*Figure 25 Adjusting the workplace with a spirit level*

- By partially unscrewing the leveling feet of the lifting element adjust the individual leveling feet such that the working surface is leveled and all attached lifting elements have uniform contact with the ground.

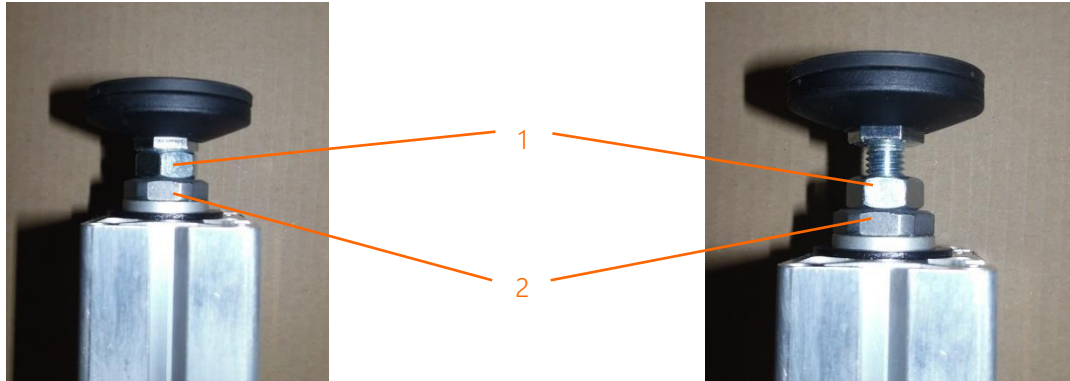


Figure 26 Adjustable leveling foot (Optional)

- 1 Leveling feet with threaded bolts and locknut SW17
- 2 Steel insert with SW23 (lifting element)

- Fix the locknuts tightly to all leveling feet to ensure that the workplace remains leveled during operation.

**⚠ CAUTION** Make sure to hold the 23 mm steel inserts with a wrench while locking down the leveling feet locknuts (see Figure 26). Otherwise, the lifting elements may be damaged.

**IMPORTANT** One indicator of a uniform load distribution during operation of the Height Adjustment System is that all the lifting elements in the area of drive units (motor / cable outlet) have the same temperature.

## 7 Operation

### 7.1 Warning Notices for Operation



#### **WARNING**

##### **Crushing or amputation risk due to moving parts**

There are risks posed by removing components of the protective housing.

Do not operate the Height Adjustment System if the protective housing of the components has been removed.

**IMPORTANT** Do not allow the electrical Height Adjustment System to be operated by children. If the device is used near children, ensure supervision by adults and activate the Childproof lock (see Section 7.6.1).

### 7.2 Tests Prior to Switching the Machine On

- ➔ Check all electrical and mechanical connections.
- ➔ Check whether there are damages to electrical wires which may have occurred during unpacking or installing of the system.
- ➔ Check all system components in order to ensure that they are fastened securely to the workplace.
- ➔ Make sure that the maximum load is not exceeded. The maximum load is the entire load including the raised workplace and all objects that are located on the working surface.
- ➔ Connect the workplace to the power supply only after checking the above-mentioned aspects.
- ➔ Allow the controller to adjust to the change from cold to hot environments for a few hours before putting them into operation, otherwise condensed water may damage them.

## 7.3 Duty Cycle

The duty cycle refers to the time period in which a motor or system is in motion, compared with the rest period.

The Height Adjustment System is not designed for continuous operation without rest periods. It is designed for intermittent use and has a maximum 10% duty cycle. This means that after operating the Height Adjustment System for two minutes, you must let it rest for 18 minutes before it can be reused. It should be noted that the maximum period of use of the system is two minutes. The limited duty cycle of 10% is stored as a security measure in the electrical controller system.



### CAUTION

#### **Danger posed by thermal energies**

The motor housing may become hot if the operating time exceeds the duty cycle.

The duty cycle must not be exceeded in order not to damage the system. Exceeding the duty cycle on a regular basis, can lead to system malfunction or damage to the lifting element motor(s) and/or electrical controller. Moreover, this could also result in the premature wear of single components, thereby reducing the lifetime of the Height Adjustment System.

Ensure adequate ventilation to ensure sufficient heat dissipation from the components of the Height Adjustment System and do not exceed the duty cycle.

## 7.4 Manual Switch

All functions of the Height Adjustment System can be controlled using the manual switch.



*Figure 27 Simple manual switch UBM-F/2-p*



*Figure 28 Programmable manual switch UBS/6-LCD (optional)*

## 7.4.1 Function of the Manual Switch

### 7.4.1.1 Simple Manual Switch UBM-F/2-p





Symbol	Function
	Up: Press the "Up" button until the workplace has reached the desired height or the maximum height.
	Down: Press the "Down" button until the workplace has reached the desired height or the minimum height.
 + 	Reset: Press both direction keys simultaneously. The workplace moves gradually to the lower mechanical end stop. The controller acknowledges this reset drive with a signal tone.

Table 8 Function of the simple manual switch UBM-F/2-p

### 7.4.1.2 Programmable Manual Switch UBS/6-LCD (Optional)





Symbol	Function
	Up: Press the "Up" button until the workplace has reached the desired height or the maximum height.
	Down: Press the "Down" button until the workplace has reached the desired height or the minimum height.
 + 	Reset: Press both direction keys simultaneously. The workplace moves gradually to the lower mechanical end stop. The controller acknowledges this reset drive with a signal tone.
Key "M"	Memory button for storing the memory positions. Optionally you can also change the upper and lower lifting limits via the setting mode.
Keys "1", "2" and "3"	Up to three memory positions can be stored. To reach the memory position press and hold the respective key.

Table 9 Function of the programmable manual switch UBS/6-LCD

Storing the memory positions:

Move to the desired position and press the "M" key three times and then press the Key 1, 2 or 3. The controller acknowledges the successful storage of the position with a signal tone. The memory position is retained even after a power failure.

Repeat the procedure described to store new memory positions.

## 7.5 Perform Reset

A reset must be performed both during the initial start-up and upon a power failure during the process. This is used to protect the workplace. Proceed as follows:

- ➔ On the manual switch, press both direction keys simultaneously.
- ➔ The workstation moves at a slow speed until the lower mechanical end stop on the lifting elements is reached.
- ➔ The controller acknowledges this reset drive with a signal tone.
- ➔ The workplace can now be moved with the two direction buttons on the manual switch.

**IMPORTANT** If the Height Adjustment System does not function immediately, disconnect power from the unit and contact the authorized dealer.

**IMPORTANT** Do not disassemble the system, unless authorized by the SUSPA GmbH. Any attempt to repair the system or the system components without the authorization of SUSPA GmbH will void the warranty.

## 7.6 Faults and Error Indications

### **WARNING**

#### **Risk of hand injury as a result of failure to observe the danger zone**

There are risks of injuries resulting from improper conduct. Never remove wedged parts or foreign bodies with your bare hands.

Use suitable aids.

## 7.6.1 Fault and Operational Messages

### 7.6.1.1 Manual Switch Error Messages

All errors are displayed on the manual switch with fault or operating messages as error codes.

3-digit LCD (programmable manual switch)	Signal tone (simple manual switch)	Meaning
A64	Continuous during operation command	Compulsory reset block run must be carried out
A65	2x	Childproof lock is active
AC9	1x	Time limit restriction has been achieved (2 min / 10% operation; 18 min / 90% break)
AD7	10x	Overcurrent / short circuit of the lifting elements
A6F		Drive monitor pulse difference (load differences) of the lifting elements is too large

Table 10 Error and status codes

### 7.6.1.2 Important Display Codes and their Meanings

#### Compulsory reset

The Height Adjustment System is not properly initialized during startup or is disconnected from the main power during the run or the difference in height of the lifting elements is too large due to improper operation.

Indicator: Drive commands are rejected during a keystroke with signal tone, error code A64 in manual switch display.

Solution: Ensure correct connection of the lifting elements and the power grid cable to the controller, check whether the mechanism is not too stiff or jammed.

#### Perform reset drive (block drive):

Press both direction keys and hold, until the drive arrives at the lower mechanical end position. (Controller acknowledges successful reset with signal tone)

Childproof lock is active

Childproof lock is activated by holding the "M" key for 10s.

Indicator: Drive commands are acknowledged with dual tone and not implemented, error code A65 in manual switch display.

Solution: Childproof lock is deactivated by holding the "M" key for 10s.

Drive monitoring

Difference between the synchronously controlled drives is too large.

Indicator: Drive commands are not implemented, error code A6F in manual switch with display (LCD).

Solution: Check connection of the lifting elements and verify and ensure their correct function. Then perform reset.

Connection error

Manual switches, motors or power plugs are not correctly connected to the controller.


Indicator: Diverse symptoms

Solution: Check the correct connection of the components, make sure that all connectors are firmly plugged into the corresponding sockets!

## 7.6.2 Troubleshooting

This section contains remedial measures in case of malfunctions. If an error or fault occurs that is not listed in this table, please contact your supplier.

The listing below handles problems that are caused directly in connection with the controller.

 **CAUTION** The troubleshooting and fault rectification should be done only by a specialist who has completed his professional education as an electro-mechanical installation engineer or an equivalent qualification. Make note of the user groups in section 2.5.3.

**IMPORTANT** Pay attention to the initialization (reset movement) in section 7.5.

	Manual switch with status LED and / or display	Manual switch without status LED and / or display
1. The controller is not work-ing; General Testing	<p>If nothing is output on the display and / or the status LED does not light up when pressing a button, check:</p> <ul style="list-style-type: none"> <li>whether the power cable is plugged in properly into the controller</li> <li>whether the power cable is plugged in properly into the socket</li> <li>whether the socket is supplying power or is switched on</li> <li>Replace the manual switch in order to ensure that the manual switch is not defective</li> <li>Notify your service partner if the controller is still not working.</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>whether the power cable is plugged in properly into the controller</li> <li>whether the power cable is plugged in properly into the socket</li> <li>whether the socket is supplying power or is switched on</li> <li>Replace the manual switch in order to ensure that the manual switch is not defective</li> <li>If the error persists, continue with step 2.</li> </ul>
2. The controller is not work-ing, but no acoustic signal is heard (beep tone)	<ul style="list-style-type: none"> <li>Initialize the controller.</li> <li>Notify your service partner if the controller is still not working.</li> </ul>	
2. The controller is not work-ing, but no acoustic signal is heard (beep tone)	<p>If the table has been moved previously for more than 2 minutes:</p> <ul style="list-style-type: none"> <li>Wait for 18 minutes and try again (switch-on period exceeded)</li> </ul> <p>If the table has not been moved previously:</p> <ul style="list-style-type: none"> <li>Initialize the controller.</li> <li>Notify your service partner if the controller is still not working.</li> </ul>	
4. The table moves briefly and then comes to a stand-still	<ul style="list-style-type: none"> <li>Initialize the controller.</li> <li>Notify your service partner if the controller is still not working.</li> </ul>	
5. The table is moving at a slant	<ul style="list-style-type: none"> <li>Initialize the controller.</li> <li>Check the load on the table if the fault persists.</li> <li>Initialize the controller once more.</li> <li>Notify your service partner if the controller is still not working.</li> </ul>	

Table 11 Troubleshooting

## 7.6.2.1 Malfunctions in the Cycle Procedure

- Operation is interrupted
- The type of malfunction is displayed on the manual switch
- The fault must be rectified
- ➔ Please contact the professional personnel when the malfunction is not rectified without additional assistance.

## 8 Service and Maintenance

### 8.1 General

- ➔ Observe and follow the general accident prevention guidelines.
- ➔ Carry out prescribed adjustment, maintenance, and upkeep work according to schedule.
- ➔ Replace defective components as quickly as possible.
- ➔ Only use tools that are in perfect condition.
- ➔ Keep suitable containers ready for small parts that may have to be disassembled.
- ➔ Only use original spare parts approved by the manufacturer.
- ➔ Tighten screw connections that have been loosened after doing maintenance and service work.
- ➔ Reattach disassembled protective devices before the first re-commissioning. Make sure that the protective equipment is functioning properly.
- ➔ Perform a functional test (test run) after maintenance or repair work.
- ➔ Check the proper function of all safety and protective devices.
- ➔ Remove any used tools, screws, aids or other objects from the operational area of the Height Adjustment System.

## 8.2 Instructions for Maintenance

### 8.2.1 Cleaning



#### **WARNING**

##### **Danger of injury by disregarding the manufacturer's instructions**

The function of the components may be impaired as a result of ignoring the manufacturer's cleaning instructions.

Follow all applicable environmental regulations when cleaning.

- Remove all cleaning aids after performing cleaning work.
- Retract the Height Adjustment System before cleaning.
- Remove the load from all lifting elements before maintenance works.
- Unplug the motor control from the mains before cleaning.
- Stabilize the workplace or the structure on which the Height Adjustment System is secured before maintenance works.
- Allow the components to cool off before cleaning.
- Clean the system components with a mild detergent and a damp cloth.
- Liquid entry of any kind must be strictly avoided.
- Do not use any corrosive detergents or high pressure washing systems to clean the components of the Height Adjustment System.
- Before restarting operation make sure the system is clean and dry.

## 8.3 Maintenance

The Height Adjustment System should be checked regularly to determine whether there are conditions that lead to excessive wear or damage to components. Especially the following possible causes of system failure should be considered.

**IMPORTANT** The maintenance instructions given in the following must be understood as recommendations by the manufacturer. The operator of the Height Adjustment System is obligated to document maintenance-related observations and to supplement and add specifications to the maintenance list in these installation instructions on their own. In addition, the maintenance instructions of the manufacturers of outsourced parts must be observed and followed!

## 8.3.1 Changing Load Conditions

- ➔ Correct the overload conditions immediately and also make sure that there is even load distribution on the workplace in order to avoid premature wear of the mechanical components.
- ➔ During the further operation note that the system remains balanced and that the mounted lifting elements have uniform contact with the ground.

**IMPORTANT** One indicator of a uniform load distribution is that all the lifting elements in the area of drive units (motor / cable outlet) have the same temperature.

## 8.3.2 Contamination

No sterile cleanliness is necessary, but regular cleaning will prolong the life of the system. Dust and dirt can cause wear in moving components, such as shafts and bearings. Therefore, efforts should be made to keep the components clean during the entire operating period.

## 8.3.3 Damages to Electrical Wires

Check the insulation of the electrical wires for visible signs of aging and wear. Replace defective or damaged wiring.

## 9 Decommissioning

### 9.1 Component Storage

The storage area should be cool and dry in order to prevent corrosion on the Height Adjustment System parts.

- Pack the Height Adjustment System parts in such a way that they are protected from damages by external influences during storage.
- If necessary, use cardboard boxes and other packaging material.
- Secure the Height Adjustment System parts against accidental tilting and instability.

Transport and storage conditions	
Temperature:	-25 °C to +60 °C
Rel. Moisture:	10% to 95% (non-condensing)
Air pressure:	106 kPa to 70 kPa

Table 12 Transport and storage conditions

### 9.2 Disposal of Components

- Dispose of the packaging material in accordance with national regulations.
- Dispose of cardboard packaging, protective packaging made of plastics and preserving agents separately and professionally.

The users are obliged to return the old equipment to a returns center for old electrical and electronic equipment.

The disposal of the controller is subject to the Elektro-G (Electrical Equipment Act), the EC Directive 2002/95/EC internationally (RoHS with effect from 7/1/2006) or the respective national legislation. The disposal of the components (also operating materials) in other countries should be performed in accordance with the local disposal regulations and environmental protection laws in the country where the machine is used.

If the equipment has reached the end of its life cycle, ensure a safe and professional disposal when dismantling, in particular for those parts or substances which are hazardous for the environment. This includes lubricants, plastics and batteries etc.

- Have the machine disposed of properly by an authorized specialist company on account of the potential risk of environmental pollution.

## 10 Appendix

### 10.1 Index of Tables

Table 1 Signal words and signal colors .....	5
Table 2 Symbols.....	6
Table 3 Warning .....	6
Table 4 Target group .....	11
Table 5 Technical Specifications.....	15
Table 6 Operating conditions .....	20
Table 7 Lighting requirements.....	21
Table 8 Function of the simple manual switch UBM-F/2-p.....	41
Table 9 Function of the programmable manual switch UBS/6-LCD .....	41
Table 10 Error and status codes .....	43
Table 11 Troubleshooting.....	45
Table 12 Transport and storage conditions.....	50

## 10.2 Index of Figures

Figure 1 Electrical controller SMS SCT4 .....	16
Figure 2 Electrical lifting element.....	16
Figure 3 Simple manual switch UBM-F/2-p .....	16
Figure 4 Programmable manual switch UBS/6-LCD (optional).....	16
Figure 5 Unpacking.....	23
Figure 6 Aligning the workplace (example: legs/lifting elements already mounted here) .....	23
Figure 7 Lifting elements in profile (cross section) with the dimensions - SMS-I-40x80 .....	24
Figure 8 Lifting elements in profile (cross section) with the dimensions - SMS-B-45x90.....	24
Figure 9 Supporting connection of base frame on the frontal outer profile of the lifting elements .....	25
Figure 10 SMS-I 40x80: Example for connecting the lifting element to the base frame by means of standard bolt clamp connectors .....	25
Figure 11 SMS-B-45x90: Example for connecting the lifting element to the base frame by means of standard bolt clamp connectors .....	26
Figure 12 SMS-B-45x90: Examples of connecting the lifting element to the base frame by means of standard connection bracket (small/large).....	27
Figure 13 Dimensions lifting element SMS-I-40x80 .....	28
Figure 14 Dimensions lifting element SMS-B-45x90 .....	29
Figure 15 Attaching the electrical controller (screw linkages: left 3x, right 1x) .....	31
Figure 16 Electrical controller dimensions-connections.....	31
Figure 17 Attaching the simple manual switch UBM-F/2-p .....	32
Figure 18 Dimensions of the simple manual switch UBM-F/2-p.....	32
Figure 19 Attaching of the programmable manual switch UBS/6-LCD .....	33
Figure 20 Dimensions of the programmable manual switch UBS/6-LCD .....	33
Figure 21 Connections of the electrical controller .....	34
Figure 22 Cable guide in the groove with cover .....	35
Figure 23 Cable guide with cable holders .....	35
Figure 24 Coiling of electric wires and cables .....	36
Figure 25 Adjusting the workplace with a spirit level .....	37
Figure 26 Adjustable leveling foot (Optional) .....	38
Figure 27 Simple manual switch UBM-F/2-p.....	40
Figure 28 Programmable manual switch UBS/6-LCD (optional) .....	40

## 10.3 Incorporation

### EC-Declaration of Incorporation

in accordance with Machinery Directive (2006/42/EC)

The manufacturer declares herewith

SUSPA GmbH  
Eisenhämmerstrasse 3  
92237 Sulzbach-Rosenberg  
GERMANY

that the design of the partly completed machine

Machine identification: SUSPA Movotec SMS-I / SMS-B  
Year of construction: 2017  
Designated use: The SUSPA Movotec SMS (Spindle Motor System)  
is used for height adjustment

the delivered version is compliant with Directive 2006/42/EC of the European Parliament and of the Council dated 17 May 2006 on machinery, and conforms with the following harmonized standards and normative documents to which this declaration refers:

Applicable directives: EC Machinery Directive (2006/42/EC)  
EC Directive for Electromagnetic Compatibility (2014/30/EU)

Applied harmonized standards:

1. DIN EN ISO 12100:2011  
Safety of machinery – Risk assessment and risk reduction
2. DIN EN ISO 13849-1:2008  
Safety of Machinery - Safety-related components of control systems - Part 1: General design guidelines
3. DIN EN 60335-1:2012 (without functional safety chapters 19.11; 22.46 and Annex R)  
Safety of electrical appliances for household and similar purposes
4. DIN EN 61000-6-1/-6-2/-6-3/-6-4 (partially)  
Electromagnetic compatibility (EMC)

The technical documentation for the partly completed machine is available.

We hereby guarantee that the certification procedure has been carried out in accordance with the Machinery Directive 2006/42 / EC. The start-up is prohibited until it has been determined that the machine into which the above mentioned partly completed machine is to be installed complies with the provisions of Machinery Directive 2006/42 / EC. This declaration will lose its validity if any modifications are made to the partly completed machine without consultation with us. Any unauthorized modifications in this sense excludes any liability on our part.

Sulzbach-Rosenberg, on

2017-11-27



Signature