Operating instructions

Metal eroder

eromobil® er 400 t-ND

Serial no.: xx

HandlingTech Automations-Systeme GmbH
Gewerbestrasse 7

D-71144 Steinenbronn

Telephone: +49 (0) 7157 98919-60
Fax: +49 (0) 7157 98919-33
e-mail: eromobil@handlingtech.de
Website: www.handlingtech.de/eromobil

Edition 11/14
Original operating instructions

NOTE

These operating instructions are a constituent part of the machine and must always be kept close at hand for the operating personnel.

The safety instructions contained within must be observed.

In the event of the machine being resold, the operating instructions must be passed on along with the machine.

Translation
For deliveries within EEC countries, the operating instructions will be translated into the language of the respective country in which they will be used.
In the event that discrepancies are found in the translated text, the original operating instructions (German) are to be consulted. Alternatively contact the manufacturer.

1 Contents

1.1 Table of contents

1.2 List of figures

1.3 List of tables

1.4 Declaration of conformity

HandlingTech
Automations-Systeme GmbH
Gewerbestrasse 7

D-71144 Steinenbronn

Declaration of conformity

in the meaning of the

- **EC Machinery Directive 2006/42/EC**
- **EC EMC Directive 2014/30/EU**

We hereby declare that the design of

Designation: **eromobil® er400t-ND**
Machine no.: **xx**

and its construction, as well as the variant marketed by us, complies with the basic health and safety requirements of EC Directive 2006/42/EC. Should any modifications be made to the machine without our approval, this declaration shall be void.
Applied harmonised DIN EN standards in accordance with the gazettes of the directives:

Directive / standard	Title	CE compliant	Remarks
DIN EN 82079-1	Preparation of instructions for use. Structuring, content and presentation – Part 1: General principles and detailed requirements	From June 2013	Harmonised standard
2014/30/EU	**EC Directive: EMC**	**2004**	*Valid from 20.04.2016*
	Electromagnetic compatibility, generic standard: interference emission - industrial area		Fulfilled by CE declaration(s) from the component suppliers and observing the installation instructions!
	Electromagnetic compatibility, interference immunity in industrial areas		
2006/42/EC	**EC Directive: Machinery**	**2006**	*Valid from 29/12/2009*
DIN EN 60204-1	Safety of machinery. Electrical equipment of machines. Part 1: General requirements	26/05/2010	Harmonised standard
DIN EN ISO 12100	Safety of machinery. General principles for design. Risk assessment and risk reduction	08/04/2011	Harmonised standard
DIN EN 13857	Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs	08/09/2009	Harmonised standard
DIN EN 626-1	Safety of machinery. Reduction of risks to health from Hazardous substances emitted by machinery – Part 1: Principles and specifications for machinery manufacturers	08/09/2009	Harmonised standard

Directive / standard	Title	CE compliant	Remarks
DIN EN 13850	Safety of machinery. Emergency stop. Principles for design (harmonised standard)	08/09/2009	Harmonised standard

The standard DIN EN ISO 12100:2010 **also refers to the following applicable standards:**

DIN EN 349; DIN EN 614-1; DIN EN 626-1; DIN EN 894-1,-2,-3; DIN EN 953; DIN EN 1037

***)** safety-relevant control elements (and those which form part of the safety circuit) are listed in **Performance Level c**.

- This declaration relates to the machine in the condition in which it was brought onto the market.
- The basic health and safety requirements per Annex I of the Machinery Directive 2006/42/EC have been applied and complied with.
- The specific documents required per Annex VII Part A have been produced and shall be presented to the national officials responsible in digital form on request.
- Person responsible for the compilation of the technical documents:
  Name: Mr Wieland
  Address: HandlingTech Automations-Systeme GmbH, Gewerbestr.7, D-71144 Steinenbronn

Steinenbronn, 27. April 2021 …….....

Signature of the person responsible for business operations
(Name, Function, Title)

2 Overview and intended use

2.1 System overview

Fig. 2-1 System overview

The metal eroder consists of the following main components:			
1	Generator	6	Table
2	Oscillating head	7	Tool drawer
3	Supply hose	8	Coolant tank
4	Earth cable	9	Magnetic stand (optional)
5	Coolant pump with hoses		

2.2 Intended use

The metal eroder is used to erode broken-off screw taps, spiral bits, etc.
It is deployed on upright and radial drilling machines, milling machines, boring machines, magnetic bases and special machines.

NOTE

Products with which explosive dust / air mixtures can occur must not be processed with this machine!

The** machine **does not meet any ATEX prerequisites and must not be set up and operated in EX zones!

The machine has been developed, designed and constructed exclusively for use in industrial and commercial applications.

Private use of the machine is excluded.

DANGER

This machine has been designed exclusively for the purpose specified above. A different use, use extending beyond the intended use or conversion of the machine without written consultation with the manufacturer is considered non-intended use.

*Conversion without written agreement will result in **severe or fatal injuries**.*
The manufacturer is not liable for any damage resulting from such use. The operator is solely responsible for the risks incurred. The machine may only be commissioned once you have ensured that all safety devices are installed and functional.

Proper use also includes compliance with the operating, maintenance and servicing conditions specified by the manufacturer.

The projected service life of the machine is approx. 10 years. Subsequently, an inspection (potentially followed by a general overhaul) by the manufacturer or a specialist company will be required.

CAUTION

*At least once a year (and when a new employee starts working), a **safety instruction** concerning hazards and protective measures as specified in the operating instructions, is required for employees in the language that they understand.*

Failure to comply with this instruction can result in injury.
The safety instruction must be confirmed with signature (TRGS 555).

DANGER

*For setup, maintenance and repair tasks pay attention to all moving parts. **Danger of entanglement!***

Failure to comply will result in severe or fatal injuries.
You must wear tight-fitting clothing in the danger zone (no chains, rings, ties, etc.). In the danger zone you must not wear protective gloves (danger of getting caught or entangled).

NOTE

***Note** on the application of the EC EMC Directive **2004/108/EC**: According to DIN EN 61000-6-4 (Generic standard - Emissions for industrial area), the machine must not be operated in residential areas, in business and commercial areas, as well as in small businesses.*

In residential areas, in business and commercial areas, and in small businesses, faults may occur on other electrical consumers. Risk of malfunction on other machines.
In residential areas, in business and commercial areas, and in small businesses, the standard DIN EN 61000-6-3 (, Residential area) must be complied with.

NOTE

These operating instructions are a constituent part of the machine and must always be kept close at hand for the operating personnel.

The safety instructions contained within must be observed.
In the event of the machine being resold, the operating instructions must be passed on along with the machine.

	**DANGER** *It is strictly prohibited to modify or disable safety devices or their functions.* ***Failure to comply will result in severe or fatal injuries.*** *After faults, repairs or maintenance tasks, all safety devices must be completely re-installed.*

2.3 Technical data

2.3.1 Dimensions

System (dimensional envelope)

Height (approx.):	1050	mm
Width (approx.):	480	mm
Depth (approx.):	700	mm
Overall weight (approx.):	110	kg

2.3.2 Product-specific data

	**DANGER** *The materials / operating media required for ensuring proper use of the machine should be purchased and used by the operator of the machine. Proper handling of these materials / operating media and the associated risks involved are the sole responsibility of the owner.* ***Failure to comply will result in severe or fatal injuries.*** *The operator must provide information on hazards and disposal. The safety datasheets from suppliers of materials and operating media must be observed.*

Generator	***er230s-ND***	***er400t-ND***
Output:	3.6 kVA	6.0 kVA
Length:	700 mm	700 mm
Width:	480 mm	480 mm
Height:	310 mm	310 mm
Weight:	approx. 30 kg	approx. 35 kg

Oscillating head	***er230s-ND***	***er400t-ND***
For threads from:	M2 to M20	M2 to M40

Coolant pump	
Pressure:	3 – 4 bar

2.3.3 Power supply

Protection class:	IP 54
Frequency:	50 Hz
Installation guideline:	Executed in accordance with VDE

eromobil® er 230s-ND:

Operating voltage	230 V_{AC}
Number of phases:	1Ph / N / PE
Connected load:	3.6 kVA
Pre-fuse:	1 x 16 A
Line cross-section:	3 x 1.5 mm^2

eromobil® er 400t-ND:

Operating voltage	230 / 400 V_{AC}
Number of phases:	3Ph / PE
Connected load:	6 kVA
Pre-fuse:	3 x 16 A
Line cross-section:	5 x 2.5 mm^2

2.3.4 General data

Ambient temperature range:

lower temperature limit:	+ 5°C
Upper temperature limit:	+ 40°C
Switching cabinets / control devices:	$\leq$ 40° C
Relative humidity:	Max. 0 – 70 %
Max. setup elevation:	$\leq$ 3000 m above sea level.

Lighting

(hall lighting, operator side, as per ASR A3.4, Chap. 7.6):	E $\geq$ 300 Lux

Noise level

Noise level (per measurement log):	L_{PA} = 70 – 84 dB (A)

Magnetic fields

Oscillating head:	Distance **$\geq$ 5 cm**, magnetic field is **< 1 mT**
Eroder generator:	Distance **$\geq$ 15 cm**, magnetic field is **< 1 mT**

3 Safety

3.1 Notes / explanations

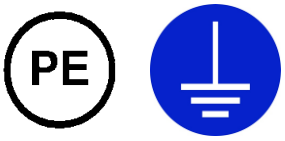
	***DANGER*** *"DANGER" warns of dangerous situations. Avoid such dangerous situations!* ***Failure to comply will result in severe or fatal injuries.***
	***WARNING*** *"WARNING" warns of dangerous situations. Avoid such dangerous situations!* ***Failure to comply may result in severe or fatal injuries.***
	***CAUTION*** *"CAUTION" in conjunction with the warning symbol warns of dangerous situations. Avoid such dangerous situations!* ***Failure to do so can result in minor injuries.***
	***NOTE*** *"NOTE" indicates handling recommendations, which if not complied with **do not result in injury**.* *However, you must comply with these handling recommendations to **avoid material damage** and problems!*
	***NOTE*** *Instructions in the operating instructions / documentation are marked with a "book" (see external documentation).* *However, you must comply with these handling recommendations to **avoid material damage** and problems!*

3.2 Explanation of the safety symbols used

DANGER

***Dangers due to hazardous electrical voltages**, from 1000 volt AC voltage with additional voltage specification.*

Failure to comply will result in severe or fatal injuries.
Access only permitted for qualified electricians or EUP.



NOTE

*The **protective earth connection** is marked by one of these symbols at the connection points.*

If it is not connected injuries can be the result.
Due to mixing up / swapping these connections during repairs.

NOTE

***Environment symbol** indicates environmental protection measures (warning - environmental pollution, see the "Disposal" chapter).*

Failure to comply will result in environmental damage.
More extensive environmental damage can occur due to improper disposal.

WARNING

***Mandatory: protective gloves** must **be worn**.*

Failure to comply may result in severe or fatal injuries.
Pay attention to the dangers for the hands.

WARNING

***Mandatory: safety footwear** must **be worn**.*

Failure to comply may result in severe or fatal injuries.
Pay attention to the dangers for the lower extremities.

3.2.1 Machine designation (type plate)

NOTE

The information in these operating instructions applies only to the machine, whose serial number is stated on the cover sheet.
The type plate with the serial number is on the back wall of the machine.

If used for a different type, technical differences may result in material damage and/or severe or fatal injuries.
The correct specification of the following information is important for all enquiries:
- *designation*
- *serial no.*

This is the only way to ensure trouble-free and fast processing.

3.3 Integrated safety systems

The installed safety devices must be tested at regular test intervals with appropriate test methods (see the following table).

Test intervals			Test methods		
d	=	daily			
w	=	weekly	**V**	=	Visual inspection
m	=	monthly	**F**	=	Functional check
¼ y	=	every 3 months	**M**	=	Measurement
½ y	=	every 6 months			
y	=	yearly			

Mains disconnector / main switch
Upon actuation of the main switch, the machine is connected to the mains grid system or disconnected from it. The main switch is located on the generator.

Check	
Interval	Method
a	**F**

DANGER

If the main switch is turned off due to cleaning, maintenance or repair work being carried out, it should be secured with its own padlock (by each person) to prevent it being inadvertently turned on again.

Failure to comply will result in severe or fatal injuries.
Non-adherence to the shut-down procedures / not securing against being turned on again: fatal and/or unexpected movements are possible.

er230s-ND (er400t-ND) *machine control system*
The machine control system is designed internally with a 3 (4)-wire, 1-(3-) phase power supply, with **separate earthing** (GREEN/YELLOW sheathing).

Check	
Interval	Method
a	**V, F, M**

3.4 Machine interfaces

Fig. 31 Machine interfaces

The following user interfaces are found on the system:	
1.	Main switch
2.	Setting switch (6 eroding voltages)
3.	Pump switch
4.	Oscillating head
5.	Hollow electrode (ø 1.0 mm to 12.0 mm and more) - consumable
6.	Coolant pump with coolant hose
7.	Mobile table with lockable castors
8.	Tool drawer
9.	Coolant tank
10.	Deep hole inspection light (optional)

3.5 Safety measures (to be implemented by the operator)

Note that the operator has the following obligations with respect to their operating and maintenance personnel:
- Training on the **protective equipment** on the machine
- Monitoring the observance of the safety measures.
- The operator must ensure that unauthorised access (by non-operating or maintenance personnel) to the hazard zone during operational processes is prevented.

These operating instructions must be kept safely for future use. The specified intervals for inspections and checks must be adhered to.

Tasks described in these operating instructions are arranged such that:
- the **Operation** chapter can be understood by a **trained person**,
- the **Installation, Cleaning and maintenance,** and **Faults, causes and remedies** chapters can be understood by a **specialist**.

The **Installation, Cleaning and maintenance, and Faults, causes and remedies** chapters are intended **only for specialists**. Tasks described in these chapters should only be carried out by specialists.

Trained person
A person who has been instructed and if necessary trained by an expert on the tasks assigned to him/her, the possible hazards that may arise due to a failure to follow instructions, and the necessary protective equipment and procedures.

Specialist
Persons who can assess the work assigned to them and recognise potential dangers on the basis of their technical training, knowledge and experience, as well as familiarity with the applicable standards.

In the definition based on EN 60204-1:2007.

3.6 Obligations of the operator

CAUTION

In the EEA (European Economic Area) the national implementation of the framework directive (89/391/EEC), as well as the associated individual directives and directive (2009/104/EEC) in particular, regarding the minimum standards for health and safety for employees using working equipment in the workplace must be observed and complied with - in the respective valid version.

Failure to comply can result in injuries.
The operating instructions have been written for specialised personnel and personnel must be appropriately trained before performing tasks on the machine.
In Germany, the current applicable version of the Industrial Health and Safety Act of October 2002 (BetrSichV), (implementation of the aforementioned directive per national law) must be complied with.

The operator must obtain the local **operator's permit** and observe the associated conditions.

In addition, the operator must comply with the local statutory regulations for
- safety of personnel (professional trade association and accident prevention regulations, workplace guidelines), for example operating instructions, and personal protective equipment (PPE) per §20 GefStoffV [hazardous materials];
- avoiding the risk of slipping during eroding (e.g. non-slip floor covering);
- unavoidable trip points (from 4 mm in height) or impact hazards, which must be identified in yellow/black (EN ISO 14122-2)
- safety of working equipment (protective equipment, operating instructions, procedural risks and maintenance);
- product procurement (safety datasheets, hazardous materials index, retention of leaks by floor-pans);
- product disposal (Waste Disposal Act);
- material disposal (decommissioning, Waste Disposal Act);
- cleaning (cleaning agents and disposal);
- observation of the applicable environmental protection requirements.

In addition, the operator must:
- carry out continuous assessment of the workplace hazards;
- guarantee the training of the operating personnel and produce operating instructions.

NOTE

Coolant / drilling emulsion:
If necessary, the operator must have an extraction system installed.

CAUTION

Lighting intensity:
The owner must ensure sufficient and uniform lighting intensity in all areas of the machine.

Failure to comply with this instruction can result in injury.
Depending on the machine area, ***200-300 Lux*** *(control stations* ***500 Lux****), is recommended (maintenance value in Germany: ASR A3.4)*.

Noise > 85 / 80 dB$_{(A)}$

CAUTION

Noise exposure:
If the machine is used in a factory hall with other machines, the resultant noise level in the hall may be higher than the above.
Failure to comply with this instruction can result in injury.
In this case, the owner is obligated to equip operating personnel with appropriate hearing protection. From 80 or 85 dB$_{(A)}$, wearing hearing protection must be recommended and training on the dangers of noise must be carried out, or the use of hearing protection must be mandated and must be monitored! From 80 dB$_{(A)}$, the employees must be advised by occupational health and safety specialists (LärmVibrArbSchV, §11). From 85 dB$_{(A)}$, the area should be designated as a noisy area and a noise reduction programme should be implemented (see German Noise and Vibration Protection Ordinance (LärmVibrArbSchV)).

NOTE

***Note** on the application of the EC EMC Directive **2004/108/EC**: According to DIN EN 61000-6-4 (Generic standard - Emissions for industrial area), the machine must not be operated in residential areas, in business and commercial areas, as well as in small businesses.*

In residential areas, in business and commercial areas, and in small businesses, faults may occur on other electrical consumers. Risk of malfunction on other machines.
In residential areas, in business and commercial areas, and in small businesses, the standard DIN EN 61000-6-3 (interference emission, residential area) must be complied with.

DANGER

It is strictly prohibited to modify or disable safety devices or their functions.

Failure to comply will result in severe or fatal injuries.
After faults, repairs or maintenance tasks, all safety devices must be completely re-installed.

DANGER

Fire hazards:
*The operator must ensure that a **suitable tested fire extinguisher** is always located near to the machine.*

Failure to comply will result in severe or fatal injuries.
Prevent hazards due to fires.

CAUTION

*At least once a year (and when a new employee starts working), a **safety instruction** concerning hazards and protective measures as specified in the operating instructions, is required for employees in the language that they understand.*

Failure to comply with this instruction can result in injury.
The safety instruction must be confirmed with signature (TRGS 555).

3.7 Safety checks

carried out in the factory by the manufacturer.

1. Risk assessment per 2006/42/EC (incl. implementation of the verification sheets) and per EN ISO 12100: 2011.

2. Airborne noise measurement
   - Per the Machinery Directive, Annex 1 (item 1.7.4/f)

3. Magnetic field measurement
   - To establish minimum distances for those with a pacemaker.

4. Testing and checking per DIN EN 60204-1 (May 2010 edition)
   - Checking that the electrical equipment conforms to the technical documentation. (Chap. 18.1)
   - Continuous connection of the protective earth conductor system (Chap. 18.2)
   - Insulation resistance testing (Chap. 18.3)
   - Voltage testing (Chap. 18.4)
   - Protection against residual voltages (Chap. 18.5)
   - Functional checks (Chap. 18.6)

     The functions of the electrical equipment, the parts associated with safety and protective equipment in particular, have been checked.

4 General hazard information

4.1 Hazards

The safety systems and safety stipulations described in these instructions must be observed.
Commands are issued from the generator.
Keep the working area free of objects during operation so that unobstructed access is ensured at all times.

WARNING

Personal protective equipment must be worn in the hazard area. The protective equipment (e.g. safety goggles) should be adapted to suit the materials / operating media being used!

Failure to comply may result in severe or fatal injuries.
Pay attention to the hazards for the eyes.

	***HAZARD***
	When performing setup, maintenance and repair tasks, pay attention to ***hazards due to high voltage!***
	Failure to comply will result in severe or fatal injuries. *Hazard-free work is only possible if the shut-down procedures (see chapter 4.5) have been carried out.*

4.2 Hazard areas on the machine

When operating the machine, the area of the oscillating head is the **operating area for operating personnel.**

	***WARNING***
	The ***danger zone*** *extends 1 m (at least 0.60 m) around the machine for setup, maintenance or repair tasks.*
	Failure to comply may result in severe or fatal injuries. *The swing area of the open control cabinet doors must also be taken into account. The owner must ensure that entry to the* ***danger zone*** *is prevented during the movement sequences.*

	***DANGER***
	The owner must ensure that entry into the operating area by unauthorised persons (persons who are not operating and maintenance personnel) is prevented.
	Failure to comply will result in severe or fatal injuries. *Always check to ensure that unauthorised persons are not present.*

4.3 Operating and maintenance personnel

Operating and maintenance personnel are persons who are responsible for the transport, assembly, installation, operation, equipping and cleaning of the machine as well as for troubleshooting.

1. The machine may only be operated by trained and authorised personnel.
2. The responsibilities for the operation of the machine must be clearly specified and observed, so that there is no unclarity about responsibility where safety is concerned.
3. The shut-down procedures stipulated in the operating instructions should be observed for all work (operation, maintenance, repair, etc.).
4. The operating personnel must refrain from any working methods which impair safety on the machine.
5. The operating personnel must ensure that only authorised persons work on the machine.
6. The operating personnel is obliged to immediately notify the operator of any changes made to the machine that affect safety.
7. The operator is obliged to operate the machine only when it is in perfect condition.

8. The operating personnel must be provided with the appropriate protective equipment by the operator in accordance with the legal constraints and the material being processed.
9. The operator must require the use of personal protective equipment and must monitor compliance with this regularly.

4.4 Installation of replacement parts and wearing parts

We draw express attention to the fact that replacement parts and accessories that are not supplied by us have not been checked and approved for use by us. Under certain circumstances, the installation and/or use of such products may therefore negatively impact the stipulated design characteristics of the machine.
HandlingTech Automations-Systeme GmbH is not liable for damage caused by use of non-original parts and non-original accessories. Standard parts can be ordered via specialist suppliers.

Service
HandlingTech Automations-Systeme GmbH will be happy to assist with special problem solutions, as well as with carrying out repairs, maintenance work and all alterations that are not described in these operating instructions. You can reach us at the address on the cover page.

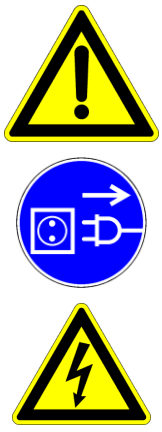
NOTE

***Lists** of the **spare parts** and **wear parts** are included in the **technical documents** as an addition.*

Failure to comply with this instruction results in material damage.
Failure to comply with the instructions in the provided technical documents can result in damage.

4.5

4.6 Shut-down procedures



DANGER

The following shut-down procedure must be observed before any cleaning, maintenance or repair work (only to be carried out by specialist personnel).
Failure to comply will result in severe or fatal injuries.

1. *Switch power supply to the machine off:*
   - *Set the main switch (mains disconnector) to "0".*
   - *Pull out the mains plug.*

Do not use water for cleaning!
Disregarding this will result in a risk to the life and limb of personnel!

DANGER

	*The **shut-down procedures** must be always be carried out before any cleaning, maintenance and repair tasks (see chapter 4.5)!* ***Failure to comply will result in severe or fatal injuries.*** *Otherwise unexpected start-up can occur. In addition, do not use any sharp objects or tools for cleaning. Only use objects that are expressly intended for this purpose.*

5 Installation

5.1 Scope of supply

The scope of supply includes:

- **Generator** with a robust, compact housing
- **Oscillating head** with cylindrical shank socket D = 12 mm
- **Table** on easy-running castors with locking mechanism
- **Tool drawer** (integrated into the table) with internal divider
- **Coolant tank** with two chambers for supply and return
- **Coolant pump** for effective flushing; 2 m intake hose and foot valve, as well as 2 m pressure hose with quick-release coupling;
- **Supply hose** 2m from the generator to the oscillating head (sizes up to 7.5 m available)
- **Earth cable** 3m with workpiece clamp
- One **open-ended spanner** each in sizes WAF 19 mm and WAF 24 mm
- 10 **bag-type splash guards**

Optional:

- Deep hole inspection light with plug-transformer
- Oscillating head socket MK 2, MK 3
- Magnetic stand
- Tapered punches, D = 2 – 6 mm
- Stationary radial eroder unit

- **Operating instructions**
- **Technical documents**

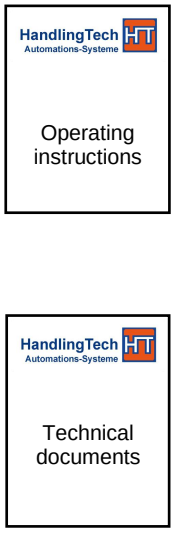


Fig. 51 Scope of supply

The detailed scope of supply can be seen in the order confirmation.

5.2 Transport and packaging

Systems and machines from HandlingTech Automations-Systeme GmbH are diligently checked and packaged carefully prior to shipping. However, it is not possible to fully exclude the possibility of damage during transport.
Transport is provided by HandlingTech Automations-Systeme GmbH or a transport company authorised by HandlingTech. Please contact our customer service if you have any questions in this regard.

5.2.1 Delivery (also for spare parts and replacement parts)

Incoming goods inspection

- Check completeness with the help of the delivery documentation!
- Check the delivery for any damage (visual inspection)!

If there are complaints:
If the delivery has been damaged in transit:
- Contact the last haulier involved immediately!
- Store the packaging safely in case it is needed for inspection by the shipping agent or for returning the delivery.

Packaging for return
If possible use the original packaging and the original packing material.
If they are both no longer available:
- Request the assistance of a packaging company with specialists.
- Set the machine down on a pallet (it must be appropriately designed to bear the weight).
- If you have questions regarding the packaging and transport protection please get in touch with HandlingTech Automations-Systeme GmbH.

Packing for transport on an HGV
When transporting using an HGV, the machine or the transport unit must be placed on a pallet, fastened down and secured with lashing gear.

5.3 Intermediate storage

The freight packing of the machine and spare and replacement parts is designed for a storage period of 3 months upon delivery.

Storage conditions
- Closed and dry room with an ambient temperature of + 5°C to + 45°C.
- The relative humidity must be no more than 70% (non-condensing).

-

NOTE

Place dessicant in the electrical system cabinet and operating cabinet.

Failure to comply with this instruction results in material damage.
Damp can penetrate the switching cabinets and cause major damage.

5.4 Transport to the installation site (by the customer)

WARNING

Transport should only be carried out by trained specialists in accordance with the specifications and the local conditions.

Failure to comply may result in severe or fatal injuries.
Failure to comply with the transport specifications can result in material damage.

The machine or the transport units are transported to the installation site by the customer on transport pallets or using appropriate transport devices.

DANGER

*When transporting, pay attention to the **weight**, the **attachment points** and the **centre of gravity** of the **transport unit**. The transport unit can tip during transport. Note the **centre of gravity**. If necessary, secure the transport unit with the appropriate **sling gear** prior to transport.*

Failure to comply will result in severe or fatal injuries.
*When **transporting the machine,** also bear in mind that system parts may tip when you consider the spatial requirements (height of the components).*

5.4.1 Transport by pallet truck

- The pallet truck must be appropriately designed for the weight of the machine or transport unit.
- Drive the pallet truck with the forks between or under the spars in the transport pallet. In doing so ensure that the forks of the pallet truck are driven in far enough (the forks must project out of the far side).
- Lift the transport unit while paying particular attention to the centre of gravity and transport it.

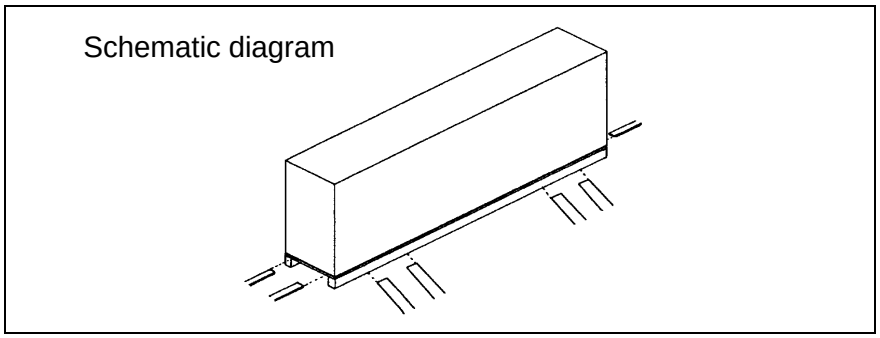


Fig. 52 Transport by pallet truck

5.4.2 Technical specifications for transport

Transport unit	**Weight**	**Centre of gravity**	**Attachment points**	**Lifting equipment**
Metal eroder complete with table	Max. 110 kg	Top-heavy		Forklift truck
Individual units:				
Generator	Max. 35 kg	Central		2 persons
Oscillating head	Approx. 4 kg	Central		By hand
Coolant pump	Approx. 10 kg	Central		By hand
Coolant tank empty	Approx. 12 kg	Central		By hand
Magnetic stand (optional)	Approx. 16 kg	Central		By hand

Table 51 Weight and transport

5.5 Setup, installation

NOTE

Check all components in the electrical system cabinets and operating cabinets for firm seat. Retighten all screws and clamps (control cabinet, motor, etc.).

The unit is set up at the usage site by the operator, who must ensure the following:

- The necessary electrical connections must be available
- There must be sufficient space to set up the unit
- Carry out the initial commissioning in accordance with the stipulations in chapter 7, as well as the supplied video documentation on DVD.

When putting the unit out of operation, the following measures must be observed:

- Establish transport safety
- Apply the locking brakes on the table
- Drain/dispose of lubricants/coolants
- Disconnect from the power supply

6 Function

6.1 System overview

Fig. 6-1 System overview

The metal eroder consists of the following main components:			
1	Generator	6	Table
2	Oscillating head	7	Tool drawer
3	Supply hose	8	Coolant tank
4	Earth cable	9	Magnetic stand (optional)
5	Coolant pump with hoses		

System overview	
1. Generator 2. Oscillating head 3. Coolant pump 4. Supply hose 5. Earth cable 6. Table with tool drawer 7. Coolant tank	The following optional items are available: 8. Deep hole inspection light with bulb holder D=5mm and 35mm long for illuminating the holes after eroding; also comes with a 230V plug-transformer so it can be used for all types of inspection work (not pictured); 9. Magnetic stand: with holding bracket and special flange for receiving the oscillating head, upper section can be pivoted and repositioned 10. Oscillating head socket MK 2, MK 3 (not pictured) 11. Tapered punches, D = 2 – 6 mm (not pictured)

6.2 Structure and function

6.2.1 Oscillating head

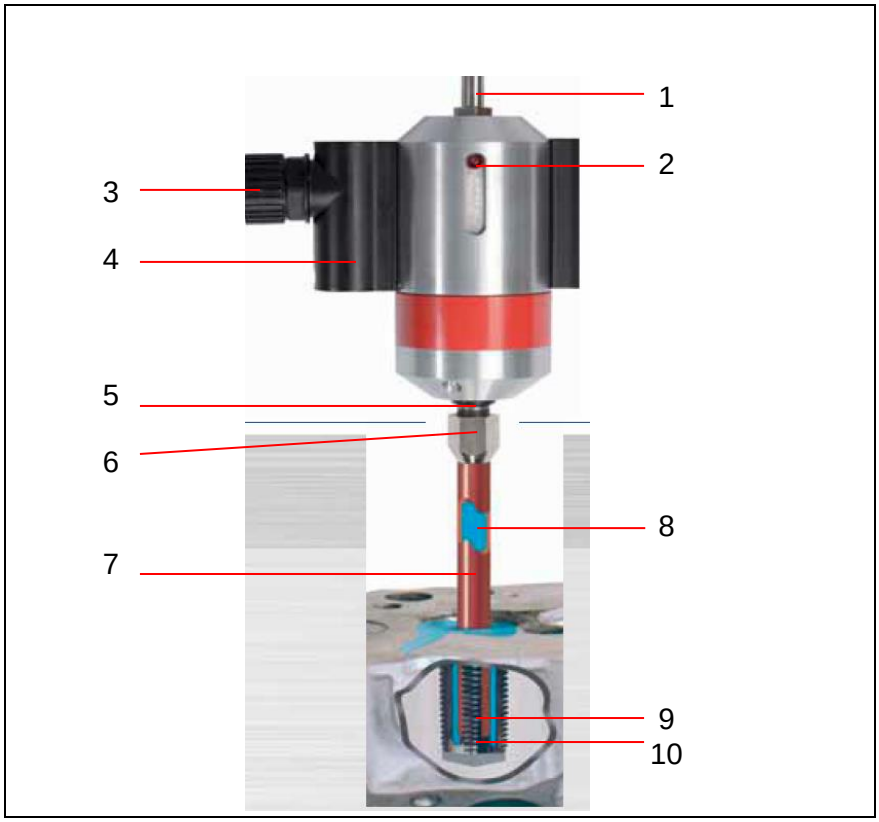


Fig. 62 Oscillating head

1. **12 mm cylindrical shank** (standard) for installation in the drill or collet chuck, or with MK-2 / MK-3 installation directly in the spindle sleeve 2. **Function light (LED)** to indicate the optimum stock removal rate 3. **Supply hose** 4. **Handle**	5. Case-hardened **oscillating armature** mounted on twin-bearings 6. **Clamping nut** for collet chuck and electrodes 7. **Hollow copper electrode** 8. Standard **drilling emulsion** 9. Broken-off **screw tap** 10. **Feed mechanism** (oscillating)

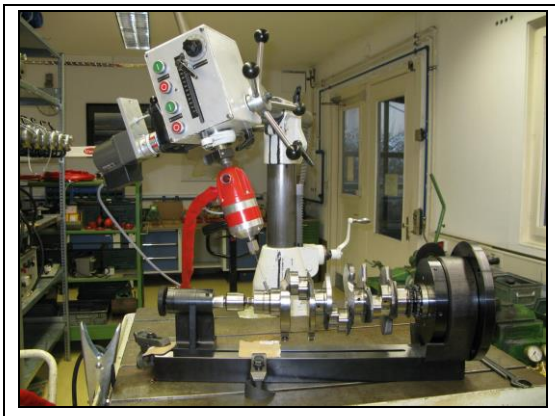
6.3 Application

The eromobil® er 230s-ND and ***eromobil® er 400t-ND*** are erosion drilling machines, which operate according to the electric arc process and allow material removal from electrically conductive materials, regardless of hardness. ***eromobil®*** machines are predominantly used to remove broken-off tools such as screw taps, spiral bits, reamers, etc.

6.3.1 Example applications:

Stationary radial-eroder unit with moveable x-axis and z-axis for precise positioning of the electrode. The z-axis, which can be rotated through 360° and the pivoting work table make it possible to carry out eroding on large workpieces. Tool remnants can even be removed from tapered drill holes using an oscillating eroding head**.**

Fig. 63 Stationary radial eroder unit



Eroding a camshaft on a special machine with automatic feed mechanism (old *eromobil* ® model).

Fig. 64 Special machine with automatic feed mechanism

A tool fracture in the end of a shaft only requires a brief interruption (old *eromobil* ® model).

Fig. 65 Tool fracture

The magnetic stand can be used to achieve even greater mobility.

Fig. 66 Magnetic stand

6.4 Effect

The electric arc is generated by a voltage supplied by the converter and is created between the electrode and the workpiece. The electrode is always the negative terminal, and the workpiece the positive.
A series of electric arcs between the electrode and the workpiece in quick succession cause material to be removed from both the electrode and the workpiece, according to the polarity.
The removal ratio of the electrode and workpiece differs depending on the material, and regardless of the hardness of the workpiece. Processing options are determined by the melt point and the material being removed.
The sequence of electric arcs is dependent on the erosion drill head (oscillating head). The hollow electrode, which is clamped there by a collet chuck, performs longitudinal oscillations which cause the ignition and breakaway of the electric arc. Even flickering of the indicator light on the oscillating head shows the material removal. Adjustment of the work setting affects the intensity of the electric arc.
The coolant pump pumps coolant (drilling emulsion) through the hollow electrode to the material being removed. The coolant serves both to cool the workpiece and at the same time to flush out drilling debris.
The ***eromobil®*** makes it possible to work from horizontal to vertical. Since the electrode does not turn during the operation, it is even possible to produce openings of any shape.

7 Operation

	WARNING
	The machine may be operated only by specialist personnel who are qualified and trained to operate it.
	Failure to comply may result in severe or fatal injuries.
	Specialised personnel must be trained before operation.

7.1 Controls

7.1.1 Controls on the generator

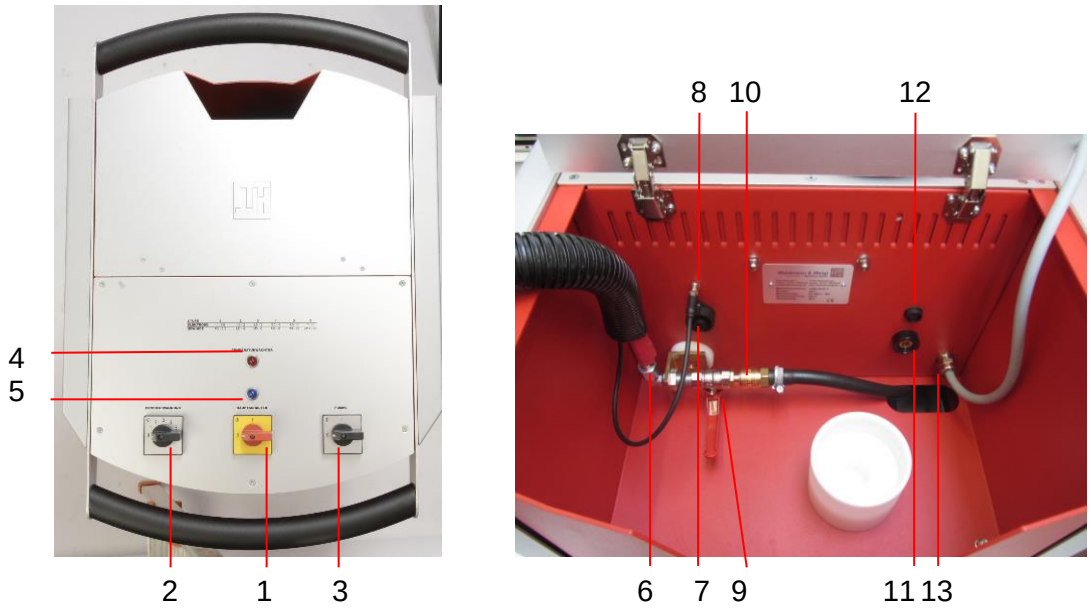


Fig. 71 Controls on the generator

The following controls are found on the generator:

1. **Main switch:** for switching the generator on and off.
2. **Setting switch:** for adjusting the erosion voltage.
3. **Pump switch:** for switching the coolant pump on and off.
4. **Temperature monitor indicator lamp:** lights up if the isolating transformer has overheated (shutting down the erosion voltage).
5. **Main switch indicator lamp:** lights up when the main switch is set to 1
6. **Elbow union for supply hose:** hose connection for the coolant circuit.
7. **Coolant pump socket:** electrical connection for the coolant pump.
8. **Oscillating head socket:** plug connection for the oscillating head.

9. **Shut-off valve:** for interrupting the coolant circuit.
10. **Coupling plug for pump:** hose connection for the coolant circuit.
11. **Earth cable connection bushing:** for connecting the earth cable.
12. **Socket:** for inspection light, 3.5V.
13. **Mains cable:** electrical connection for the generator.

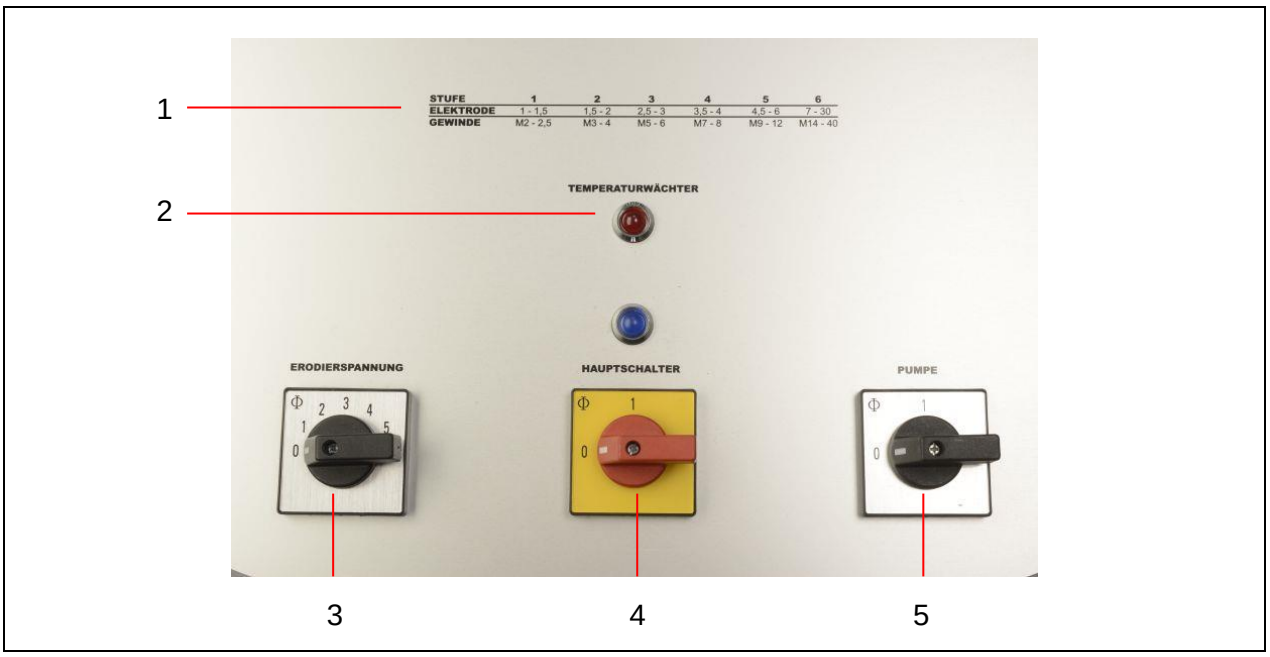


Fig. 72 Label on the cover panel

1

SETTING	1	2	3	5	6
ELECTRODE	1 - 1.5	1.5 - 2	2.5 - 3	4.5 - 6	7 - 30
THREAD	M2 - 2.5	M3 - 4	M5 - 6	M9 - 12	M14 - 40

2 TEMPERATURE MONITOR

3 EROSION VOLTAGE

4 MAIN SWITCH

5 PUMP

7.1.2 Controls on the oscillating head

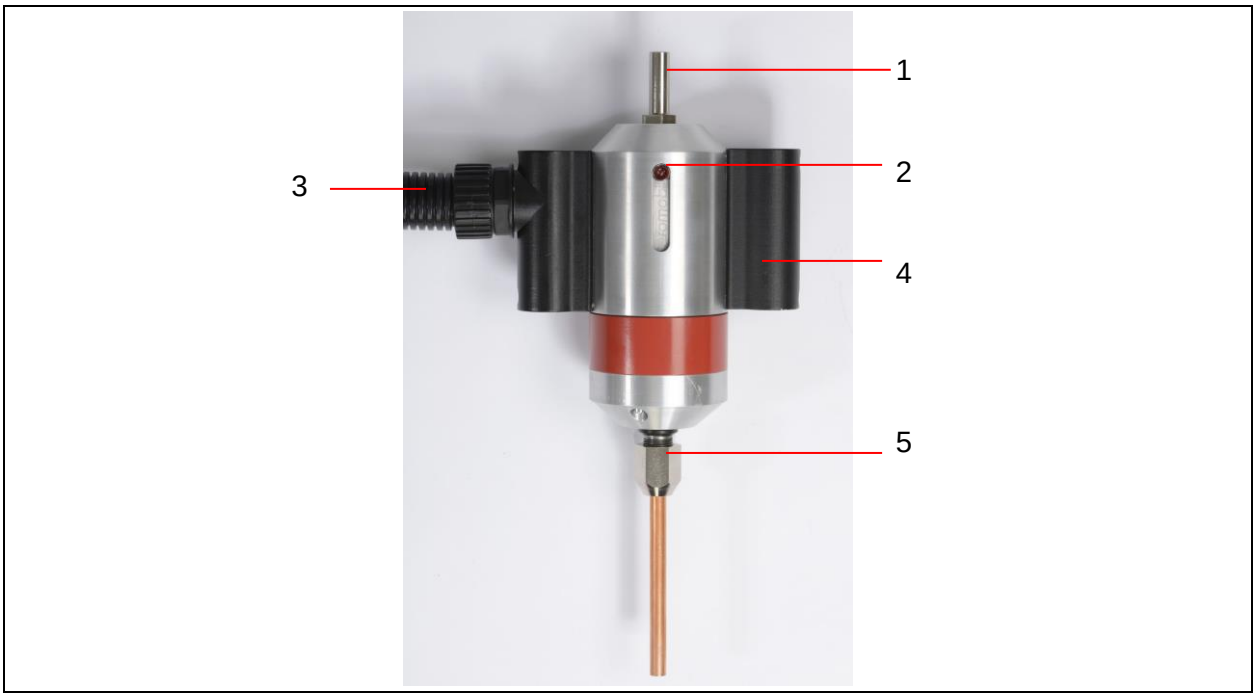


Fig. 73 Controls on the oscillating head

The following controls are found on the oscillating head:

1. **12 mm Cylindrical shank:** for installation in the drill or collet chuck, or with MK-2 / MK-3 installation directly in the spindle sleeve.
2. **Function light:** for showing the optimum stock removal rate.
3. **Supply hose:** used to supply the coolant as well as the coil and erosion voltage.
4. **Handle:** for holding the oscillating head.
5. **Clamping nut:** for collet chuck and electrodes.

7.2 Commissioning

eromobil® machines are intended for use on existing upright and radial drilling machines, milling machines, boring machines or special machines. For this purpose, the oscillating head is clamped either with a clamping adapter Ø12mm or a Morse taper MK-2 / MK-3.

	***WARNING***
	The oscillating head must not be allowed to turn. Any rotation of the socket must be stopped! ***Failure to comply may result in severe or fatal injuries.*** *Pay attention to hazards for limbs, eyes, etc.*

Pay attention to the type plate on the back wall of the machine!

- Coolant consumption:
  use your company's standard choice of drilling emulsion. Do not use any oils, as is the case for spark erosion! Risk of fire!
- Supply hose:
  The free end of the supply hose is fastened to the back panel of the machine with an Ermeto union and a coupling plug.
- Earth cable:
  The earth cable is plugged into the back panel of the machine and the terminal connected to the workpiece.
- Coolant pump:
- The pump hose and supply line are snapped into the cable clip on the back panel of the machine and routed.
  Electrical and fluid connections are made on the back panel of the machine.

WARNING

Driven spindle sleeves must not be rotated, and the feed system must not be switched on.

Failure to comply may result in severe or fatal injuries.
Pay attention to hazards for limbs, eyes, etc.

7.3 Important preparatory work

Before commissioning, the electrics must be tested by the operator in accordance with BGV A3. This test must be repeated on a regular basis.
Earthing of the erosion location (drill hole) must be guaranteed. The electrode is the negative terminal, and the workpiece the positive terminal (attach the workpiece clamp on the earth cable to the workpiece).
The work piece for machining must be firmly attached to the table, and must not oscillate with the drill during the operation.
Ensure the electrode is correctly and firmly fitted in the collet chuck. When eroding broken-off tools, the electrode should be centred as precisely as possible in order to avoid damaging the workpiece (e.g. the thread). To protect against the effects of splash water, the electrode is covered with a bag-type splash guard.

WARNING

Mandatory: protective goggles/eye protection *must be* ***worn*** *or the electrode must be covered appropriately.*

Failure to comply may result in severe or fatal injuries.
Pay attention to hazards for the eyes (flash burn).

7.4 Selection of electrodes

Electrodes of Ø 12 mm and up have a clamping adapter of Ø 10 mm, so the largest collet chuck is always Ø 10 mm.
Electrodes can be supplied at up to Ø 30 mm and 1000 mm in length.
Special hollow electrodes made from tungsten/copper are used to erode **solid carbide tools**.
These are available from Ø 1.0 mm to 12.0 mm.

Standard values for the removal of broken-off screw taps:

Diameter: screw tap / 2 = diameter of the electrode

Thread (metric mm)	Electrode size	Collet chuck size
Ø 2 - 2.5	Ø 1.0 mm	Ø 1.0 mm
Ø 3	Ø 1.5 mm	Ø 1.5 mm
Ø 4	Ø 2.0 mm	Ø 2.0 mm
Ø 5	Ø 2.5 mm	Ø 2.5 mm
Ø 6	Ø 3.0 mm	Ø 3.0 mm
Ø 7	Ø 3.5 mm	Ø 3.5 mm
Ø 8	Ø 4.0 mm	Ø 4.0 mm
Ø 9	Ø 4.5 mm	Ø 4.5 mm
Ø 10	Ø 5.0 mm	Ø 5.0 mm
Ø 12	Ø 6.0 mm	Ø 6.0 mm
Ø 14	Ø 7.0 mm	Ø 7.0 mm
Ø 16	Ø 8.0 mm	Ø 8.0 mm
Ø 18	Ø10.0 mm	Ø10.0 mm
Ø 20	Ø12.0 mm	Ø10.0 mm

Table 71 Electrode diameters for different screw taps

From Ø 20 upwards, we require the core diameter and the chip flute depth to determine the appropriate electrode.

General rule for drills **M 20 and larger**:
(Chip flute depth / 2 = core diameter = diameter of the electrode

Standard values for the removal of broken-off spiral bits:

General rule:
Diameter of the spiral bit x $^2/_3$ = Diameter of the electrode
(the results are rounded up or down)

7.5 Selection of setting values

A decisive factor for ensuring fast machining is choosing the right setting of the work setting switch. This is used to select the erosion voltage. ***eromobil®*** provides the option of working with one of six different voltage settings. Voltage setting I provides the lowest rate of stock removal, and Voltage setting VI the highest.

Standard values for the removal of broken-off screw taps:

Erosion voltage		
Setting	Electrode Ø	Thread Ø
1	1.0 - 1.5 mm	M2 - M2.5
2	1.5 - 2.0 mm	M3 - M4
3	2.5 - 3.0 mm	M5 - M6
4	3.5 - 4.0 mm	M7 - M8
5	4.5 - 6.0 mm	M9 - M12
6	7.0 - 30.0 mm	M14 – M40

Table 72 Standard values for screw taps

Before switching on the main switch, always check the following points:

- Is the workpiece firmly clamped on the work table?
- Is the electrode properly secured and centred?
- Is the earth cable attached to its terminal on the workpiece?
- Main switch "ON": the oscillating head should start to oscillate. Main switch indicator comes on.
- Setting switch "ON": set the required work setting. The oscillating head indicator light comes on.
- Switch for pump "ON": completely fill the pump beforehand.

WARNING

After clamping in a linear guide:
The oscillating head must not be allowed to turn. Any rotation of the socket must be stopped!

Failure to comply may result in severe or fatal injuries.
Pay attention to hazards for limbs, eyes, etc.

NOTE

When commissioning the coolant pump, please observe its separate operating instructions.
Failure to comply with this instruction can result in material damage.

CAUTION

Make sure that the shut-off valve is fully open while eroding, no matter what diameter of electrodes you use!

Failure to follow the instructions can result in minor injuries.

To protect against the effects of splash water, the point to be drilled is covered with a bag-type splash guard. The bag-type splash guard is attached behind the clamping nut on the oscillating head.

- The electrode is positioned by hand on the workpiece using the feed mechanism until a sparkover takes place. The remaining feed process is carried out while watching the indicator

light on the oscillating head. If it is flickering evenly, the right feed rate has been achieved. If it goes out, the feed rate is too high.

7.6 Decommissioning

After completing work with the eroder machine, the following decommissioning procedures are necessary:

- Set the main switch (mains disconnector) to "0'.
- Set the pump switch and setting switch to "0'.
- Pull out the mains plug.
- Drain the hoses:
  - Release the coolant pump pressure line in the intermediate coupling
  - Collect the water that drains out
  - Remove the electrode and collet chuck from the oscillating head
  - Use compressed air to remove the remaining water from the pressure hose (with the shut-off valve fully open)

8 Cleaning and maintenance

WARNING

*The **maintenance / cleaning / inspection interval checks chapter** is written for:*

- *Maintenance and repair tasks **/** Inspection interval checks may **only be carried out by specialised personnel**.*
- *Cleaning tasks must **also be carried by instructed persons**.*

Failure to comply may result in severe or fatal injuries.
This operating manual is not written for laypersons.

- *Laypersons should contact the manufacturer (see the information on the title page) for maintenance, repairs and tests.*

Specialist
- A person who can assess the work assigned to them and recognise potential dangers on the basis of their technical training, knowledge and experience, as well as familiarity with the applicable standards.

Definitions based on EN 60204-1.

WARNING

The operating and maintenance personnel will be trained by specialist personnel from HandlingTech at the installation location of the machine.

Failure to comply may result in severe or fatal injuries.
If you have any questions or are uncertain of anything, please contact HandlingTech.

In order to achieve trouble-free operation of the machine it is absolutely essential that the machine be cleaned and serviced at regular intervals.

The machine is subject to vibrations during operation and this can lead to screws and clamped connections becoming loose. In order to avoid damage, check the machine at regular intervals for loose connections.

NOTE

Maintenance / cleaning of individual procured components (e.g. electric motor, fan) is described in the separate manufacturer operating instructions.
Failure to comply with this instruction can result in material damage.

NOTE

The machine has an average service life of 10 years. After this a general overhaul by a specialist company is required.

NOTE

The intervals are calculated on the basis of (single-shift operation) 8 hours per day, 21 days per month, 12 months per year.

s = per shift;
d = daily;
w = weekly;
m = monthly;
C = Commissioning;
¼ y = every 3 months;
½ y = every 6 months;
y = yearly;
4 y = every 4 years;
MOM = proceed in accordance with the manufacturer's operating manual.

Failure to do so can result in material damage and/or injuries.
If you require a different shift operation, contact the manufacturer and adjust the maintenance times accordingly.

8.1 Inspection intervals for functional checks

Assembly	**Interval for single-shift operation**					
Normal functional checks:	**d**	**w**	**m**	**½ y**	**1 y**	**MOI**
Main switch					**X**	**X**
Mains connection cable					**X**	
Buttons and switches on the control panels.			**X**			
Functional check of all rotating and moving machine elements (by visual inspection).			**X**			
Check conductive connections (acc. to BGV A3)			**X**			
Check the potential equalisation			**X**			
Labelling & warning placards are present and legible (by visual inspection).					**X**	
Check wires are firmly seated and not worn through.					**X**	
Check all the plug-in, screw and clamp connections for firm seating, and tighten if necessary					**X**	
Check coolant unit & hoses (every 6 months), replace coolant hoses (acc. to manufacturer's instructions, every 5 years). Check the pressure on a daily basis.	**X**			**X**		**X**

Table 81 Inspection intervals

8.2 Cleaning

DANGER

*The **shut-down procedures** must be always be carried out before any cleaning, maintenance and repair tasks (see chapter 4.5)!*

Failure to comply will result in severe or fatal injuries.
Otherwise unexpected start-up can occur. In addition, do not use any sharp objects or tools for cleaning. Only use objects that are expressly intended for this purpose.

Cleaning	**Interval**
Clean the oscillating heat socket of shavings and dirt regularly.	**d**
Drain the supply hose regularly.	**d**
Clean the operating elements and information signs with a lint-free cloth (replace any signs that are no longer legible).	**½ y**
Clean all machine components of any contaminants at the end of work.	**d**
Keep the area around the machine clean (well swept).	**d**
Remove material residue, cleaning waste and cleaning materials regularly.	

Table 82 Cleaning

8.3 General maintenance instructions

- Prompt maintenance by the owner is a prerequisite for fault-free operation of the machine. The maintenance intervals are based on the manufacturers' stipulations for procured parts and the experience of HandlingTech Automations-Systeme GmbH.
- Under extreme operating conditions, these service intervals must be reduced.
- Care of the machine includes checking the relevant safety devices as well as the maintenance intervals for the lubrication cycles and cleaning the machine.
- Observe the instructions in Chapter 3: Safety instructions in this context.
- The system will be exposed to greater wear when emulsions are used as cooling lubricants. Emulsion vapours and deposits result in increased wear on scrapers and seals.

Inspections	**Interval**
Check the correct and firm seating or base of the machine and of the table	**½ y**
Check the electrical connections	**w**
Remove any dirt	**d**
Check the system pressure	**d**
Check threaded connections for firm seating, and if necessary retighten	**w**

Table 83 Inspections

	***NOTE***
	Information regarding the type, scope and interval for lubrication of individual components assemblies is provided in the external manufacturers' operating instructions. ***Failure to comply with this instruction can result in material damage.***

8.4 Inspections

- Perform a visual inspection. Check:
  - wiring for kinks, chaffing and scorch marks
  - covers or insulation for damage

- Perform a functional check of all assemblies in setup mode.

	***WARNING***
	After checking and replacing worn parts, check to ensure that all safety devices are fully functional. ***Failure to comply may result in severe or fatal injuries.*** *The machine may not be started up until it has been checked.*

- After the work is finished, check:
  - the earth connections on the machine for firm seating
  - that all work has been fully completed

If all functions are working correctly, the machine is **handed over** to the **operator**.

8.5 Warranty and guarantee terms

The manufacturer's warranty is 12 months from the date of delivery, with proper maintenance of the system, excluding wearing parts.

9 Faults, causes and remedies

DANGER

The facts and information described in these instructions on "Faults, causes, remedies" are listed in such a manner that they can be understood by persons with technical training (for more information, see the definition in chap. 4.3 "Safety measures) in

- *Electrical system / electronics*
- *Mechanical systems / maintenance.*

Failure to comply* will result in severe or fatal *injuries.

*Appropriate tools and test equipment must be provided to personnel. The **shut-down procedures** (see chapter 4.5) must be carried out before any maintenance or repair work. If the stipulated measures are unsuccessful, please contact HandlingTech.*

WARNING

Before opening the housing, pull out the mains plug!
Failure to comply may result in severe or fatal injuries.

Fault	Cause	Remedy
Multiple short-circuit or electrodes sticking / feed rate too high	1. Insufficient or no coolant available 2. Shut-off valve on the back of the machine not open or not fully open. 3. Suction basket on the suction hose is dirty. 4. The pump is producing too low a pressure. 5. Detached waste and thread lips can lead to short circuiting. 6. Bent electrodes or electrodes mounted crooked are contacting the wall of the drill hole.	1. Top up the coolant. 2. Open the shut-off valve. 3. Clean the suction basket on the suction hose. 4. The pump is required to produce a pressure of 3-4 bar. Open the pump housing and check the injector with its diffusor, impeller and mechanical seal for wear. 5. Pull the electrode out of the drill hole. If this does not help, remove drilling debris from the borehole. 6. Check the electrode!
Electrode does not oscillate	Miniature fuse burnt out	Open the front panel and check the miniature fuse on the right-hand side.
Indicator light does not react (does not come on) to setting on the setting switch	LED defective	Check LED
No sparkover takes plate when the electrode is fitted	Connection of the earth cable between the generator and the	Check the connection of the earth cable from the generator

	workpiece gas been interrupted	to the workpiece.
Machine switches off	If overloaded, the transformer heats up and cuts out automatically. Indicator light on the front panel (temperature monitor) comes on.	As soon as the light goes off, the ***eromobil®*** is ready for operation again.
If the problem persists, contact the customer service department at HandlingTech Automations-Systeme GmbH.		

Table 91 Faults, causes and remedies

10 In an emergency

If there is an emergency press one of the EMERGENCY STOP buttons.

Emergency stop buttons are located:
- On the operating control cabinet (controller),
- On the control console.

The EMERGENCY STOP button can be unlocked by pulling it or turning it to the right.
If necessary, switch off the main switch affected.

11 Disassembly and disposal

Disassembly
Disassembly must only be performed by specialised personnel.
Ensure the shut-down procedures have been observed before starting any disassembly work.

Disposal
The system is primarily (with the exception of the electrical equipment) made from steel (to some extent also from aluminium) and should be disposed of in accordance with the local environmental regulations valid at the time of disposal.
Dispose of the system in accordance with its current condition, the existing regulations and taking into account the provisions applicable at that time, e.g. as:
- Electrical scrap (circuit boards)
- Plastics (housing)
- Sheet metal, steel, copper, aluminium (separate by type)

All parts that have been in contact with media are to be decontaminated before disposal.

Oils, solvents, cleaning agents and contaminated cleaning tools (brushes, clothes, etc.) must be disposed of in accordance with the local regulations, per the applicable waste code and taking into consideration the instructions in the safety datasheets from the manufacturer.

12 Appendix

Spare parts lists

Hollow copper electrodes standard length 250 mm

Order no.	Size	Order no.	Size
09000284	Ø 1.0 mm x 250 mm	9000297	Ø 12.0 mm x 250 mm
09000285	Ø 1.5 mm x 250 mm	9503757	Ø 13.0 mm x 250 mm
09000286	Ø 2.0 mm x 250 mm	9503295	Ø 14.0 mm x 250 mm
09000287	Ø 2.5 mm x 250 mm	9503296	Ø 15.0 mm x 250 mm
09000288	Ø 3.0 mm x 250 mm	9503297	Ø 16.0 mm x 250 mm
09000289	Ø 3.5 mm x 250 mm	9503758	Ø 17.0 mm x 250 mm
09000290	Ø 4.0 mm x 250 mm	9503298	Ø 18.0 mm x 250 mm
09000291	Ø 4.5 mm x 250 mm	9503299	Ø 20.0 mm x 250 mm
09000292	Ø 5.0 mm x 250 mm	9503300	Ø 22.0 mm x 250 mm
09000293	Ø 6.0 mm x 250 mm	9503301	Ø 24.0 mm x 250 mm
09000294	Ø 7.0 mm x 250 mm	9503302	Ø 25.0 mm x 250 mm
09000295	Ø 8.0 mm x 250 mm	9503759	Ø 30.0 mm x 250 mm
09000296	Ø 10.0 mm x 250 mm		

Electrodes larger than Ø 12 mm have a soldered in clamping adapter of Ø 10 mm.
Special lengths up to 1000 mm are available.

Collet chucks

Order no.	Size	Order no.	Size
09000020	Ø 1.0 mm	9000268	Ø 4.5 mm
09000022	Ø 1.5 mm	9000269	Ø 5.0 mm
09000263	Ø 2.0 mm	9000270	Ø 6.0 mm
09000264	Ø 2.5 mm	9000271	Ø 7.0 mm
09000265	Ø 3.0 mm	9000272	Ø 8.0 mm
09000266	Ø 3.5 mm	9000273	Ø 10.0 mm
09000267	Ø 4.0 mm		

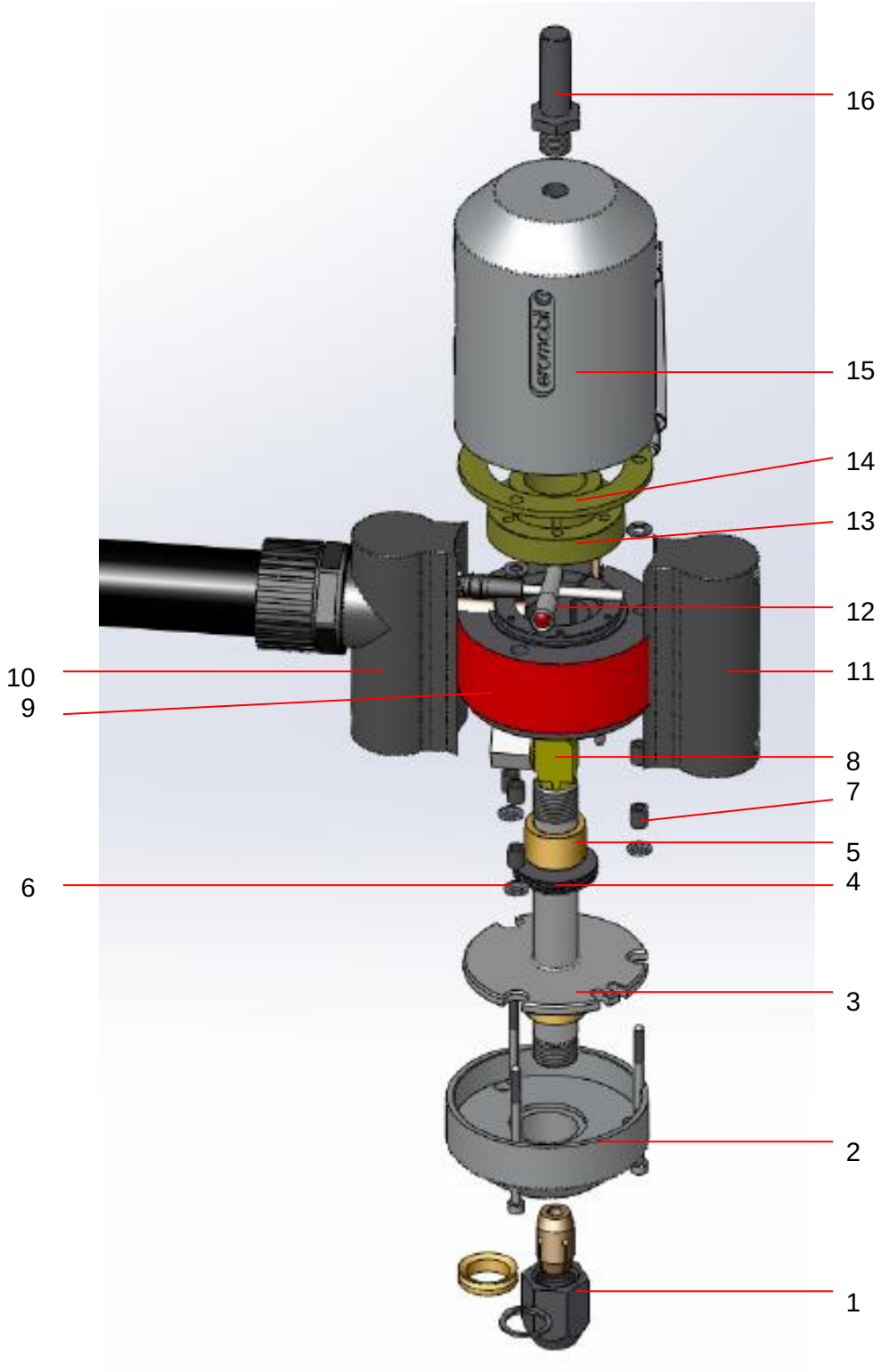
The largest collet chuck is of Ø 10 mm.

Special hollow electrodes made from tungsten/copper for eroding solid carbide materials

Order no.	Size	Order no.	Size
09503815	Ø 1.0 mm x 175 mm	9503822	Ø 4.5 mm x 175 mm
09503817	Ø 1.5 mm x 175 mm	9504012	Ø 5.0 mm x 175 mm
09503816	Ø 2.0 mm x 175 mm	9503332	Ø 6.0 mm x 200 mm
09503818	Ø 2.5 mm x 175 mm	9503333	Ø 7.0 mm x 200 mm
09503855	Ø 3.0 mm x 175 mm	9503334	Ø 8.0 mm x 200 mm
09503820	Ø 3.5 mm x 175 mm	9503337	Ø 10.0 mm x 200 mm
09503773	Ø 4.0 mm x 175 mm		

eromobil® ***oscillating head***

Order no.	Description	Quantity	Item no.
0950 4865	Complete new oscillating head	1	00
0950 3392	Clamping nut	1	1
0950 4872	Base	1	2
0950 4468	Armature R1/4 Inch	1	3
0950 3396	Plate spring	8	4
0950 3426	Sintered bushing	2	5
0950 4951	Insulating bushing	3	6
0501 7270	Distance roller 7x4,2x8	6	7
0950 4878	Elbow union	1	8
0950 4979	Pot-magnetic core ND with integrated ring coil	1	9
0950 4930	Left handle	1	10
0950 4874	Right handle	1	11
0950 4939	LED indicator lamp	1	12
0950 4869	Bearing cover	1	13
0950 4868	Insulating disc	1	14
0950 4867	Housing upper section	1	15
0950 3433	Clamping adapter	1	16
0950 3438	MK2 socket	1	_
0950 3625	MK3 socket	1	_
0950 3408	Bag-type splash guard	1	_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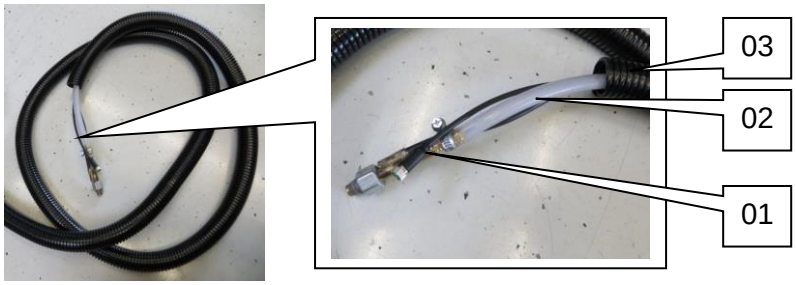
Supply hose from the generator to the oscillating head

Order no.	Description	Quantity	Item no.
0950 4968	Complete supply hose, 2m	1	
0950 4927	Oscillating head connection cable	1	1
0950 3866	Internal drilling hose	1	2
0950 4881	Protective tube	1	3

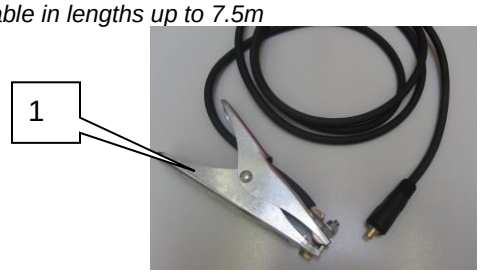
Supply hoses are available in lengths up to 7.5m



Earth cable

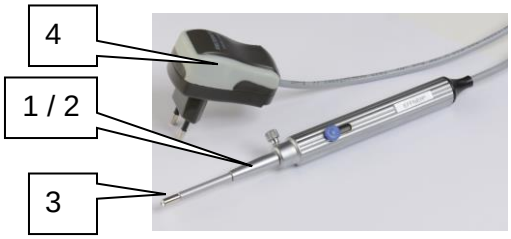
Order no.	Description	Quantity	Item no.
0950 4623	Complete earth cable, 3m	1	
0950 4895	Workpiece clamp	1	1

Earth cables are available in lengths up to 7.5m

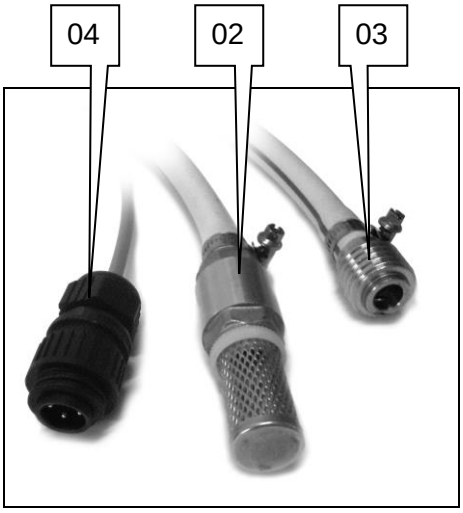


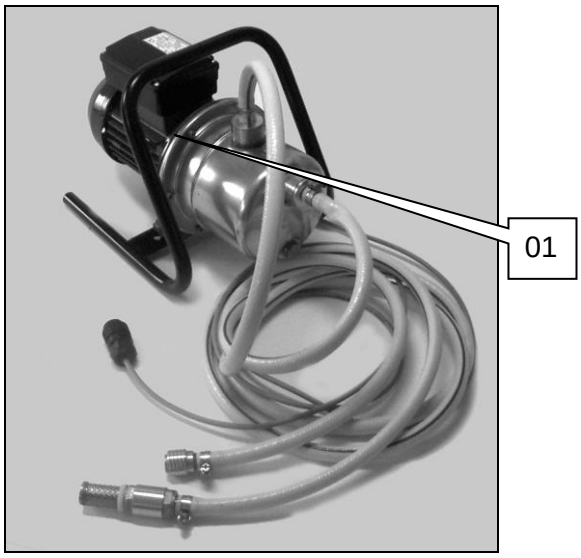
Deep hole inspection light

Order no.	Description	Quantity	Item no.
0950 3357	Complete deep hole inspection light	1	
0950 3363	Bulb holder, 35 mm long	1	1
0950 3364	Bulb holder, 100 mm long	1	2
0950 3366	Bulb for deep hole inspection light; 3.8V	1	3
0950 3643	Transformer plug	1	4



JEXI STAR coolant pump





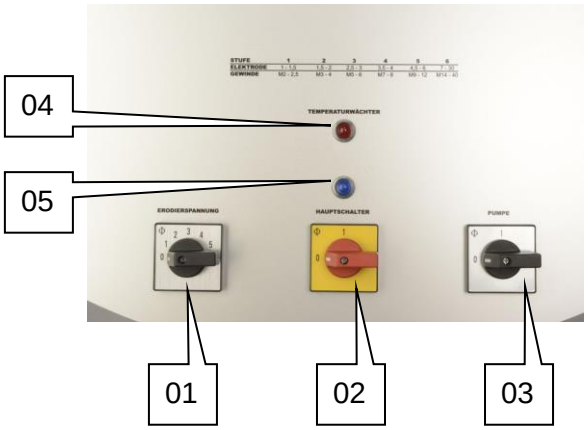
Order no.	Description	Quantity	Item no.
0950 3409	Complete pump with one 2m pressure hose and intake hose each for the ***eromobil® er 230 s*** Voltage 230 VAC, 50 Hz	1	01
0950 3414	O-ring	1	
0950 3415	Injector with diffusor and seal	1	
0950 3416	Nut	1	
0950 3417	Impeller	1	
0950 3418	Mechanical seal	1	
0950 3419	Spacer ring	1	
0950 3421	Intake basket	1	02
0950 3401	Coupling plug	1	03
0950 3423	Connector	1	04

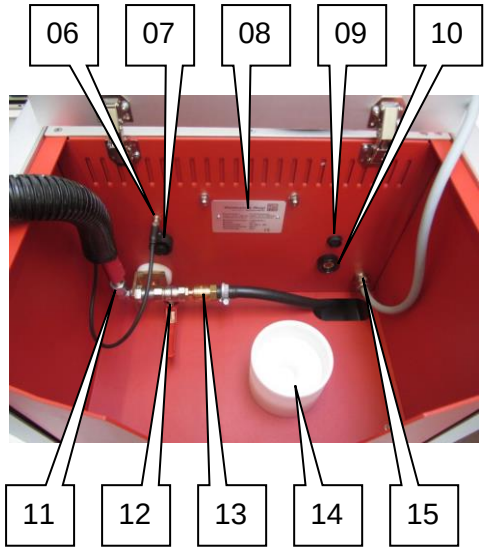
NOTE

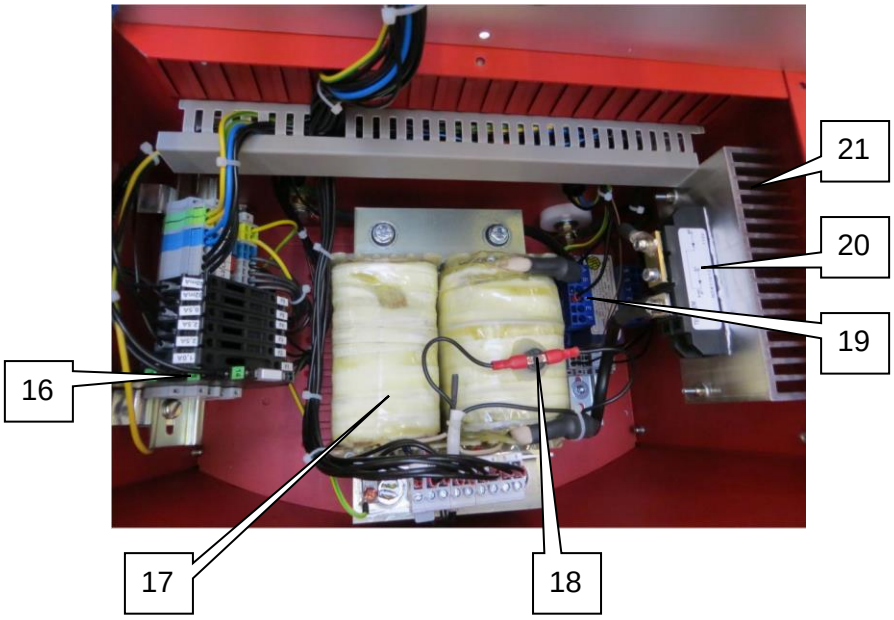
The design, function and mode of operation of the coolant pump are described in detail in the manufacturer's operating instructions in the appendix.

Failure to comply with this instruction can result in material damage.

Generator







Order no.	Description	Quantity	Item no.
0950 5008	Setting switch	1	01
0950 4933	Main switch	1	02
0950 5009	Pump switch	1	03
0950 4971	Red temperature monitor LED	1	04
0950 4926	Blue main switch LED	1	05
0950 4972	Oscillating head flange socket	1	06
0950 3379	Coolant pump socket	1	07
----------	Type plate	1	08
0950 3378	Deep hole inspection light socket, 3.5V	1	09
0950 3391	Earth cable connection bushing	1	10
0950 3403	Supply hose elbow union	1	11
0950 4289	Complete shut-off valve	1	12
0950 3401	Coupling plug for pump	1	13
0950 4906	Socket for oscillating head	1	14
----------	Generator supply line / power supply	1	15
0950 4953	Output relay, 6.2 230V-1U	1	16
0950 3380	Burning transformer, 230V	1	17
0950 3381	Burning transformer, 400V	1	17
0950 3374	Thermocouple	1	18
0950 3382	Oscillating head transformer, 230/400V	1	19
0950 4430	Diode module	1	20
0950 4431	Profile cooling body	1	21

The time to supply spare and wearing parts is normally approx. 3-5 working days.
Spare parts from the machines will be available from HandlingTech Automations-Systeme GmbH for at least 10 years after your purchase of the machine.