

# Junction box

# J-BOX

## Assembly and Operating Manual



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Dear customer,

congratulation on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase.

Kindest Regards

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## 1 About this manual

This instruction is an integral part of the product and contains important information for a safe and proper assembly, commissioning, operation, maintenance and helps for an easier trouble shooting.

Before using the product, read and note the instruction, especially the chapter "Basic safety notes".

### 1.1 Warnings

The following signal words and symbols are used to highlight dangers.

#### 1.1.1 Signal words

<b>DANGER</b>	Dangers for persons. Non-compliance will inevitably cause irreversible injury or death.
<b>WARNING</b>	Dangers for persons. Non-compliance may cause irreversible injury or death.
<b>CAUTION</b>	Dangers for persons. Non-observance may cause minor injuries.
<b>ATTENTION</b>	Information about avoiding material damage

#### 1.1.2 Symbols



Warning about a danger point



Warning about dangerous electrical voltage



Danger of magnetic field



Danger of falling down workpieces



General mandatory sign to prevent material damage

## 2 Basic safety notes

### 2.1 Intended use

This junction box has exclusively been designed as a connection between SCHUNK electro-permanent-chucks and SCHUNK electronic control units, meant to operate machine tools for the metal cutting processing of workpieces.

This junction box must be positioned and installed in a place complying with its corresponding IP-class.

The requirements of the applicable standards must be observed and complied with. The junction box may be used only in the context of its defined application parameters.

To use this unit as intended, it is also essential to observe the technical data and installation and operation notes in this manual and to comply with the maintenance intervals.



#### **DANGER**

##### **Danger due to short circuit**

- The junction box must be installed outside of the machine tool and must always be protected against water and/or operating fluids from the machine and protected against metal chips.

#### **NOTE**

This junction box must not be put into service until the machine tool, for which the junction box is provided, satisfies the requirements of the Machinery Directive 2006/42/EC!!

### 2.2 Environmental and operating conditions

- Use the junction box only within its defined application parameters. "Technical data" ([☞ 5, Page 10](#)).
- Make sure that the environment is clean and the ambient temperature corresponds to the specifications.

## 2.3 Product safety

Dangers arise from the use of the junction box, if e.g.:

- the junction box is not used in accordance with its intended purpose.
- the junction box is not installed or maintained properly.
- the safety and installation notes are not observed.

Avoid any manner of working that may interfere with the function and operational safety of the junction box.

Wear protective equipment.

### NOTE



More information is contained in the relevant chapters.

### 2.3.1 Protective equipment

Provide protective equipment as per EC Machinery Directive.

## 2.4 Personnel qualification

Installation, connection, maintenance, and repair of the junction box may be performed by trained specialist personnel, only. Every person called upon by the operator to work on the junction box must have read and understood the complete assembly and operating manual especially the chapter "Basic safety notes" ([👉 2, Page 5](#)). This applies particularly to personnel only used occasionally, such as maintenance personnel.

	 <b>DANGER</b>
	<p><b>Danger due to a magnetic field.</b> The junction box is always linked to the use of a magnetic system. The following persons must not come into contact with it:</p> <ul style="list-style-type: none"><li>• Persons with pacemakers.</li><li>• Persons with metal or electronic prostheses.</li><li>• Persons with insulin pumps.</li><li>• Persons with muscular stimulation systems.</li><li>• Pregnant women.</li></ul> <p>These persons should always keep a safe distance of at least 2m from the magnetic system.</p>

## 2.5 Using personal protective equipment

When using this product, observe the relevant industrial safety regulations and use the personal protective equipment (PPE) required!

- Use protective gloves, safety shoes and safety goggles.
- Observe safety distances.
- Minimum safety requirements for the use of equipment.

## 2.6 Notes on particular risks

- Remove the power supply before installation, modification, maintenance, or adjustment work.
- Ensure that no residual energy remains inside the system.
- Perform maintenance, modifications, and integrations outside the danger zone.
- For all work, secure the junction box against accidental operation.

### 3 Warranty

The warranty is valid for 12 months from the delivery date to the production facility under the following conditions:

- Intended use in 1-shift operation
- Observe the mandatory maintenance intervals.
- Observe the environmental and operating conditions.

Parts touching the work piece and wearing parts are not part of the warranty.

**Procedure in the event of warranty** The buyer agrees to send a written detailed report on newly discovered defects of the junction box to SCHUNK within 10 days after identification.

## 4 Scope of delivery



*Fig. 1*

The Junction box will be delivered as complete unit.


## 5 Technical Data

Type	0420184	0420185	0420186	0422940	0422941	0422942	0422943	0422944	0422945	0422946
Mains voltage	Depending on the control unit									
Frequency	Depending on the control unit									
Phases	Depending on the control unit									
Rated current	Depending on the control unit									
Rated short circuit current	Depending on the control unit									
IP rating	IP20, after having fastened each connector									
Activation time	~ 2 s	~ 4 s	~ 4 s	~ 3 s	~ 5 s	~ 6 s	~ 7 s	~ 8 s	~ 6 s	~ 8 s
Activation change	1 (de-) magnetization - max. every 3 min.									
Weight	~4 kg	~7 kg	~4 kg	~6 kg	~9 kg	~10 kg	~12 kg	~13 kg	~6 kg	~7 kg
Ambient temperature	5° - 55° C									
Ambient conditions	Operation in dry interiors with a maximum relative air humidity of 50%. Protect product from caustic vapours and excessive heat.									

## 5.1 Identification plate

The identification plate is on the backside of the junction box:

Id.No.		Type	
Serial No.		Work No.	
Voltage		Frequency	
Channels		Phases	
Current		Icc	
Year		Weight	
Main Document			



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Fig. 2

Information	Description
Id. No.	Product code no.
Type	Model
Serial No.	Product serial no.
Work No.	Product production no.
Voltage	Rated voltage (mains)
Frequency	Rated frequency (mains)
Channels	Number of output channels
Phases	Phases (mains)
Current	Rated current (mains)
Icc	Rated short-circuit data
Year	Year of manufacture
Weight	Weight

The identification plate must never be removed! Please always have the serial no. at hand when contacting SCHUNK about technical matters.

## 6 Description

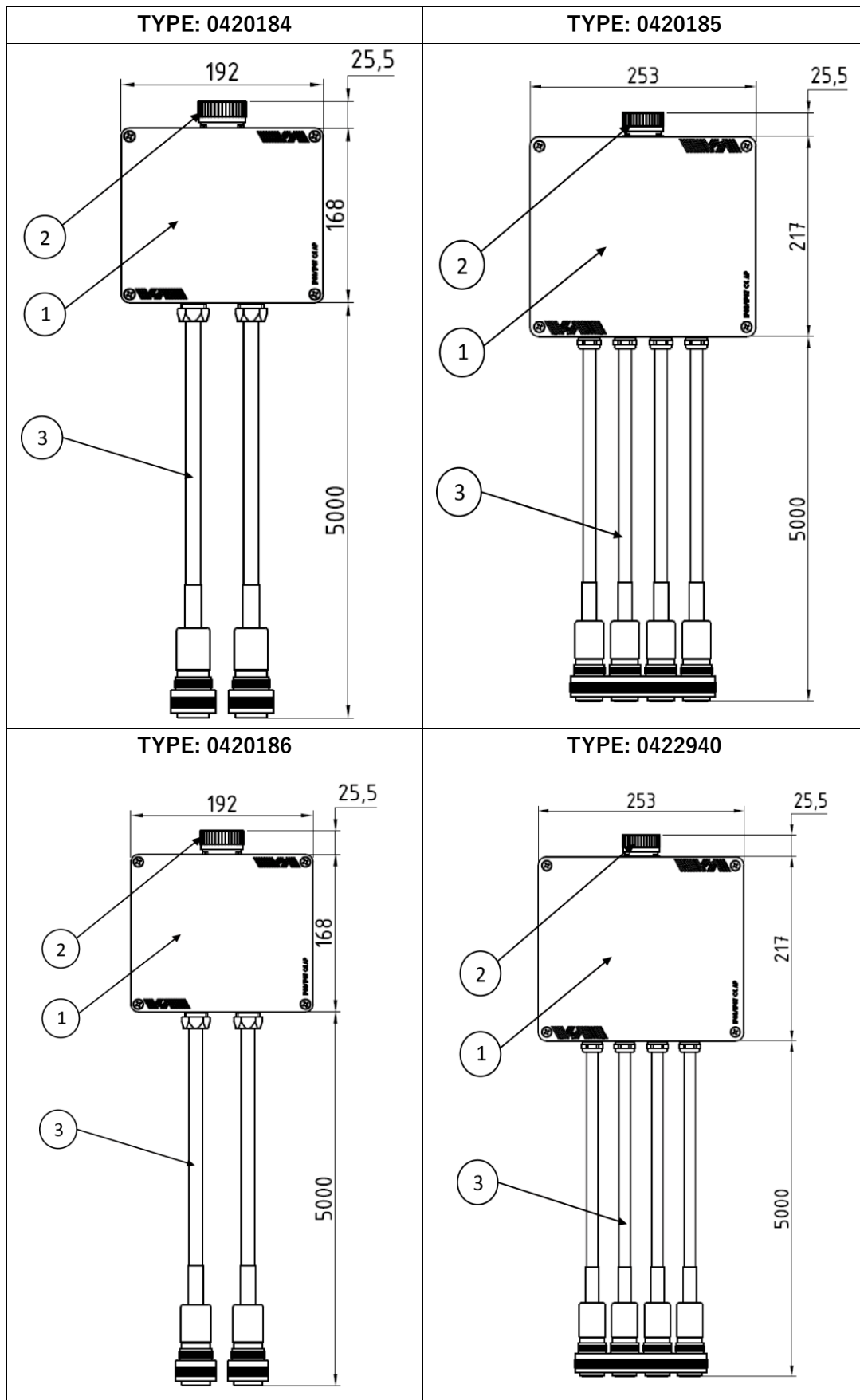
### 6.1 Functioning description

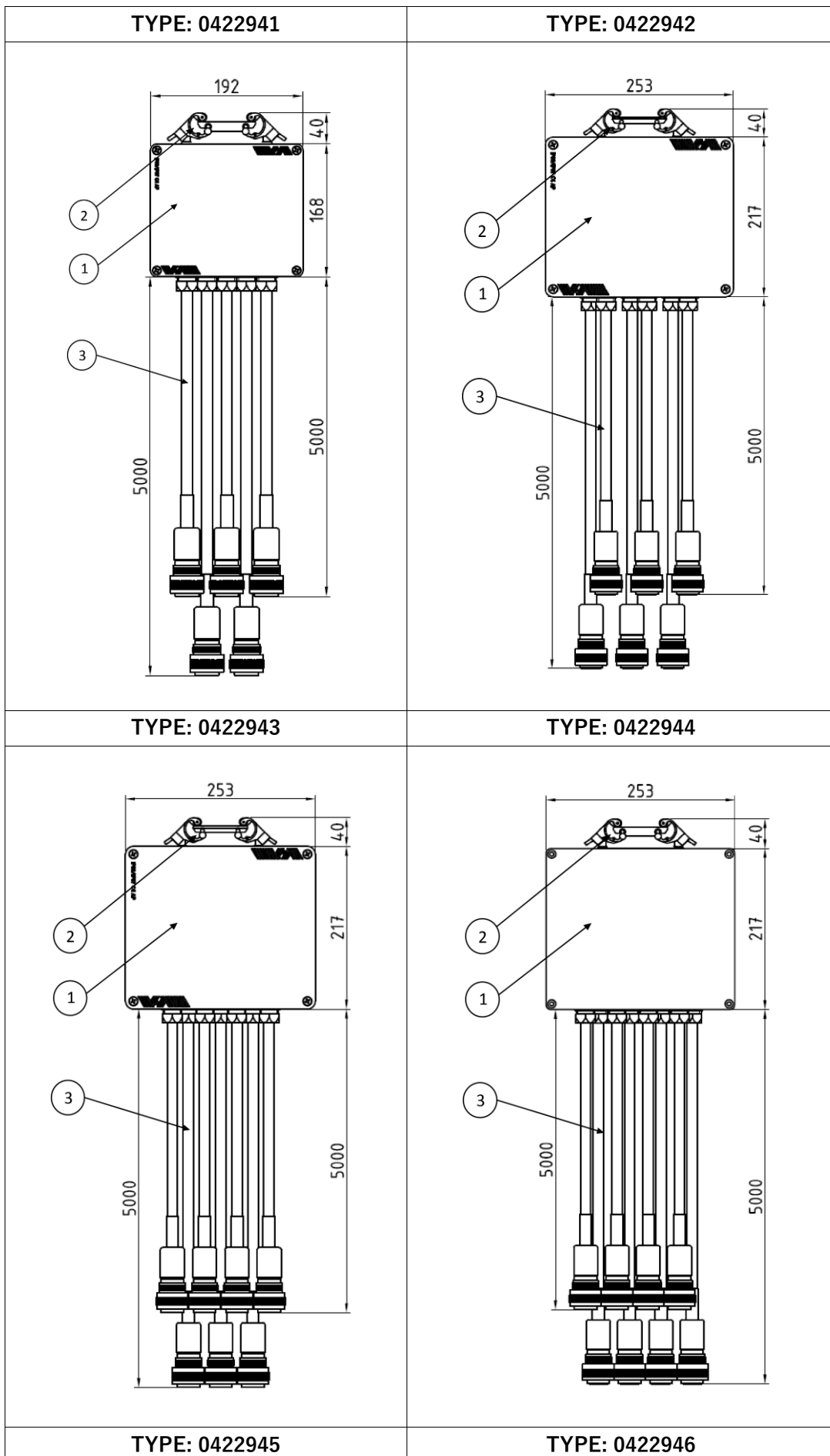
By using the electronic junction box linked to a SCHUNK control unit, the operator is able to magnetize and to demagnetize small and large electro-permanent magnetic chucks connected to the same.

By means of this junction box, the operator can use a single control unit for the magnetization of several magnetic chucks (up to 8), thus optimising at best the efficiency of the entire magnetic system.

The magnetization time depends on the type of junction box applied.

## 6.2 Product description





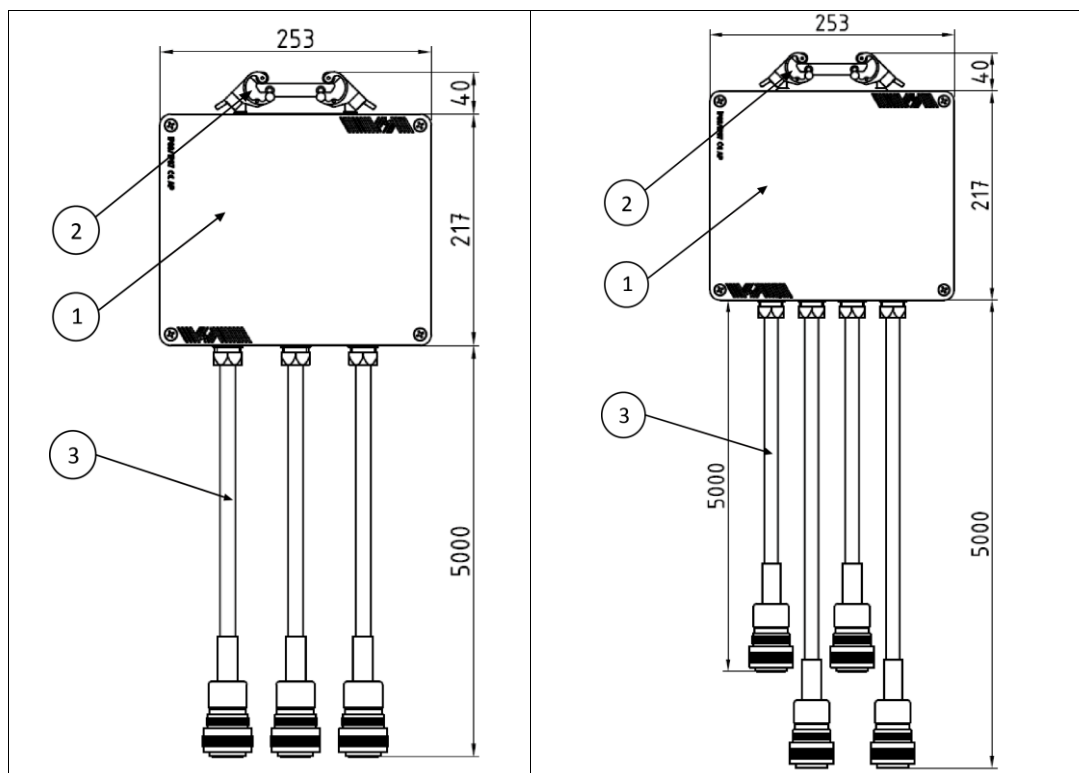


Fig. 3

The delivery includes:

Pos. n.	Description
1	Aluminium junction box.
2	Input multi-pole connector <sup>(1)</sup>
3	Metal coated output discharge cable and end connector <sup>(1)</sup> for the connection to the magnetic chuck. The cable length is of five (5) meters

<sup>(1)</sup> The type of connector changes according to the type of junction box.

## 7 Installation and connection

### 7.1 Installation

- 1 Open the packaging and take out the junction box.
- 2 Check the junction box for transport damage!
- 3 Compare the junction box with the specifications given in the order!
- 4 Visually inspect the connection cable for damages. (Notches? Abrasion? Cuts?)
- 5 Carry out the installation of the junction box by means of the (4) fixing holes. In the following the centre-to-centre distance of these holes:

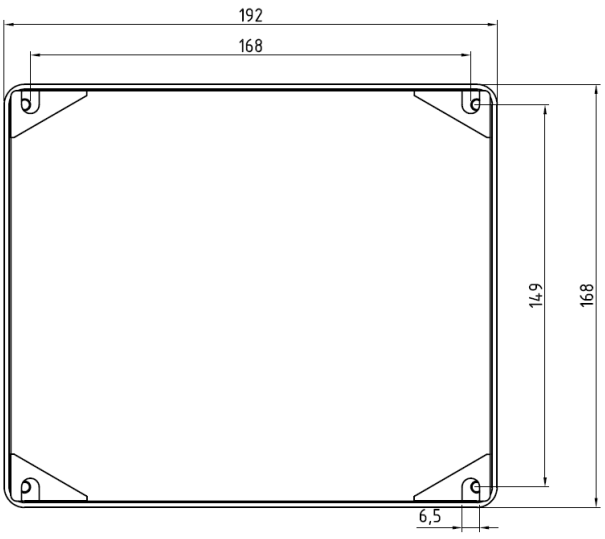
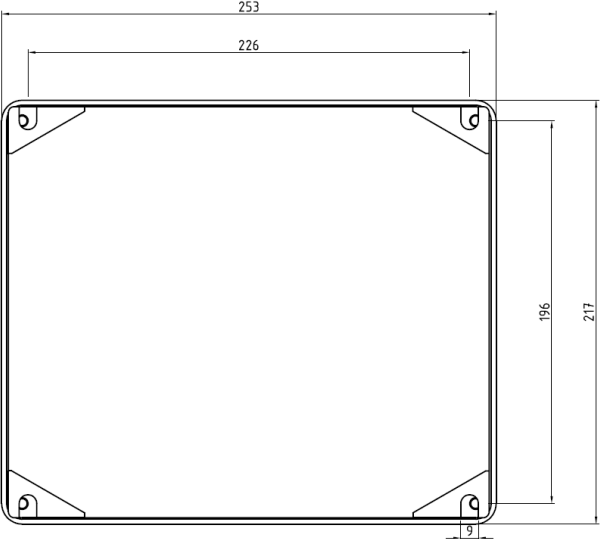
<p>TYPE: 0420184 TYPE: 0420186 TYPE: 0422941</p>	<p>TYPE: 0420185 TYPE: 0422940 TYPE: 0422942 TYPE: 0422943 TYPE: 0422944 TYPE: 0422945 TYPE: 0422946</p>
 <p>Technical drawing of a square junction box. The outer width is 192 and the inner width is 168. The height is 168. There is a 6.5 offset from the bottom edge. Four fixing holes are located at the corners.</p>	 <p>Technical drawing of a square junction box. The outer width is 253 and the inner width is 226. The height is 217. There is a 9 offset from the bottom edge. Four fixing holes are located at the corners.</p>

Fig. 4

**CAUTION**

**Danger caused by a sudden falling down of the junction box.**

- An inadequate fixing can cause the falling down of the junction box with a consequent risk of injury for the operators.

- 6 Apply if necessary a protective cover (complying with the IP class indicated at paragraph 5) to the junction box in order to prevent the same from being exposed to continuous water splashes caused during the working process.

**NOTICE**



**Damage to the junction box as a result of a short-circuit.**

The junction box could be damaged by oil and water.

- The positioning of the junction box inside the machining area should be avoided during its installation and operation;

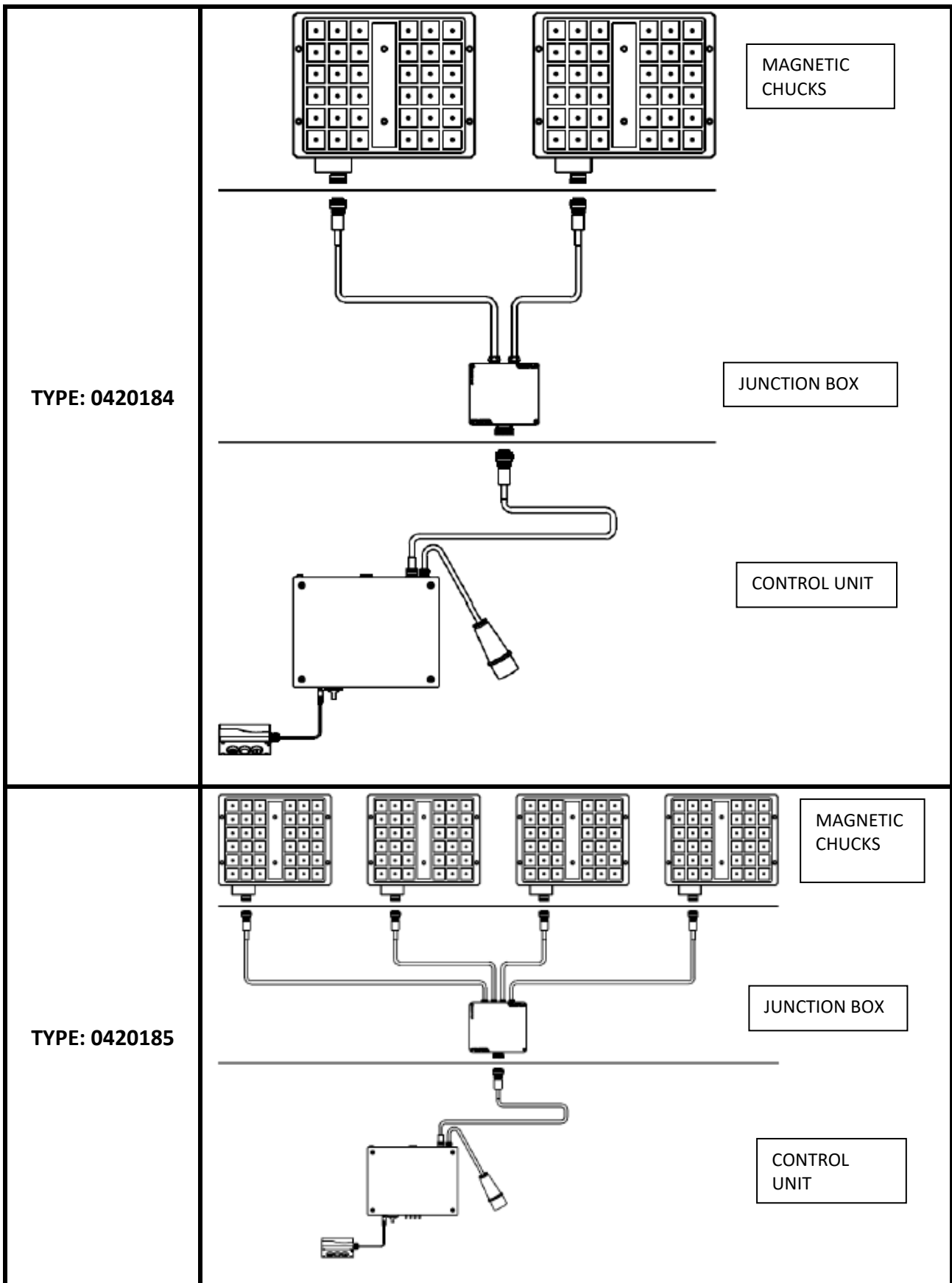
## 7.2 Connection

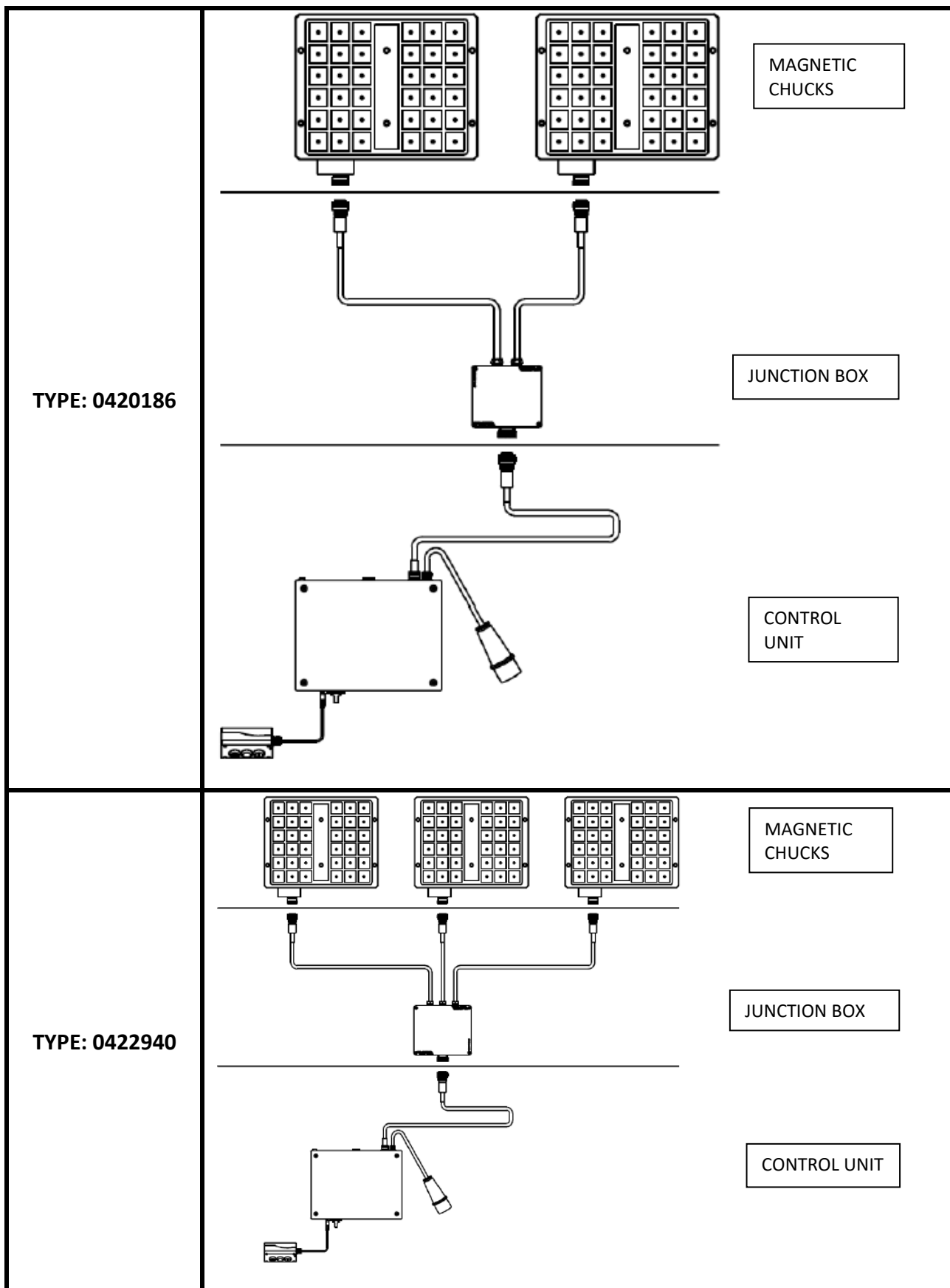
After having installed the junction box in a place complying with the requirements indicated at paragraph 7.1, the connection between the same, the magnetic chucks and the control unit must be carried out.

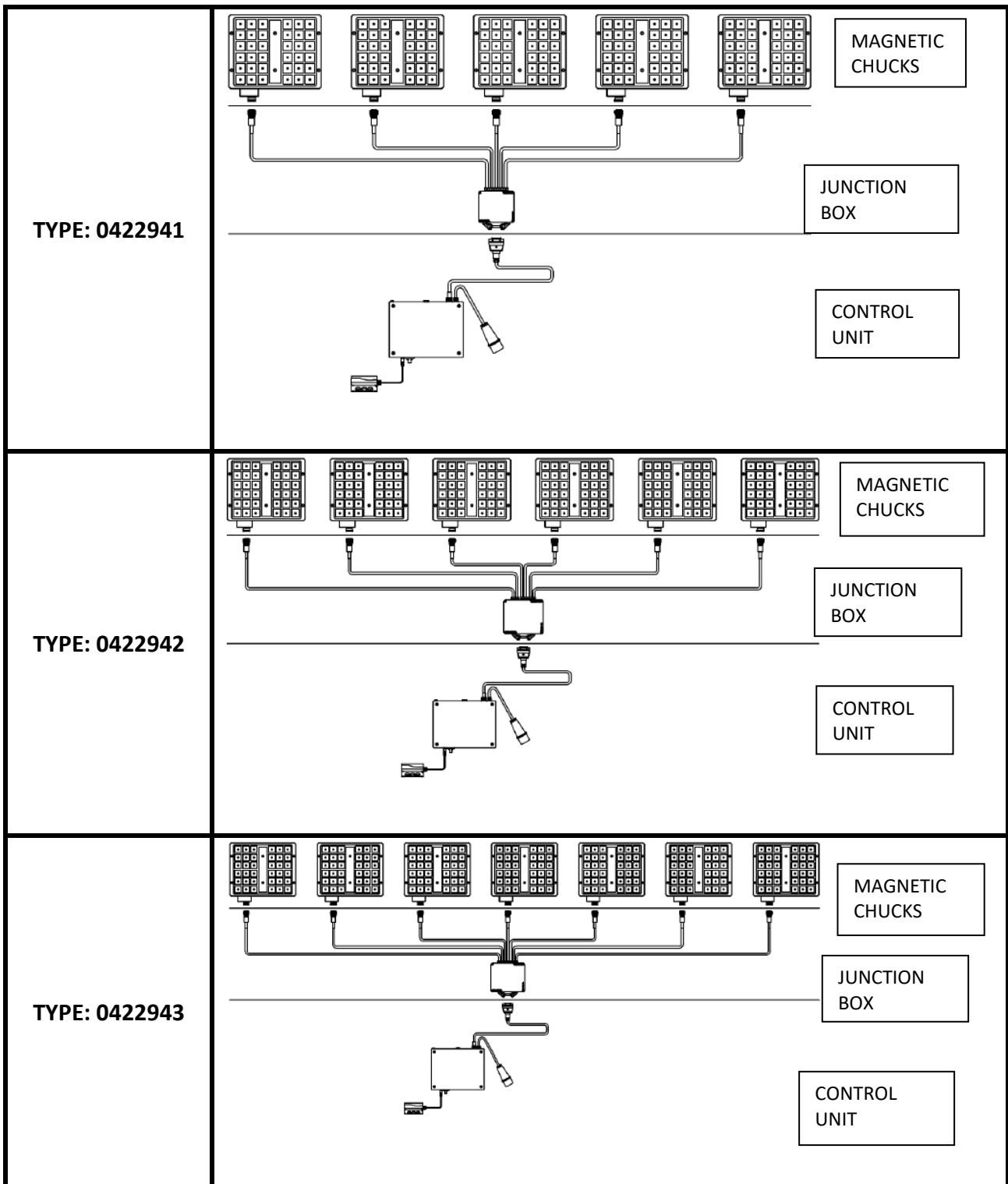
	 <b>DANGER</b>
	<b>Danger due to electric shock!</b> Touching live parts can cause death by electric shock. The connection of the control unit to the junction box must only be carried out after its disconnection from the mains.

Possible connection layouts involving:

- Magnetic chucks.
- Junction boxes.
- Control units







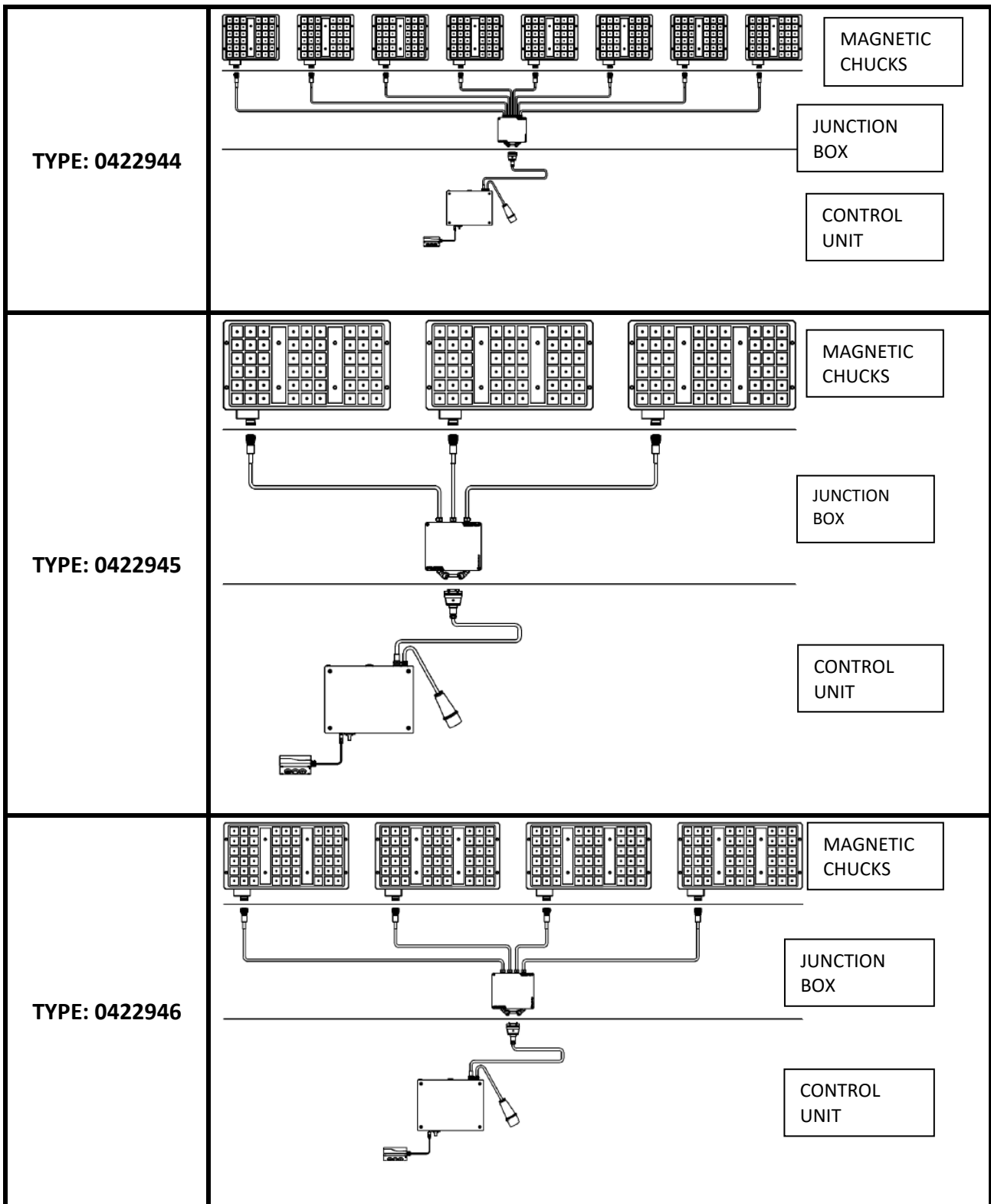


Fig. 5

**NOTE**

Please always have the serial number at hand when contacting SCHUNK GmbH & Co. KG or service centres.

**⚠ DANGER****Danger caused by short-circuit.**

Never connect the junction box if you have detected visual damage!

- Notify the freight carrier or SCHUNK GmbH & Co. KG immediately if you detect damage and/or missing components (with all the relevant details)!

**⚠ DANGER****Danger from electric shock.**

Touching live parts can cause death by electric shock.

The junction box may be opened for the connection to the control unit and to the magnetic chucks only by an electrician. Removing protective devices is reserved exclusively to SCHUNK.

- Always disconnect the complete system from the mains before opening the top cover, etc.
- All the electrical connections must be established by an electrician who has all the relevant information for the job. Always observe laws, regulations and standards applicable at the site of installation and operation

## 8 Initial commissioning and normal operation



### 8.1 Initial commissioning

After having installed the junction box in an adequate place for its use ([↩ 7.1, Page 16](#)) and after its connection ([↩ 7.2, Page 18](#)), the proper functioning must be checked:

- 1 Ensure that the magnetic chucks are not magnetized; you can do this with the steel tip of a screw driver.

#### NOTE

There may be slight residual magnetization on delivery, e.g. due to transportation of the chucks with lifting magnets.

	 <b>WARNING</b>
	<b>Danger due to suspended loads.</b> If moving the workpiece requires the use of lifting equipment, cranes etc., please keep the respective safe distances!

- 2 The contact area between the magnetic chuck and the discharge cables (armoured) of the junction box must be free of metal, chips and dirt in general. The area must also be absolutely dry. If there is dirt, water or chips, carefully clean the connecting elements and contact surfaces and remove any causes of problems.
- 3 Remove the protective cap from the connection plugs of the magnetic chucks and ensure that it is free of chips, dirt and liquids. Otherwise carefully remove everything that could cause problems for the electromechanical properties of the connection plug.



Fig. 6



Fig. 7

- 4 Connect the bayonet coupling/-s of the discharge cable/-s (armoured) coming out of the junction box to the magnetic chucks.
- 5 The contact area between the junction box and the discharge cable (armoured) of the control unit must be free of metal, chips and dirt in general. The area must also be absolutely dry. If there is dirt, water or chips, carefully clean the connecting elements and contact surfaces and remove any causes of problems.
- 6 Remove the protective cap from the connection plug of the junction box and ensure that it is free of chips, dirt and liquids. Otherwise carefully remove everything that could cause problems for the electromechanical properties of the connection plug.
- 7 Connect the discharge cable (armoured) of the control unit to the fixed connector with quick-change coupling of the junction box.



Fig. 8





 **CAUTION**

**Danger due to faulty connection.**



The connection plug of the armored cable of the control unit must be properly connected to the connector of the junction box, in order to avoid problems of partial magnetization or demagnetization!

For a correct connection, operate as follows:

1. If the armoured discharge cable of the control unit features a circular type end quick connector, this connector must be plugged into the matching input connector fixed on the junction box and its outer ring must be rotated clockwise as far as it will go.
2. If the armoured discharge cable of the control unit features a rectangular type end quick connector, this connector must be plugged into the matching input connector fixed on the junction box and locked into position by means of the lateral clamps.

	 <b>DANGER</b>
	<p><b>Danger of electric shock from faulty connection.</b> Touching live parts can cause death by electric shock.</p> <ul style="list-style-type: none"> <li>• The following step may only be taken after correct installation and inspection of the protective devices (<a href="#">↗ 7.2, Page 18</a>).</li> </ul>

- 8 Connect the complete system to the power supply as described in the manual of the control unit.
- 9 Switch on the control unit by turning the main switch into the “I” position and carry out all the operations indicated on the user’s manual of the control unit.

	 <b>CAUTION</b>
	<p><b>Danger due to the disregard of the indications mentioned in another user’s manual.</b> The user’s manual of the control unit contains important information for a safe functioning of the whole system. It is therefore absolutely necessary that the operator reads the relevant manual very carefully before putting the junction into operation.</p>

- 10 Please contact SCHUNK if the expected results are not achieved even if you strictly followed the previously described steps.

## 8.2 Normal operation

Switch on the control unit by turning the main switch into the “I” position and carry out all the operations indicated on the user’s manual of the control unit.

## 9 Troubleshooting

Problem	Possible cause	Corrective action
No (de-) magnetization	The discharge cable of the system is not connected.	Check electric connection between the junction box and the magnetic chuck, as well as between the junction box and the control unit.
Demagnetization and magnetization are inverted.	Faulty electronic control system	Switch off the system, disconnect it from the mains and notify Schunk Service. Move the magnetic chuck into a safe position since it could still be partially magnetized.
Protection device against overcurrent switches off the power during (de-) magnetization.	Chips on connector of the discharge cable and/or of the magnetic chuck.	
Residual-current circuit-breaker switches off the power during (de-) magnetization.	Water / liquid on connector of the discharge cable and/or of the magnetic chuck and/or inside the junction box.	

In case of problems or additional information you may require, please contact the SCHUNK customer service.

## 10 Servicing and maintenance

We recommend checking the state of the power cables regularly and exchange them if necessary. Do not bundle cables! The discharge cable/-s of the junction box should not be attached to each other with fixing devices (adhesive tape, cable straps). Excellent and careful maintenance is a decisive factor for optimum safety, functioning and performance and a longer service life of the product.



### **DANGER**

#### **Danger due to electric shock!**

Touching live parts can cause death by electric shock.

- Maintenance work must always be performed by an electrician. The maintenance personnel must read this operating manual carefully. Work inside the junction box must be done by SCHUNK Service personnel only.

To ensure optimum availability and reliability of the junction box in the long run, the parts that are exposed to the greatest strain during operation must be inspected regularly.

Please follow the instructions and maintenance intervals given in the table below in order to avoid failures and other inconveniences and consequently down-times due to repairs on the junction box.


Activity	Description	Frequency			
		Each time before switching on	Once a week	Once a month	Once a year
Clean the connector	With switched off system: inspect connector for chips, dirt etc. and remove as necessary.	•			
Inspect the discharge cable	Check if the discharge cable's metal jacket is damaged.	•			
Check the identification plate / label on the junction box	Check if the identification plates and other plates etc. on the junction box are damaged and ensure good legibility.	•			
Inspect the seals	Check all the seals in the system (connectors, caps, housings etc.).	•			
Outer cleaning	Wipe with a damp cloth and dry immediately with a dry cloth.		•		

Defective electrical and electromechanical components must always be replaced by SCHUNK Service personnel. If components are replaced by the operator, this automatically voids the warranty.

After maintenance and before reconnecting and restarting the junction box, reinstall all the protective devices.

## 11 Transportation and storage

### 11.1 Transportation

	<b>⚠ CAUTION</b>
	<p><b>Risk of injury and risk of damage to the junction box in case of falling down during the transportation!</b></p> <p>The junction box weighs more than 4 kg and contains electronic components. Persons may be injured and the electronic components may be damaged.</p> <ul style="list-style-type: none"><li>• The weight of the packaging is stated on the label on the side; this should be noted during transport.</li><li>• Use the required personal protective equipment for transport.</li></ul>

### 11.2 Storage

When storing the junction box for a longer period of time, observe the following instructions to ensure functionality up to the time of installation:

- Ensure a correct packaging!  
Recommendation: store the product in its original packaging.
- The junction box and the packaging should be inspected at regular intervals.
- Inspect the packaging for outer damage due to collisions and effects of the weather.

## 12 Disposal

This product is made of plastic, iron, electrical and electronic components. If it is taken out of operation, it has to be disposed of in compliance with the applicable regulations.



SCHUNK junctions boxes have been designed according to specific constructions standards such as sturdiness, durability, and flexibility.

As soon as the end of the lifecycle has been reached, the junction box has to be decommissioned, i.e. put into a state in which it can no longer be used for its original intended use and in which it is still possible to recycle the raw materials contained.

### NOTE

SCHUNK GmbH & Co. KG assumes no liability for material damage or personal injury that may result from reusing individual components of the junction box for purposes other than the original intended use! SCHUNK GmbH & Co. KG provides neither implicit nor explicit declarations about possible usability of recycled components after decommissioning the junction box.

Procedure for final decommissioning and disposal of the junction box:

	 <b>CAUTION</b>
	<p><b>Risk of injury.</b> Decommissioning, disassembly and disposal of the junction box must be performed by qualified persons using suitable tools.</p>

- 1 Ensure that the machine tool has safely come to a halt. Disconnect all the electrical, hydraulic and pneumatic connections that could cause unexpected movements of the machine or its components.
- 2 Disconnect the product from all the auxiliary devices.
  - ⇒ Please contact a company specialized in the disposal of electrical equipment.

### **13 Spare parts**

Contact the SCHUNK service department in case of any spare parts requests.