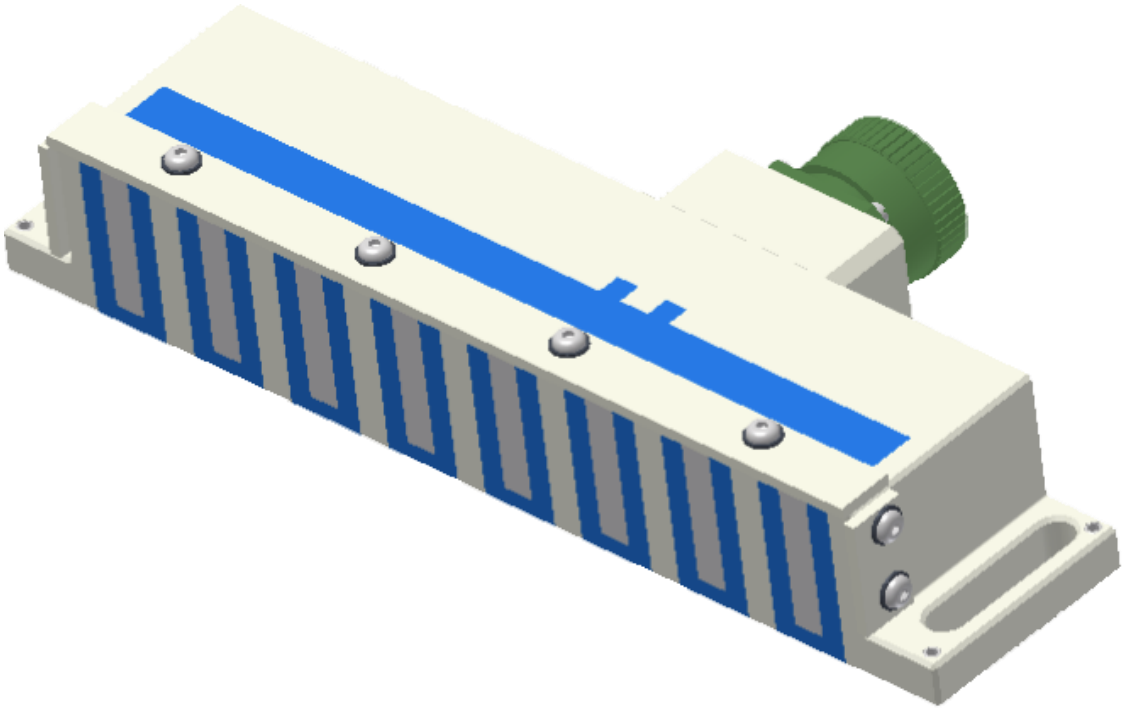
Electro-permanent magnetic chucks for wire-cut EDM

MEF series

Assembly and operating manual



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Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,
Congratulations for 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 the 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 your purchase
Kindest regards.

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1. About this manual

This manual is an integral part of the product and contains important information for safe and proper assembly, commissioning, operation, maintenance and ensures easier troubleshooting.
Before using the product, carefully read the instructions, especially chapter "Basic safety notes".

1.1 Warnings

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

1.1.1 Signal words

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

1.1.2 Symbols

	Warning about a danger point
	Warning about dangerous electrical voltage
	Magnetic field hazard
	Falling pieces hazard
	General mandatory sign to prevent material damage

2. Basic safety notes

2.1 Intended use

The intended use of the wire-cut EDM electro-permanent magnetic chucks is to block any ferromagnetic material on processing machines that use wire-cut technology. These chucks, made of stainless steel, take advantage of the technological innovation provided by the electro-permanent system. The electro-permanent characteristic of this magnetic chuck also allows it to operate in full safety in case of a sudden power failure. This is because the system only needs to be powered when magnetising and demagnetising the chuck. Therefore during an eventual power failure, the tool machine would stop while the magnetic chuck would remain magnetised. The position slots, located on the two short sides of the module, fasten it to the characteristic drilling grid of the wire-cut EDM machines.

The requirements of the applicable standards must be observed and complied with. The product may be used only within the scope 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.

ATTENTION

The electro-permanent chucks **must not** be put into service until the machine tool, for which the chucks were provided, meets the requirements of Machinery Directive 2006/42/EC!

2.2 Environmental and operating conditions

- Use the product only within the scope of its defined application parameters. See “Technical data”.
- Make sure that the workplace is clean and the ambient temperature corresponds to the specifications.

2.3 Product safety

Using the product can be dangerous if:

- it is not used in accordance with its intended purpose.
- maintenance is not performed on a regular basis.
- the safety notes are not complied with.

Avoid any working method that may interfere with the function and operational safety of the product.

Wear personal protective equipment as required by the Machinery Directive.

NOTE
More information is contained in the relative chapters.

2.4 Personnel qualification

Assembly, commissioning, maintenance and repair of the product may be performed only by trained, qualified personnel. Every person appointed by the operator to work on the product must have read and understood the assembly and operating manual in its entirety, especially Chapter “Basic safety notes”. This applies particularly to personnel only appointed occasionally, such as maintenance personnel.

DANGER

Hazard due to a magnetic field.
Since these are electro-permanent chucks of magnetic systems, the following categories of people are strictly prohibited from coming into contact with them:

- People with pacemakers.
- People with metal or electronic prostheses.
- People using insulin pumps.
- People with muscle stimulation systems.
- Pregnant women

The above-mentioned persons must always keep a safe distance of at least 2 metres from the electro-permanent chucks.
The magnetic field generated by the product is not such as to create health problems to generally healthy workers in the short term. It is however recommended that all workers always keep a certain safety distance from the magnetised product because there is still a danger for it to attract metal objects.

DANGER

Electric shock hazard.
The electro-permanent chucks are electrically powered systems, often in contact with emulsified water or different types of liquids.
It is therefore strictly prohibited to touch the magnetic chuck or any part connected to it (circular connector, for example) when being magnetised and demagnetised.

2.5 Using personal protective equipment

When using this product, comply with the relevant industrial safety regulations and use the personal protective equipment (PPE) required.

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

2.6 Notes on specific risks

- Perform any installation, modifications, maintenance or adjustments with the magnetic chuck demagnetised.
- Make sure that no residual magnetic energy remains in the system.
- Perform maintenance, changes and integrations outside the danger zone.
- For all work, secure the product against accidental use.

3. Warranty

The warranty is valid for 12 months from the delivery date of the product under the following conditions:

- Intended use in 1 work shift
- Comply with the maintenance and lubrication intervals
- Observe the environmental and operating conditions

Parts touching the work piece and parts subject to wear are excluded from the warranty.

Procedure in the event of a warranty claim

The buyer agrees to send a written detailed report on defects detected on the magnetic chuck to SCHUNK within 10 days after identification.

4. Scope of supply

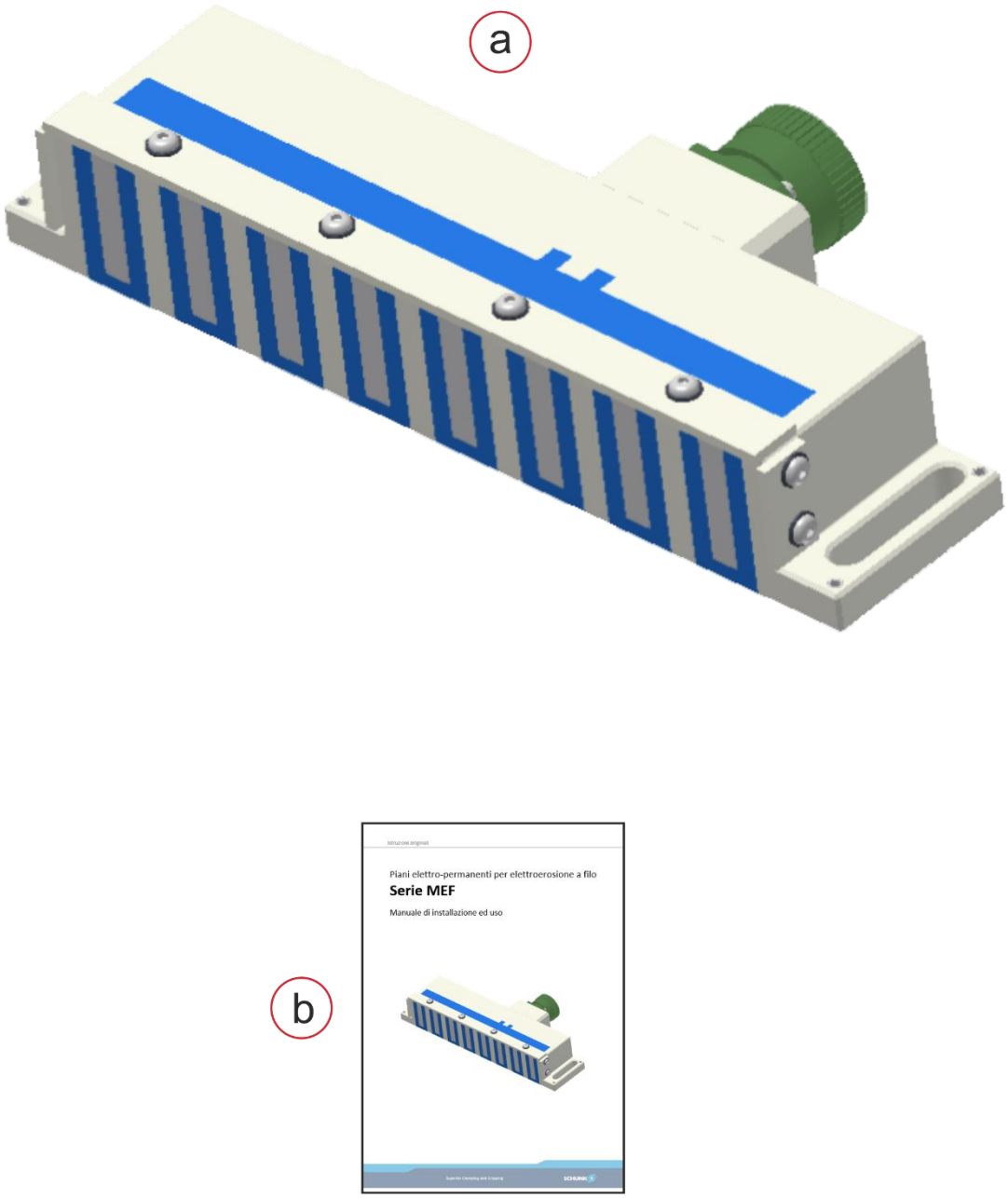


Fig.1

The supply includes:

a. Magnetic chuck

b. User and operating manual

5. Technical data

MEF					
Model	**Dimensions**			**Weight kg**	**Connection**
	Length	**Width**	**Height**		
MEF-45-Q	270	60	45	6	Circular connector
MEF-90-Q	270	60	90	10	Circular connector
MEF-45-F	270	60	45	6	Fixed box
MEF-90-F	270	60	90	10	Fixed box

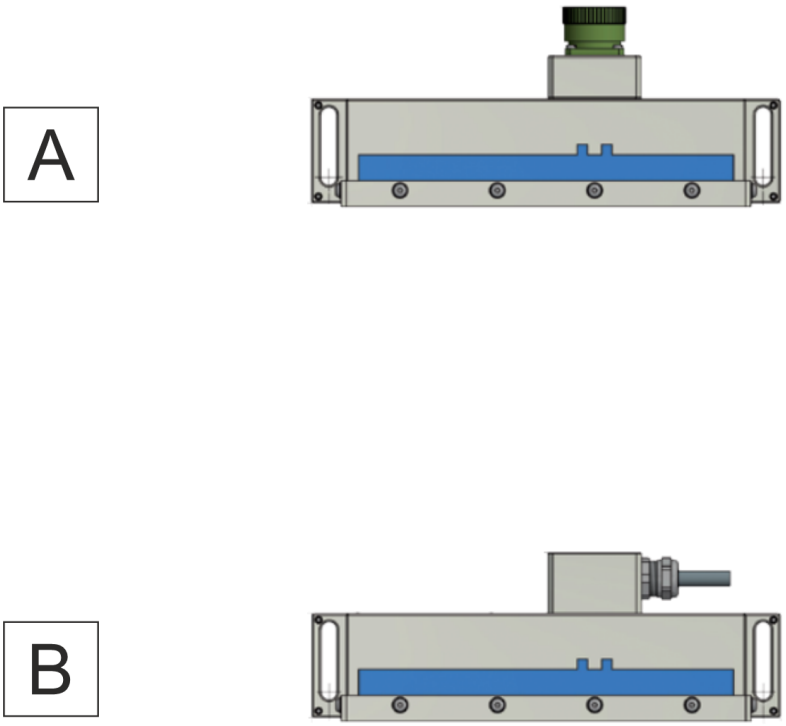


Fig.2

A. MEF-Q
B. MEF-F

5.1 Rating plate

The rating plate is on the side of the product.
It bears the following information:

Fig.3

Information	Description
Id. Number	Product code number
Work number	Product production no.
Serial number	Product serial no.
Year	Year of manufacture
Weight	Weight
Resistance	Ohmic Resistance
Voltage	Supply voltage
Watt	Power (not provided)
Amp. for sec.	Current per second (not provided)

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

6. Description

6.1 Product description

The electro-permanent magnetic chucks are capable of blocking all ferromagnetic materials. However, this is not true for the following materials:

- Aluminium and its alloys
- Bronze
- Brass
- Non-magnetic cast-iron
- *Some STAINLESS steels (such as austenitic,* though they can be slightly magnetisable following hardening due to plastic deformation).

Even among ferromagnetic materials, the greater or lesser clamping force of the piece on the chuck depends on the reluctance of the part to be anchored. This reluctance depends on the chemical composition of the material. This composition can significantly reduce (by up to 20 - 30%) the maximum value of the attraction force that is reached for mild steel.

Material	Efficiency
Conventional steel (Fe 360 - C40)	100%
Ferromagnetic raw steel (C10 - C15)	90%
Magnetic stainless steel	65%
Cast-iron	50%

Thermal treatments carried out on work piece.

Some thermal treatments reduce the magnetic attraction properties. Therefore pay the utmost attention to materials which have undergone one of the following treatments:

- hardening in all possible variants
- tempering
- cementing
- nitriding

To take the greatest advantage of the magnetic force, pay attention to:

- positioning the piece on the magnetic chuck;
- the contact surface between the piece to be clamped and the magnetic chuck;
- the air gap value (space between chuck and piece to be attracted).

7. Installation

1. Check the packaging before accepting the product.
2. Open the package and take the magnetic chuck out.
3. Check the product for transport damage.
4. Compare the product with the specifications given in the order.
5. Clean any rustproof oil from the magnetic chuck.
6. Fasten the electro-permanent magnetic chuck to the flatbed of the machine by means of the side slots specifically provided on the mono-block.

ATTENTION

Use class 8.8 clamping screws making sure to tighten them at a suitable torque. To avoid excessive deformation of the magnetic chuck, the machine board on which the magnetic chuck will be attached must have maximum planarity of 0.05.

7. After installation, check that the chuck is fixed securely without being able to move in any direction.

DANGER

Dangers caused by short-circuit.
Never power the electro-permanent magnetic chuck if you detect any damage. Notify the freight carrier or SCHUNK GmbH & Co. KG. if you detect damage and/or missing components (providing all relevant details).

8. In case of chuck with connection via a fixed box (MEF-F), connect the magnetic chuck to the relevant control unit, following the instructions in its user manual.

8. Commissioning and normal operation

8.1 Commissioning

Connect the control unit to the electric mains as indicated in the manual of the electronic equipment.
After setting up the connection to the electric mains, check the following operation:

1. Ensure that the magnetic chuck is not magnetised; you can do this with the steel tip of a screwdriver.

NOTE
There may be a slight residual magnetisation upon delivery, e.g. due to the handling of the chucks with magnetic lifters.

2. Position one piece on the magnetic chuck, paying attention to the instructions in chapter 6. For a reliable test of the attraction force of the magnetic chuck, you must have a mild steel plate (we recommend UNI Fe 360 steel) at least 10 mm thick and sized 50 x 50 mm.
3. If a chuck with connection via circular connector is available, remove the protective cap from the magnetic chuck connector and connect the discharge cable (reinforced) of the control unit with the magnetic chuck using the quick coupling.

⚠ CAUTION

Danger due to a faulty connection.
Problems may arise due to partial (de)magnetisation.
The connector of the discharge cable must be properly fixed to the magnetic system. For correct contacting, the connector of the discharge cable must be inserted into the connector of the magnetic chuck, and the ring nut must be turned clockwise as far as it will go.

⚠ DANGER

Electric shock hazard due to a faulty connection.
Touching live parts can cause death by electric shock. The following step may only be taken after properly installing and inspecting the protective devices.

4. Follow the instructions in the control unit user manual to magnetise the magnetic chuck.

⚠ CAUTION

Risk of injury due to a piece coming unanchored as a result of incorrect displays of the magnetic clamping system.
Ensure that the workpiece is now properly clamped on the magnetic chuck.
Take suitable safety precautions when doing so.

5. Manually check that the piece is secured stably to the chuck.

NOTE
Do not hit the chuck with a hammer to test clamping of the piece. In that case the force would not be equally distributed on the piece but would be concentrated at one sole point, making the test unreliable.

6. Follow the instructions given in the control unit user manual to demagnetise the magnetic chuck.
7. If the product has a magnetic status indicator, check whether the internal mechanism has turned to red.
8. If a chuck with connection via circular connector is available, disconnect the discharge cable (reinforced) of the control unit from the magnetic chuck by rotating the ring nut anticlockwise and reposition the protective cap on the magnetic chuck connector.
9. Remove the workpiece from the magnetic chuck

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

8.2 Normal operation

To ensure proper use of the product, follow the steps below:

1 Ensure that the magnetic chuck is not magnetised; you can do this with the steel tip of a screwdriver.
2 Position one piece on the magnetic chuck, paying attention to the instructions in chapter 6.
3 If a chuck with connection via circular connector is available :
   - Make sure that the contact area between the magnetic plate and the discharge cable (reinforced) is 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.
   - Remove the protective cap from the connector of the magnetic chuck and ensure that it is free of chips, dirt or liquids. Otherwise remove carefully anything that could cause problems to the electromechanical properties of the connection plug.

Fig.4

- Connect the discharge cable (reinforced) of the control unit with the magnetic chuck using the quick coupling.

	**⚠ CAUTION** **Faulty connection hazard** Problems may arise due to partial magnetisation or demagnetisation. The connector of the discharge cable must be properly fixed to the magnetic system! For correct contacting, the connector of the discharge cable must be inserted into the connector of the magnetic chuck, and the ring nut must be turned clockwise as far as it will go.

4. Follow the instructions in the control unit user manual to magnetise the magnetic chuck.

	**⚠ CAUTION** **Risk of injury due to a piece coming unanchored as a result of incorrect displays of the magnetic clamping system.** Ensure that the workpiece is now properly clamped on the magnetic chuck. Take suitable safety precautions when doing so.

5. Manually check whether the pieces are firmly secured to the chuck

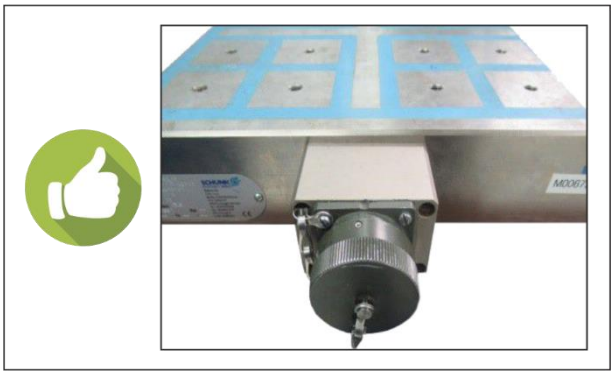
NOTE

Do not hit the chuck with a hammer to test clamping of the piece. In that case the force would not be equally distributed on the piece but would be concentrated at one sole point, making the test unreliable.

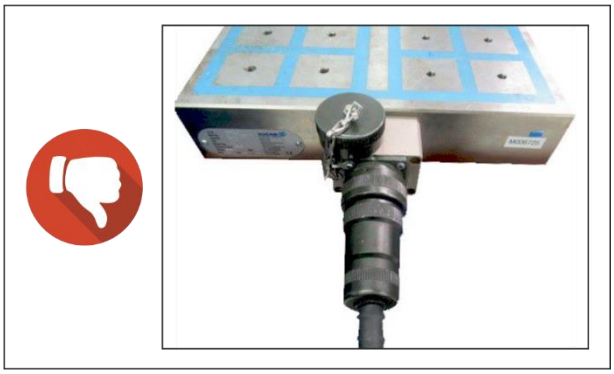
6. If a chuck with connection via circular connector is available :
   - Disconnect the discharge cable (reinforced) of the control unit from the magnetic chuck using the quick coupling.
   - Tighten the protective cap on the magnetic chuck connector.

ATTENTION

Damage to the product due to use with the discharge cable connected.
The magnetic chuck is designed to be used, during mechanical processing, with the discharge cable disconnected and the cap correctly inserted on the connector.
Only under these conditions is it possible to have an IP67 degree of protection.



If the discharge cable is left connected during processing, the magnetic chuck will have an IP20 degree of protection and there is a risk of damaging the magnetic chuck or the connected control unit.



7. Proceed with the desired work process.
8. If a chuck with connection via circular connector is available :
   - Remove the protective cap from the connector of the magnetic chuck and ensure that it is free of chips, dirt or liquids. Otherwise remove carefully anything that could cause problems to the electromechanical properties of the connection plug.

Fig.5

- Connect the discharge cable (reinforced) of the control unit with the magnetic chuck using the quick coupling

	**⚠ CAUTION** **Faulty connection hazard** Problems may arise due to partial magnetisation or demagnetisation. The connector of the discharge cable must be properly fixed to the magnetic system! For correct contacting, the connector of the discharge cable must be inserted into the connector of the magnetic chuck, and the ring nut must be turned clockwise as far as it will go.

9. Follow the instructions given in the control unit user manual to demagnetise the magnetic chuck.
10. If a chuck with connection via circular connector is available :
    - Disconnect the discharge cable (reinforced) of the control unit from the magnetic chuck using the quick coupling.
    - Tighten the protective cap on the magnetic chuck connector. Ensure that the cap properly screws on all the way.

	**⚠ WARNING** **Suspended loads hazard** If workpiece handling requires the use of lifting equipment, cranes etc., observe the respective safety distances.

11. Remove the workpiece from the magnetic chuck.

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

	**ATTENTION** **Damage to the product due to overheating.** The magnetic chuck is designed to withstand a maximum temperature of 80°C. Too close magnetisation/demagnetisation operations or processing very hot pieces can quickly increase the chuck's internal temperature. This could cause the resin to rise or blacken. If this happens, it is recommended to remove the cause of overheating to prevent the product from being damaged!

9. Troubleshooting

Fault detected	Possible Cause	Suggested intervention
The piece is not sufficiently anchored to the magnetic chuck	The control unit did not carry out the magnetisation phase correctly	See the use and maintenance manual of the control unit
	The workpiece is not positioned properly	Check the recommendations in chapter 6
The status of the magnetic chuck does not change	Problem depending on the electronic control unit	See the use and maintenance manual of the control unit
The chuck has sections with damaged or burnt resin (darker resin)	Too many (de)mag operations or too hot pieces have caused the resin to overheat	Perform (de)mag operations at least every 3 minutes.

Should you have any problems or need any further information, please contact the technical assistance service.

10. Repairs and maintenance

It is recommended to check the product condition on a regular basis. Excellent and careful maintenance is a decisive factor for optimum safety, functioning and performance and a longer service life of the product!

To ensure optimum efficiency and reliability of the electro-permanent magnetic chuck in the long run, the parts exposed to the greatest strain during operation must be inspected regularly. Please follow the instructions and maintenance intervals given in the table below so as to avoid running into problems and malfunctions requiring product repairs with consequent downtime.

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

After maintenance and before restarting the electro-permanent magnetic chuck, reinstall all protective devices.

Activity	Description	Frequency			
		With every use	Once a week	Once a month	Once a year
Cleaning the connector	Check the connector for chips, dirt, etc. and remove as necessary	•			
Checking the connector cover	Check that the gasket of the connector cover is not worn or broken	•			
Checking the rating plate	Check that the rating plate is not damaged or illegible	•			
Inspect seals	Check all the system seals (connectors, caps, housings, etc.)		•		
Checking the product	Check the whole product for cracks, breaks or deformations			•	
Checking the safety devices	Check the safety devices upstream of the product for proper operation using suitable tests	Test as often and with the method recommended by the manufacturer of the devices			

11. Transport and storage

11.1 Transport

The electro-permanent magnetic chuck can be lifted manually thanks to its reduced weight.

11.2 Storage

When storing the electro-permanent magnetic chuck for a longer period of time, observe the following instructions to ensure perfect operation up to the time of installation:

- Ensure adequate packaging by keeping the product in its original packaging.
- The product and its packaging should be inspected at regular intervals.
- Check that the packaging has not deteriorated due to shocks or bad weather.
- Make sure that the temperature remains between 15°C and + 70°C so as not to damage the magnetic chuck.

ATTENTION

Dispose of all packaging properly.
Unpacking and positioning the product on the machine tool may require the operation of two or more persons and the use of handling equipment like hoists, cranes etc.

NOTE

The presence of magnetic residue on the surface of the new chuck is determined by the use of magnetic lifts when inserting the modules into the crates. This residue disappears as soon as the first demagnetisation cycle is performed.

12. Disposal

This product is made of plastic, iron, permanent magnets and electronic components. If it is decommissioned, it has to be disposed of in compliance with the applicable regulations.
As soon as the end of the lifecycle has been reached, the electro-permanent magnetic chuck 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 shall not be held liable for any material damage or personal injury that may result from reusing individual components of the product for purposes other than the original intended use! SCHUNK provides neither implicit nor explicit declarations about any possible usability of recycled components after decommissioning the electro-permanent magnetic chuck.

Procedure for final decommissioning and disposal of the product.

	⚠ **CAUTION**
	Risk of injury. Decommissioning, disassembly and disposal of the electro-permanent magnetic chuck must be performed by qualified persons using suitable tools.

- 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.
- Disconnect the product from all utilities.
- Have the electro-permanent magnetic chuck disposed of by a company that specialises in the disposal of electrical and magnetic equipment.

13. Spare parts

To purchase spare parts, contact SCHUNK.