HAFCO METALMASTER

GEAR HEAD DRILL
OPERATION MANUAL

Model
GHD-45G

Edition No	:	*GHD45G001*
Date of Issue	:	*10/2017*

MACHINE DETAILS

MACHINE	GEAR HEAD DRILL
MODEL NO.	GHD-45G
SERIAL NO.	
DATE OF MANF.	

Distributed by

MACHINERYHOUSE

www.machineryhouse.com.au
www.machineryhouse.co.nz

NOTE:
This manual is only for your reference. Owing to the continuous improvement of the machine, changes may be made at any time without obligation or notice. Please ensure the local voltage is the same as listed on the specification plate before operating this electric machine.

NOTE:
In order to see the type and model of the machine, please see the specification plate. Usually found on the back of the machine. See example (Fig.1)

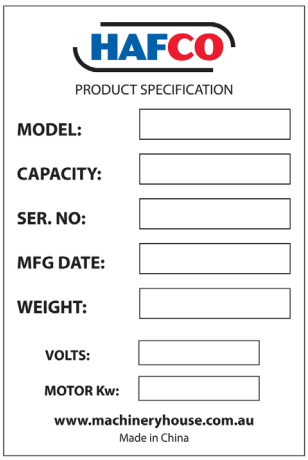


Fig.1

Table of contents

Preface

Dear customer,

Thank you very much for purchasing a product made by OPTIMUM.

OPTIMUM metal working machines offer a maximum of quality, technically optimum solutions and convince by an outstanding price performance ratio. Continuous enhancements and product innovations guarantee state-of-the-art products and safety at any time.

Before commissioning the machine please thoroughly read these operating instructions and get familiar with the machine. Please also make sure that all persons operating the machine have read and understood the operating instructions beforehand.
Keep these operating instructions in a safe place nearby the machine.

Information

The operating instructions include indications for safety-relevant and proper installation, operation and maintenance of the machine. The continuous observance of all notes included in this manual guarantee the safety of persons and of the machine.

The manual determines the intended use of the machine and includes all necessary information for its economic operation as well as its long service life.

In the paragraph "Maintenance" all maintenance works and functional tests are described which the operator must perform in regular intervals.

The illustration and information included in the present manual can possibly deviate from the current state of construction of your machine. Being the manufacturer we are continuously seeking for improvements and renewal of the products. Therefore, changes might be performed without prior notice. The illustrations of the machine may be different from the illustrations in these instructions with regard to a few details. However, this does not have any influence on the operability of the machine.
Therefore, no claims may be derived from the indications and descriptions. Changes and errors are reserved !

Your suggestion with regard to these operating instructions are an important contribution to optimising our work which we offer to our customers. For any questions or suggestions for improvement, please do not hesitate to contact our service department.

If you have any further questions after reading these operating instructions and you are not able to solve your problem with a help of these operating instructions, please contact your specialised dealer or directly the company OPTIMUM.

Optimum Maschinen Germany GmbH
Dr.- Robert - Pfleger - Str. 26
D-96103 Hallstadt
Fax (+49)0951 / 96 555 - 888
Email: info@optimum-maschinen.de
Internet: www.optimum-maschinen.de

1 Safety

Glossary of symbols

☞	provides further instructions
➜	calls on you to act
❍	listings

This part of the operating instructions

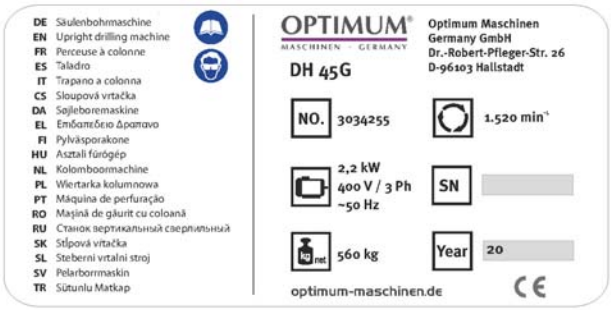
- ❍ explains the meaning and use of the warning notes included in these operating instructions,
- ❍ defines the intended use of the geared drill,
- ❍ points out the dangers that might arise for you or others if these instructions are not observed,
- ❍ informs you about how to avoid dangers.

In addition to these operation instructions, please observe

- ❍ the applicable laws and regulations,
- ❍ the statutory provisions for accident prevention,
- ❍ the prohibition, warning and mandatory signs as well as the warning notes on the geared drill.

Always keep this documentation close to the geared drill.

1.1 Type plate



INFORMATION

If you are unable to rectify an issue using these operating instructions, please contact us for advice:

Optimum Maschinen Germany GmbH
Dr. Robert-Pfleger-Str. 26

D-96103 Hallstadt, Germany

Email: info@optimum-maschinen.de

1.2 Safety instructions (warning notes)

1.2.1 Classification of hazards

We classify the safety warnings into different categories. The table below gives an overview of the classification of symbols (ideogram) and the warning signs for each specific danger and its (possible) consequences.

Symbol	Alarm expression	Definition / consequence
	**DANGER!**	Impending danger that will cause serious injury or death to people.
	WARNING!	A danger that can cause serious injury or death.
	CAUTION!	A danger or unsafe procedure that can cause personal injury or damage to property.
	**ATTENTION!**	Situation that could cause damage to the geared drill and product, as well as other types of damage. No risk of injury to persons.
	**Information**	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram with


general danger


with a warning of


injury to hands,


hazardous electrical voltage,

or


rotating parts.

1.2.2 Other pictograms


Warning: danger of slipping!


Warning: risk of stumbling!


Warning: hot surface!


Warning: biological hazard!


Warning: automatic start-up!


Warning: tilting danger!


Warning: suspended loads!


Caution, danger of explosive substances!

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Switching on forbidden!


Do not climb onto the machine!


Read the operating instructions before commissioning!


Pull out the mains plug!


Wear protective glasses!


Wear protective gloves!


Wear safety shoes!


Wear a protective suit!


Use ear protection!


Only switch during standstill!


Protect the environment!


Contact address

1.3 Intended use

WARNING!

In the event of improper use of the geared drill

- **will endanger personnel,**
- **will endanger the machine and other material property of the operating company,**

the correct function of the geared drill may be affected.

The geared drill is designed and manufactured to be used in a non-explosive environment. The geared drill is designed and manufactured for holes in cold metals or other non flammable materials or that not constitute a health hazard using a rotating filing-stripping tool that has a number of grooves for collecting the filings.

If the geared drill is used in any way other than described above, modified without authorization of Optimum Maschinen Germany GmbH, then the geared drill is being used improperly.

We will not be held liable for any damages resulting from any operation which is not in accordance with the intended use.

We expressly point out that the guarantee or CE conformity will expire due to any constructive technical or procedural changes which had not been performed by the company Optimum Maschinen Germany GmbH.

It is also part of intended use that

- observe the limits of the geared drill,
- the operating manual is observed,
- the inspection and maintenance instructions are observed.

☞ "Technical specification“ on page 16

WARNING!

Extremely severe injuries.

It is forbidden to make any modifications or alternations to the operation values of the geared drill! They could endanger the personnel and cause damage to the geared drill.

1.4 Reasonably foreseeable misuse

Any use other than that specified under "Intended use" or any use beyond that described will be deemed non-intended use and is not permissible.

Any other use must be discussed with the manufacturer.

It is only allowed to process metal, cold and non-inflammable materials with the geared drill.

In order to avoid misuse, it is necessary to read and understand the operating instructions before first commissioning.

Operators must be qualified.

1.4.1 Avoiding misuse

➜ Use of suitable cutting tools.
➜ Adapting the speed adjustment and feed to the material and workpiece.
➜ Clamp workpieces firmly and free of vibration.

ATTENTION!

The workpiece is always to be fixed by a machine vice, jaw chuck or by another appropriate clamping tool such as for the clamping claws.

WARNING!

Risk of injury caused by flying workpieces.

Clamp the workpiece in the machine vice. Make sure that the workpiece is firmly clamped in the machine vice and that the machine vice is firmly clamped onto the machine table.

➜ Use cooling and lubricating agents to increase the durability of the tool and to improve the surface quality.
➜ Clamp the cutting tools and workpieces on clean clamping surfaces.
➜ Sufficiently lubricate the machine.
➜ Set the bearing clearance and guides correctly.

Recommendations:

➜ Insert the drill in a way that it is exactly positioned between the three clamping jaws of the quick action chuck.

When drilling, make sure that

➜ the suitable speed is set depending on the diameter of the drill,
➜ the pressure must only be such that the drill can cut without load,
➜ if there is too much pressure, the drill will wear quickly and may even break or jam in the borehole. If the drill jams, immediately stop the main motor by pressing the emergency stop switch,
➜ use commercial cooling/lubricating agents for hard materials, e.g. steel and
➜ generally always back the spindle out of the workpiece while it is still turning.

1.5 Possible dangers caused by the geared drill

The geared drill was built using state-of-the-art technology.

Nevertheless, there is a residual risk as the geared drill operates with

❍ at high speeds,
❍ with rotating parts,
❍ electrical voltage and currents.

We have used design and safety engineering to minimize the health risk to personnel resulting from these hazards.

If the geared drill is used and maintained by personnel who are not duly qualified, there may be a risk resulting from incorrect or unsuitable maintenance of the geared drill.

INFORMATION

Everyone involved in the assembly, commissioning, operation and maintenance must

- be duly qualified,
- and strictly follow these operating instructions.

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the machine and other material values,
- the correct function of the geared drill may be affected.

Always disconnect the geared drill if cleaning or maintenance work is being carried out, or is no longer in use.

WARNING!

The geared drill may only be operated with functional safety devices.

Disconnect the geared drill immediately, whenever you detect a failure in the safety devices or when they are not fitted!

All additional devices installed by the operator must be equipped with the stipulated safety devices. This is your responsibility as the operator!

☞ **"Safety devices“ on page 11**

1.6 Qualification of personnel

1.6.1 Target group

This manual is addressed to

- the operating companies,
- the operators,
- the maintenance personnel.

Therefore, the warning notes refer to both, operation and maintenance personnel of the geared drill.

Determine clearly and explicitly who will be responsible for the different activities on the geared drill (operation, setting up, maintenance and repair).

Unclear responsibilities constitute a safety risk!

Always disconnect plug of the geared drill from the electrical power supply. This will prevent it from being used by unauthorized persons.

The qualifications of the personnel for the different tasks are mentioned below:

Operator

The operator is instructed by the operating company about the assigned tasks and possible risks in case of improper behaviour. The operator may only carry out tasks that exceed normal operation if this is stated in these instructions and the operating company has explicitly entrusted him with the task.

Qualified electrician

With professional training, knowledge and experience as well as knowledge of respective standards and regulations, qualified electricians are able to perform work on the electrical system and recognise and avoid any possible dangers.

Qualified electricians have been specially trained for the working environment, in which they are working and know the relevant standards and regulations.

Qualified personnel

Due to their professional training, knowledge and experience as well as knowledge of relevant regulations, qualified personnel are able to perform the assigned tasks and to independently recognise and avoid any possible dangers.

Instructed person

Instructed persons were instructed by the operating company regarding the assigned tasks and any possible risks of improper behaviour.

1.6.2 Authorized persons

WARNING!

Inappropriate operation and maintenance of the geared drill constitutes a danger for the personnel, objects and the environment.

Only authorized personnel may operate the geared drill !

Authorized operating and maintenance personnel are specialists instructed and trained by the operator company and the manufacturer.

Obligations of the operating company

- train the personnel,
- instruct the personnel in regular intervals (at least once a year) on
  - all safety regulations relevant to the machine,
  - its operation and
  - generally accepted engineering standards.
- check the personnel‘s knowledge level,
- document the training/instruction,
- have attendance at the training/instruction confirmed by signature and
- check whether the personnel is working in a safety and risk-conscious manner and following the operating instructions.
- define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act.

Obligations of the operator

- have obtained a training regarding the handling of the geared drill,
- know the function and mode of action,
- before taking the machine in operation
  - have read and understood the operating manual,
  - be familiar with all safety devices and instructions.

Additional requirements apply for work on the following machine components:

Additional requirements regarding the qualification

- Electrical parts or operating agents: shall only be performed by an electrician or under the guidance and supervision of an electrician.
- Before starting work on electrical parts or operating agents, the following actions must be taken in the order given:

➜ disconnect all poles,

➜ secure against restarting,

➜ check that there is no voltage.

1.7 User positions

The operator position is in front of the geared drill.

1.8 Safety measures during operation

CAUTION!

Danger due to inhaling dust and mist that are hazardous to health.

Depending on the materials to be machined and the agents used, dusts and mists can arise that are detrimental to health.

Ensure that the harmful dust and mist generated are safely sucked off at the point of origin and routed away from the working area or filtered. To do so, use a suitable extraction unit.

CAUTION!

Risk of fire and explosion by using flammable materials or cooling lubricants.

Extra precautionary measures must be taken before machining flammable materials (e.g. aluminium, magnesium) or using combustible agents (e.g. spirit) to avert a health hazard.

1.9 Safety devices

Use the geared drill only with properly functioning safety devices.

Stop the geared drill immediately, if a safety device fails or is faulty or becomes ineffective.

It is your responsibility!

If a safety device has been activated or has failed, the geared drill must only be used if you

- the cause of the fault has been eliminated,
- you have verified that there is no danger to personnel or objects.

WARNING!

If you bypass, remove or deactivate a safety device in any other way, you are endangering yourself and other personnel working with the geared drill. The possible consequences are

- **injuries due to components or workpieces flying off at high speed,**
- **contact with rotating parts,**
- **fatal electrocution,**

The geared drill includes the following safety devices:

- an emergency stop push button,
- a drilling table with T-slots to fix the workpiece or a vice,
- a drill chuck guard, in order to prevent interference with the rotating tool.

INFORMATION

The geared drill can only be switched on if the drill chuck guard is closed.

WARNING!

Although the isolating safety devices provided and delivered with the machine are designed to reduce the risks of workpieces being ejected or parts of tools or workpieces breaking off, they cannot eliminate these risks completely. Always work carefully and observe the limits of the machining process.

1.10 Safety check

Check the geared drill before each start-up or at least once per shift. Inform the person responsible immediately of any damage, defects or changes in the operating function.

Check all safety devices

- at the beginning of each shift (with the machine stopped),
- once a week (with the machine in operation) and

- after all maintenance and repair work.

Check that prohibition, warning and information signs and the labels on the geared drill

- are legible (clean them, if necessary)
- are complete (replace if necessary).

INFORMATION

Organise the checks according to the following table;

General check		
Equipment	**Check**	**OK**
Guards	Mounted, firmly bolted and not damaged	
Signs, Markers	Installed and legible	
Date:	**Checked by (signature):**	

Functional check		
Equipment	**Check**	**OK**
Emergency-stop push button	After actuating the emergency stop push button the geared drill must be switched off.	
Drill chuck guard	The geared drill can only be switched on if the drill chuck guard is closed. The engine must switch off when the drill chuck guard is opened during operation.	
Date:	**Checked by (signature):**	

1.11 Emergency-stop push button

ATTENTION!

The drilling spindle keeps turning for a short time even after actuating the emergency stop push button depending on the preset speed.

1.11.1 Main switch

In the "0" position, the lockable main switch can be secured against accidental or non-authorised switching on by means of a padlock.

The power supply is interrupted by switching off the main plug.

Except for the areas marked by the pictogram in the margin. In these areas there might be voltage, even if the main switch is switched-off.

WARNING!

Dangerous voltage even if the main switch is switched off.

The areas marked by the pictogram might contain live parts, even if the main switch is switched off.

1.11.2 Drill chuck guard

Adjust the guard to the correct height before you start working.
To do so, slacken the clamping screw, set the required height and re-tighten the clamping screw.

There is a switch integrated in the spindle protection mounting which monitors the closed position.

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed.

1.12 Personal protective equipment

For some works you need personnel protective equipment as protective equipment. These are

- Safety helmet,
- protective glasses or face guard,
- protective gloves,
- safety shoes with steel toe caps,
- ear protection.

Before starting work make sure that the required personnel protective equipment is available at the work place.

CAUTION!

Dirty or contaminated personnel protective equipment can cause illness.

Clean your personal protective equipment

- **after each use,**
- **regularly once a week.**

Personal protective equipment for special works

Protect your face and your eyes: Wear a safety helmet with facial protection when performing work where your face and eyes are exposed to hazards.

Wear protective gloves when handling pieces with sharp edges.

Wear safety shoes when you assemble, disassemble or transport heavy components.

1.13 Safety during operation

We provide information about the specific dangers when working with and on the geared drill in the descriptions for these types of work.

WARNING!

Before switching on the geared drill make sure that there are

- **no dangers generated for persons,**
- **no objects are damaged.**

Avoid any unsafe work methods:

- Make sure that your operation does not create a safety hazard.
- The rules specified in these operating instructions must be observed during assembly, operation, maintenance and repair.
- Do not work on the geared drill if your concentration is reduced, for example, because you are taking medication.
- Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities applicable to your company.
- Inform the supervisor about all hazards or faults.
- Stay on the geared drill until the machine completely stopped moving.
- Use the specified personal protective equipment. Ensure you wear close-fitting clothing and, if necessary, a hairnet.
- Do not use protective gloves when drilling.

1.14 Safety during maintenance

Inform the operators in good time of any maintenance and repair works.

Report all safety relevant changes and performance details of the geared drill or their operational behavior. Any changes must be documented, the operating instructions updated and machine operators instructed accordingly.

1.14.1 Disconnecting and securing the geared drill

Switch off the geared drill with the main switch and secure the main switch with a padlock against unauthorised switching-on or switching-on by accident.

All machine parts as well as all dangerous voltages are switched off. Excepted are only the positions which are marked with the adjoining pictogram.

1.15 Using lifting equipment

WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death.

Check that the lifting and load suspension gear

- **they have sufficient load carrying,**
- **and that it is in perfect condition.**

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities applicable to your company.

Fasten the loads properly. Never walk under suspended loads!

1.15.1 Mechanical maintenance

Reinstall all protection and safety devices after any maintenance work once the work has been completed.This includes:

- covers,
- safety instructions and warning signs,
- grounding cables.

Check if they are working properly!

1.16 Accident report

Inform your supervisors and Optimum Maschinen Germany GmbH immediately in the event of accidents, possible sources of danger and any actions which almost led to an accident (near misses).

There are many possible causes for "near misses".

The sooner they are notified, the quicker the causes can be eliminated.

1.17 Electrical system

Have the machine and/or the electric equipment checked regularly. Immediately eliminate all defects such as loose connections, defective wires, etc.

A second person must be present during work on live components to disconnect the power in the event of an emergency. Disconnect the machine immediately if there is a malfunction in the power supply!

Comply with the required inspection intervals in accordance with the factory safety directive, operating equipment inspection.

The operator of the machine must ensure that the electrical systems and operating equipment are inspected with regards to their proper condition, namely,

- by a qualified electrician or under the supervision and direction of a qualified electrician, prior to initial commissioning and after modifications or repairs, prior to recommissioning
- and at certain intervals.

The deadlines must be set so that arising, foreseeable defects can be detected in a timely manner.

The relevant electro-technical rules must be followed during the inspection.

The inspection prior to initial commissioning is not required if the operator receives confirmation from the manufacturer or installer that the electrical systems and operating equipment comply with the accident prevention regulations, see conformity declaration.

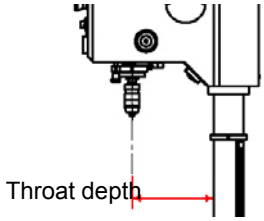
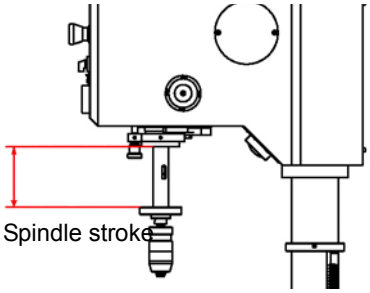
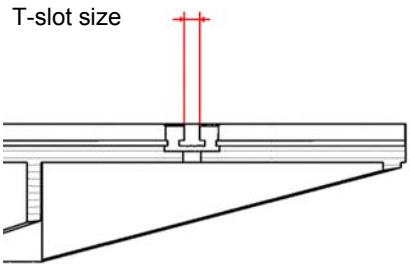
Permanently installed electrical systems and operating equipment are considered constantly monitored if they are continually serviced by qualified electricians and inspected by means of measurements in the scope of operation (e.g. monitoring the insulation resistance).

1.18 Inspection deadlines

Define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act. Also use the inspection intervals in the maintenance section as reference values.

2 Technical specification

The following information represents the dimensions and indications of weight and the manufacturer‘s approved machine data.

	DH45G
Electrical connection	400 V / 3 Ph ~50 Hz
Spindle drive motor power	2.2 kW
Coolant pump motor power	40W
Drilling capacity in steel (S235JR) [mm]	Ø 45
Tapping in steel (S235JR) [mm]	M 35
	350 mm
	180 mm
Spindle seat	MT4
Table size Length x Width of the working surface	530 x 530 mm
Bearing load drilling table [kg]	250
Tilting the table to the side	0 - 90°
Drilling table rotate	360°
 T-slot size / distance / number	18 mm / 125 mm / 3
Distance spindle - table [mm]	70 - 730 mm
Maximum distance [mm] spindle - stand	1210

DH45G_GB_2.fm

	DH45G
Working surface stand [mm] Length x Width of the working surface	755 x 480
Dimensions of the machine	☞ "Dimensions“ on page 19
Required space	Keep a work area of at least one metre around the machine free for operation and maintenance.
Machine weight [kg]	560
Gross weight (Packing + accessory) [kg]	670
Packing dimension L x B x H	2440 x 770 x 1110
Spindle speeds [rpm]	90 - 1520 rpm
Number of stages	8
Column diameter [mm]	Ø 150 mm
Environmental conditions temperature	5 - 35 °C
Environmental conditions Relative humidity	25-80%
Gear operating material	3 liters Mobilgear 629 ☞ "Schmierstoffe“ on page 61
Operating material Toothed rod and drill column	acid-free oil
Coolant equipment	max. 5 liters ☞ "Schmierstoffe“ on page 61

2.1 Emissions

The airborne noise of the geared drill is 75 to 80 dB (A) at the operator position and operating conditions in accordance with DIN ISO 8525

If the geared drill is installed in an area where various machines are in operation, the noise exposure (immission) on the operator of the geared drill at the working place may exceed 80 dB(A).

INFORMATION

This numerical value was measured on a new machine under the operating conditions specified by the manufacturer. The noise behaviour of the machine might change depending on the age and wear of the machine.

Furthermore, the noise emission also depends on production engineering factors, e.g. speed, material and clamping conditions.

INFORMATION

The specified numerical value represents the emission level and does not necessarily a safe working level.

Though there is a dependency between the degree of the noise emission and the degree of the noise disturbance it is not possible to use it reliably to determine if further precaution measures are required or not.

The following factors influence the actual degree of the noise exposure of the operator:

- Characteristics of the working area, e.g. size of damping behaviour**,**
- other noise sources, e.g. the number of machines,
- other processes taking place in proximity and the period of time, during which the operator

is exposed to the noise.

Furthermore, it is possible that the admissible exposure level might be different from country to country due to national regulations.
This information about the noise emission should, however, allow the operator of the machine to more easily evaluate the hazards and risks.

CAUTION!

Depending on the overall noise exposure and the basic threshold values, machine operators must wear appropriate hearing protection.

We generally recommend the use of noise and ear protection.

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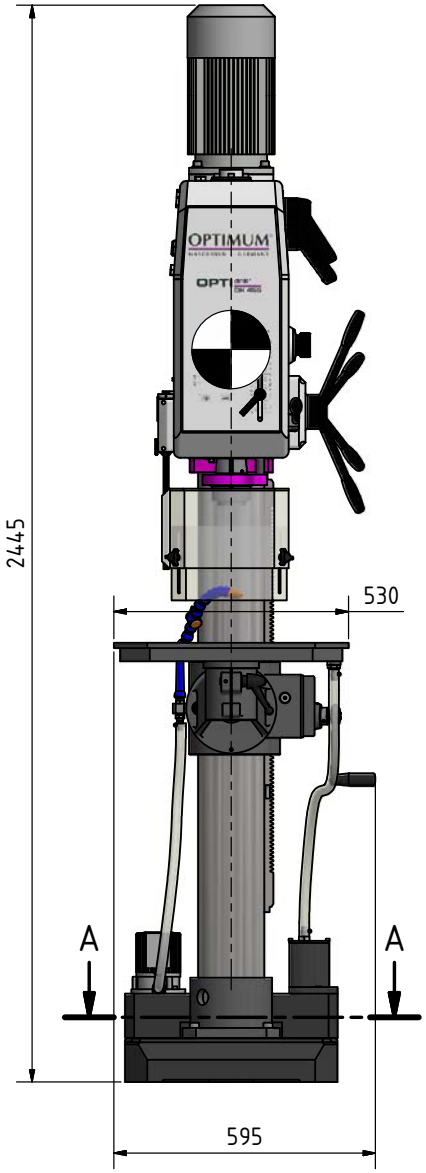
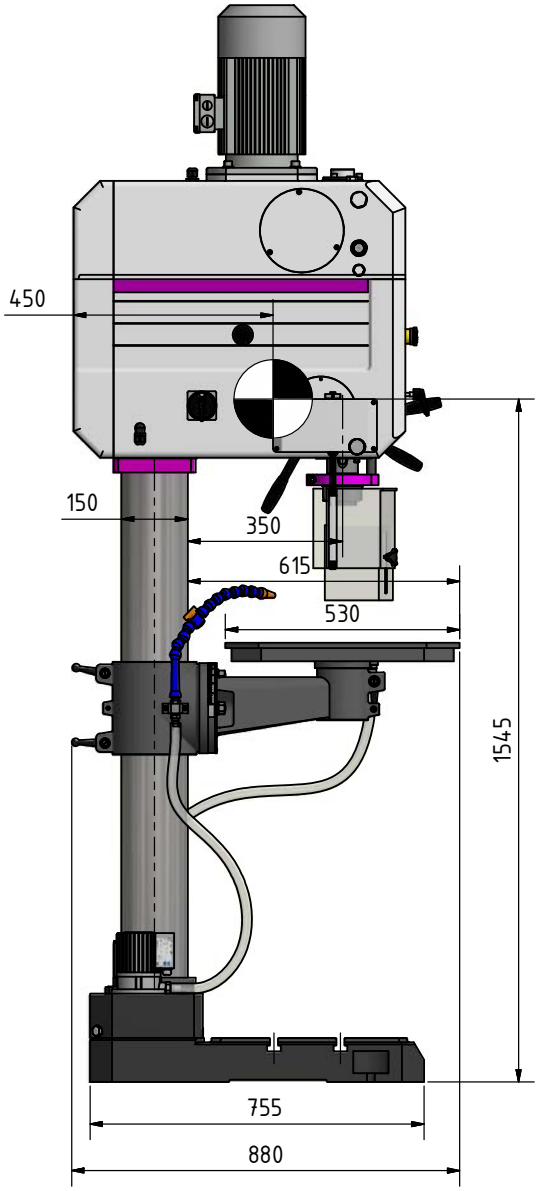
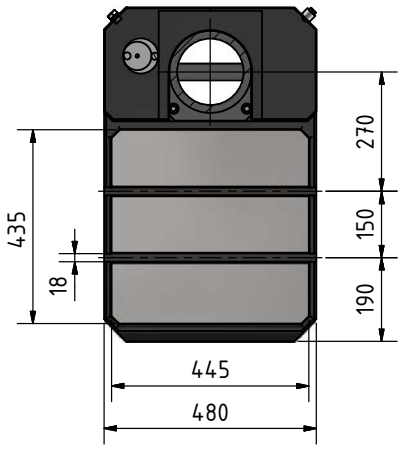
2.2 Dimensions





A–A



Schwerpunkt / Ceentre of gravity

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3 Delivery, internal transport, unpacking

INFORMATION

The machine is pre assembled. It is delivered in a transport box. After the unpacking and the transportation to the installation site it is necessary to mount and assemble the individual components of the machine.

3.1 Delivery

Check the status of the machine immediately upon receipt and claim possible damages at the last carrier also if the packing is not being damaged. In order to ensure claims towards the freight carrier we recommend you to leave the machines, devices and packing material for the time being in the status at which you have determined the damage or to take photos of this status. Please inform us about any other claims within six days after receipt of delivery.

Check if all parts are firmly seated.

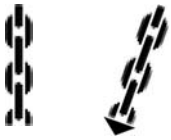
3.2 Internal transport

WARNING!

Severe or fatal injuries may occur if the machine or parts of the machine tumble or fall down from the forklift truck or from the transport vehicle. Follow the instructions and information on the transport box:

- **Centres of gravity**

- **Load suspension points (Marking of the positions for the load suspension gear)**



- **Prescribed transport position (Marking of the top surface)**

- **Means of transport to be used**
- **Weights**

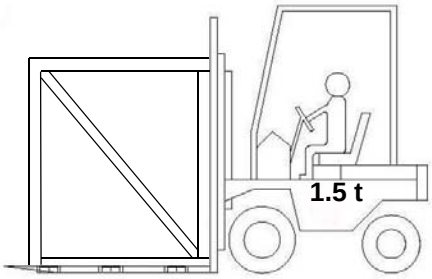
WARNING!

The use of damaged lifting and load suspension equipment without sufficient load capacity that might break under load can cause severe injuries or even death.

Check that the lifting and load suspension equipment has sufficient load capacity and that it is in perfect condition. Observe the accident prevention regulations. Fasten the loads carefully. Never walk under suspended loads!

DH45G_GB_3.fm

The machine can be raised with a lift truck or forklift truck underneath the packing case.



3.3 Unpacking

Install the machine close to its final position before unpacking. If the packaging shows signs of having possibly been damaged during transport, take the appropriate precautions to prevent the machine being damaged when unpacking. If damage is discovered, the carrier and/or shipper must be notified immediately so the necessary steps can be taken to register a complaint.

Examine the complete machine carefully and check whether all materials, such as shipping documents, instructions and accessories have been delivered with the machine.

3.4 Lifting the machine

- ➜ Reclining transport. Dismantle the side parts of the box.
- ➜ Dismantle the fortifications in the box.
- ➜ Fit a steel rod 30 mm x approx. 600 mm through the hole in the drill head. Pull up the machine with a suitable lifting device from the box, and set up the machine on the floor.

3.5 Installation requirements

Organise the working area around the machine according to the local safety regulations. The work area for operation, maintenance and repair must not be restrictive.

- Follow the prescribed safety areas and escape routes according to VDE 0100 part 729 as well as the environmental conditions for the operation of the machine.
- The main switch of the machine must be freely accessible.
- The machine must only be installed and operated in a dry and well-ventilated place.
- Avoid places near machines generating chips or dust.
- The installation site must be free from vibrations also at a distance of presses, planing machines, etc.
- Provide sufficient space for the personnel preparing and operating the machine and transporting the material.
- Also make sure the machine is accessible for setting and maintenance works.

3.5.1 Foundation and ground

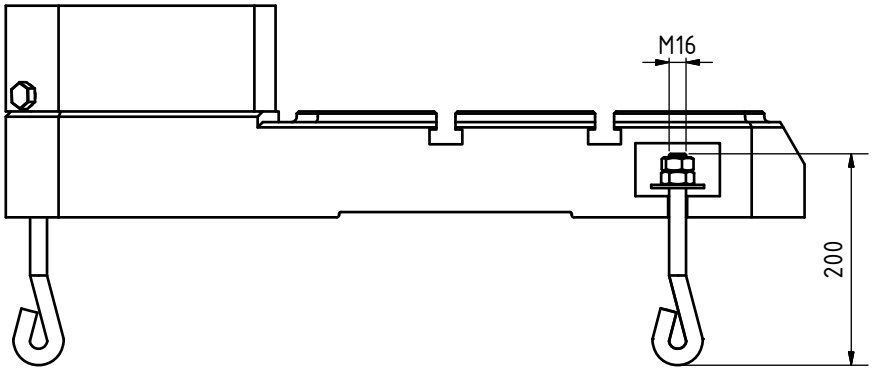
➜ Check the ground. The ground must bear the load.

➜ The ground must be prepared in a way that potential coolants cannot penetrate the floor.

3.6 Fixing

In order to provide for the necessary stability of the geared drill,
it is necessary to firmly connect the geared drill with its foot to the ground. We recommend the use of anchor rods DIN 529 M16 x 200

➜ Fix the foot of the geared drill to the ground with the holes pre-drilled for this purpose.



ATTENTION!

Tighten the fixing screws of the geared drill only as much that it is safely fixed and cannot break away or tilt over.

If the fixing screws are too tight in particular in connection with an uneven substructure it may result in a broken stand of the machine.

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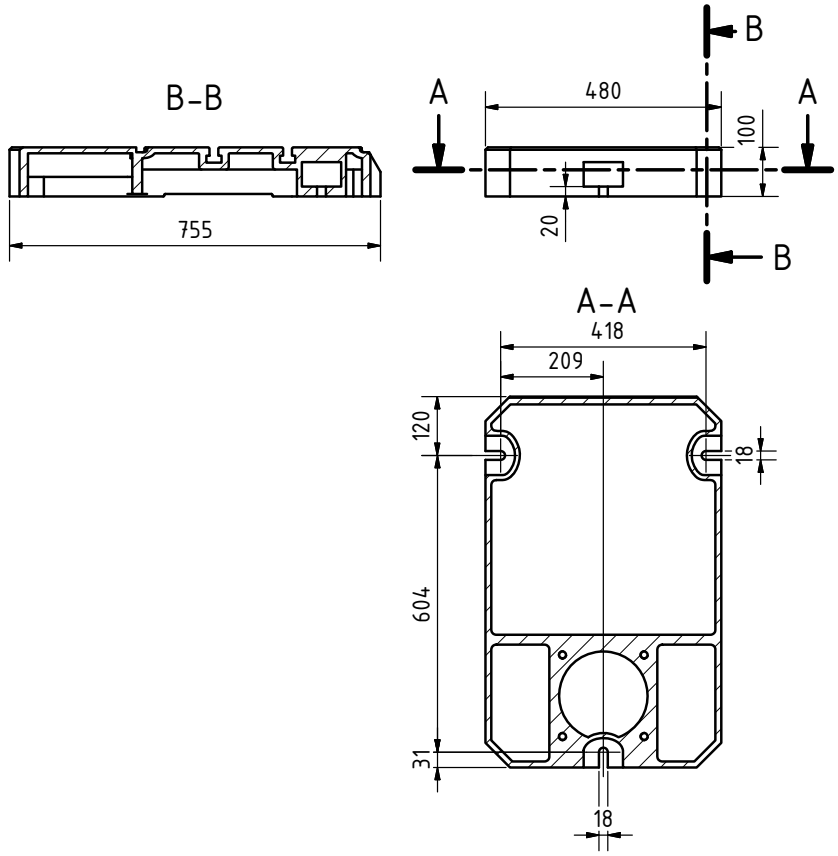
3.6.1 Assembly drawing

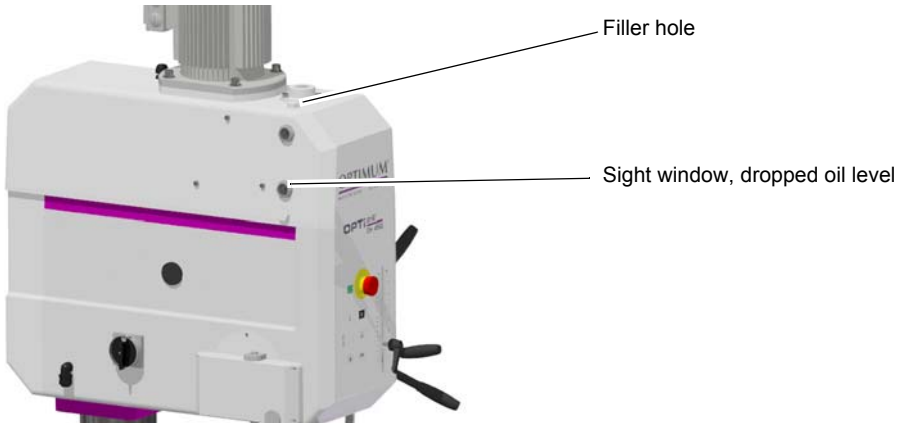


3.7 Lubrication

With the first lubrication and greasing your new machine, oil in the gear and the coolant system is filled. Once these operations have been carried out, the machine can be started up.

- ➜ The oil tank of the gearbox must be filled to half way up the lower sight glass. Filling quantity about 3 liters.
- ➜ The oil must be changed 200 hours after being filled for the first time, then after every 2000 operating hours.
- ➜ Use the oil types recommended in the reference table ☞ "Lubricant“ on page 61. This table can be used to compare the characteristics of each different type of oil of your choice.
- ➜ The coolant tank must be filled to half way up the sight glass. Filling quantity about 4 liters. Fill the coolant tank over the drilling table.

3.7.1 Gear



3.7.2 Coolant system

INFORMATION!

The container with coolant device is located 180 ° turned in the packing box for transport purposes.

➜ Install the coolant device as shown in the figure.

3.8 First commissioning

CAUTION!

First commissioning may only take place after proper installation.

WARNING!

The use of improper tool holders or their operation at inadmissible speeds constitutes a hazard.

Only use the tool holders (e.g. drill chuck) which were delivered with the machine or which are offered as optional equipment by OPTIMUM.

Only use tool holders in the intended admissible speed range.

Tool holders may only be modified in compliance with the recommendation of OPTIMUM or of the manufacturer of the clamping devices.

WARNING!

There is a danger to persons and equipment, if the first commissioning of the geared drill is carried out by inexperienced personnel.

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We do not accept any liability for damages caused by incorrectly performed commissioning.

☞ „Qualification of personnel“ auf Seite 9

3.9 Electrical connection

WARNING!

The three-phase electrical connection may only be performed by an electrician or under the guidance and supervision of an electrician.

CAUTION!

Install the connection cable of the machine in such a way that people will not stumble over it.

ATTENTION!

Ensure that all 3 phases (L1, L2, L3) and the ground wire are connected correctly.

The neutral conductor (N) of its power supply is not connected.

ATTENTION!

Observe the rotating field!

Please check that the type of current, voltage and protection fuse correspond to the values specified. A protective earth ground wire connection must be available.

➜ Mains fuse 10A to 16A

INFORMATION!

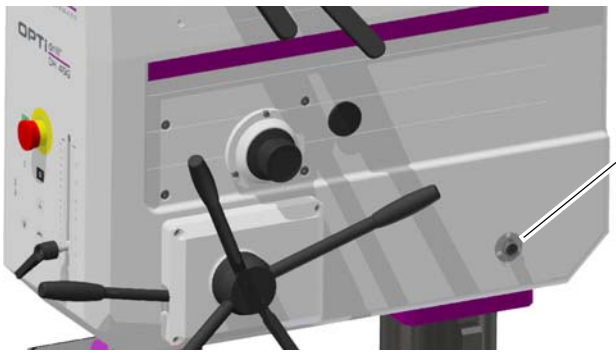
The direction of rotation must match the direction of rotation selection on the control panel. The field of rotation may be different at your connection.

➜ If necessary swap two phases on the power plug in order to obtain the correct direction of rotation.

3.9.1 Connecting the optional foot switch

Floating contact for thread cutting.

The foot switch is used to reverse the direction of rotation for thread cutting.



Img.3-1: Connector plug foot switch

➜ Connect the foot switch to the connector.

INFORMATION

The connection cable has no polarity. The contact (2 wires) is designed as looped signal.

3.9.2 Warming up the machine

ATTENTION!

If the geared drill and in particular the drilling spindle is immediately operated at maximum load when it is cold it may result in damages.

If the machine is cold, e.g. directly after having transported the machine, it should be warmed up at a spindle speed of only 500 1/min for the first 30 minutes.

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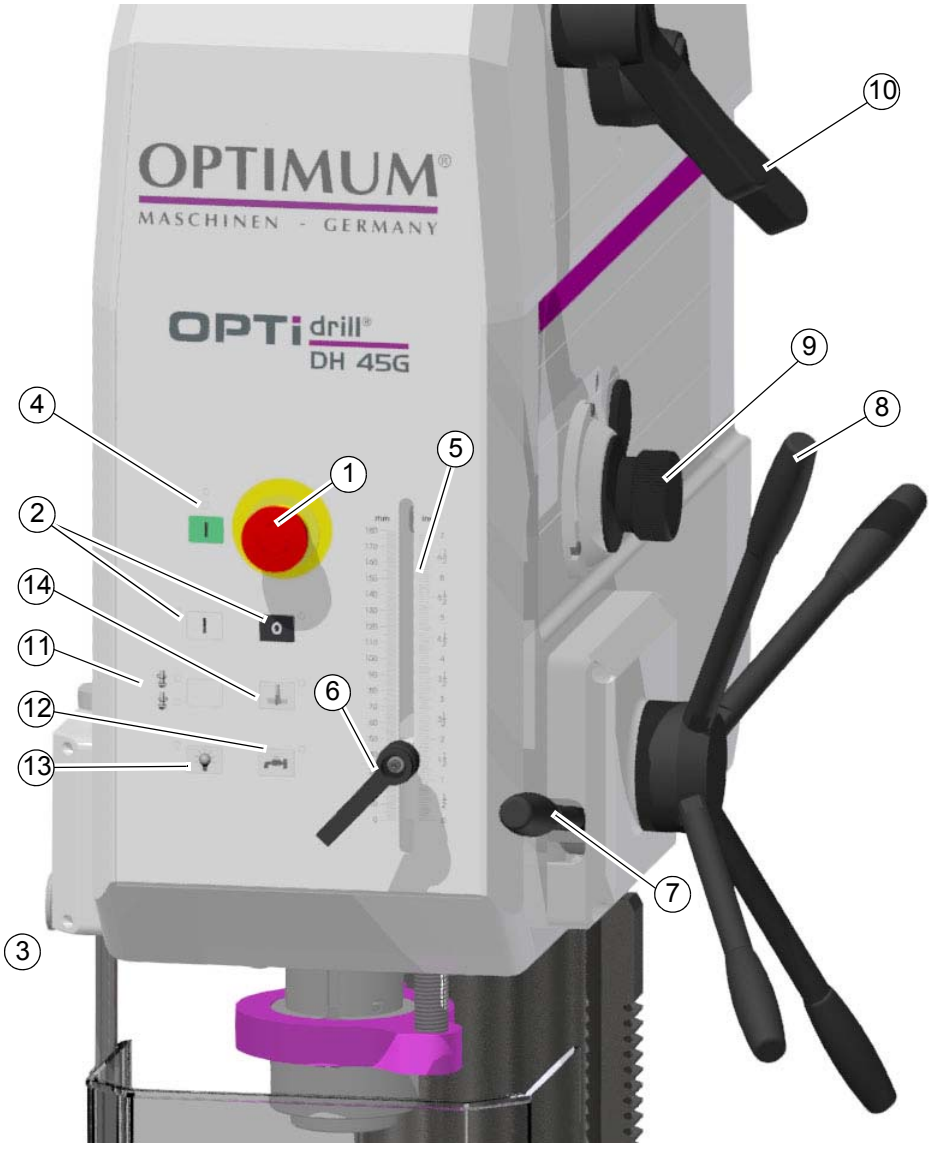
4 Operation

4.1 Control and indicating elements



Img. 4-1: Control and indicating elements

Pos.	Designation	Pos.	Designation
1	Emergency stop switch	2	Push button spindle rotation "On/Off"
3	Drill chuck guard	4	Push button control "On"
5	Drill depth scale	6	Drilling depth clamping lever
7	Activation quill feed	8	Lever for spindle sleeve feed
9	Feed selector	10	Speed gear lever
11	Push button for spindle rotation direction	12	Push button coolant pump "On/Off"
13	Push button lighting "On/Off"	14	Push button thread tapping

4.2 Control panel

INFORMATION

The control system switches off, once the feed lever is engaged or thread cutting is activated when the spindle is in counter clockwise operation.

Pay attention to the correct phase sequence for the electrical connection of the machine.

Push button thread tapping

In the thread cutting mode the engine automatically starts up according to a predefined path over the drilling depth stop and automatically changes the turning direction as soon as the predefined depth had been achieved. The screw-tap is drawn out of the workpiece.

Push button ON

The push button "ON" switches on the rotation of the drilling spindle.

Push button Off

The "push button OFF“ switches the rotation of the drilling spindle off.

Coolant pump ON / OFF

Switches the backlight on or off.

Machine illumination ON / OFF

Switches the backlight on or off.

Main switch

Interrupts or connects the power supply.

4.2.1 Drill depth stop

Use the drilling depth stop when drilling several holes of the same depth.

➜ Adjust the desired drilling depth by means of the scale and of the clamping lever.

4.3 Switching on the machine

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed. The control voltage is switched off, as soon as the drill chuck guard will opened.

➜ Switch on the master switch.
➜ Select the gear stage
➜ Set the height of drill chuck guard and close the drill chuck guard.
➜ Switch on the control voltage.
➜ Select the direction of rotation.
➜ Actuate the push button "ON".

4.4 Switching off the machine

CAUTION!

Only press the emergency-stop button in a genuine emergency. You should not use the emergency-stop button to stop the machine during normal operation.

➜ Actuate the push button "OFF".

➜ For a long-term standstill of the machine switch it off at the main switch.

4.4.1 Gear selector switch

The speed is selected by means of the gear selector switches.

Only switch during standstill of drilling spindle!

INFORMATION

Observe the speed table on the drilling head when selecting the range of speed.

4.5 Spindle quill feed

The spindle sleeve feed is performed manually by actuating the spindle sleeve lever or automatically.

4.5.1 Manual spindle sleeve feed

Move the sleeve downward by means of the spindle sleeve lever. The sleeve is returned to its initial position by means of the spring force.

4.5.2 Automatic spindle sleeve feed

➜ Select the speed of the spindle sleeve feed actuating the selector rotary switch:

➜ The feed is activated mechanically with the lever.

➜ The depth stop moves the lever out again.

INFORMATION

The spindle sleeve feed only works if the direction of rotation is correct.

The higher the pre-set speed the more rapid is the feed speed on the sleeve. Adjust the correct speed depending on the used material and on the drill diameter.

4.6 Disassembly, assembly of drill chucks and drill bits

Taper mandrels can be drifted out with the integrated drill drift or with an ordinary drill drift.

4.6.1 Use of the drill chuck

CAUTION!

Make sure that the clamped tool is firmly and correctly fitted.

4.6.2 Disassembly with integrated drill drift

ATTENTION!

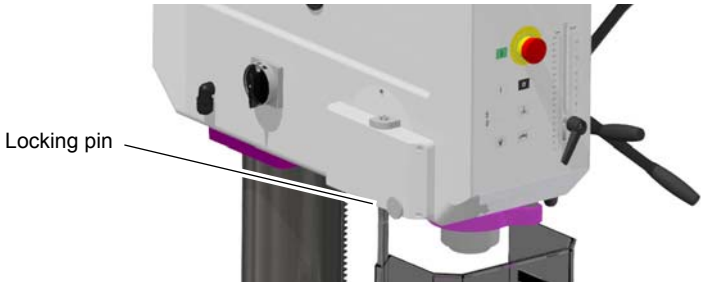
The tool and/or the drill chuck will fall down. Hold the tool or the drill chuck while drifting it out.

With the below described procedure the taper mandrel is being loosened from the drilling spindle.

➜ Move the spindle sleeve down until the locking pin can be moved in.

➜ Press the sleeve lever with a fast and powerful movement upwards.

The taper mandrel is pressed out of the drill spindle.



4.6.3 Fitting the drill chuck

The drill chuck or the tool is secured in the drill spindle against turning over by means of a form-locking connection (driver).

A frictionally engaged connection keeps and centres the drill chuck or the drill in the drill spindle.

➜ Check and, if necessary, clean the conical seat in the drilling spindle and at the taper mandrel of the tool or the drill chuck.

➜ Press the taper mandrel into the drill spindle.

4.7 Coolant equipment

➜ Adjust the flow using the shut-off and dosing tap.

ATTENTION!

Destruction of the pump due dry running.

The pump is lubricated by the cooling agent. Do not operate the pump without coolant. Clean the collection container of the chip filter in regular intervals.

WARNING!

Discharge and overflow of cooling lubricants and lubricants. Ensure that cooling lubricants are not discharged onto the floor. Any cooling lubricants that run onto the floor must be removed immediately.

Regularly clean the coolant tank.

CAUTION!

The cooling lubricant needs to be checked at least weekly, including during downtimes, with regard to its concentration, ph-value, bacteria and fungal decay.

☞ **"Cooling lubricants and tanks“ on page 40**

☞ **"Inspection plan for water-mixed cooling lubricants“ on page 41**

Please note the VKIS - VSI - IGM substance list for coolant lubricants as per DIN 51385 for metal working.

4.8 Footswitch - Rotation reversal

Use the optional foot switch for a reversal of direction for thread cutting.

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5 Determining the cutting speed and the speed

5.1 Table cutting speeds / infeed

Material table						
Material to be processed	Recommended cutting speed **Vc** in m/min	Recommended infeed **f** in mm/revolution				
		Drill bit diameter **d** in mm				
		2...3	>3...6	>6...12	>12...25	>25...50
Unalloyed construction steels < 700 N/mm²	30 - 35	0.05	0.10	0.15	0.25	0.35
Alloyed construction steels > 700 N/mm²	20 - 25	0.04	0.08	0.10	0.15	0.20
Alloyed steels < 1000 N/mm²	20 - 25	0.04	0.08	0.10	0.15	0.20
Steels, low stability < 800 N/mm²	40	0.05	0.10	0.15	0.25	0.35
Steel, high stability > 800 N/mm²	20	0.04	0.08	0.10	0.15	0.20
non-rust steels > 800 N/mm²	12	0.03	0.06	0.08	0.12	0.18
Cast iron < 250 N/mm²	15 - 25	0.10	0.20	0.30	0.40	0.60
Cast iron > 250 N/mm²	10 - 20	0.05	0.15	0.25	0.35	0.55
CuZn alloy brittle	60 - 100	0.10	0.15	0.30	0.40	0.60
CuZn alloy ductile	35 - 60	0.05	0.10	0.25	0.35	0.55
Aluminum alloy up to 11% Si	30 - 50	0.10	0.20	0.30	0.40	0.60
Thermoplastics	20 - 40	0.05	0.10	0.20	0.30	0.40
Thermosetting materials with organic filling	15 - 35	0.05	0.10	0.20	0.30	0.40
Thermosetting materials with anorganic filling	15 - 25	0.05	0.10	0.20	0.30	0.40

5.2 Speed table

Vc in m/min	4	6	8	10	12	15	18	20	25	30	35	40	50	60	80	100
Drill bit **Ø** in mm	Speed **n** in rpm															
1,0	1274	1911	2548	3185	3822	4777	5732	6369	7962	9554	11146	12739	15924	19108	25478	31847
1,5	849	1274	1699	2123	2548	3185	3822	4246	5308	6369	7431	8493	10616	12739	16985	21231
2,0	637	955	1274	1592	1911	2389	2866	3185	3981	4777	5573	6369	7962	9554	12739	15924
2,5	510	764	1019	1274	1529	1911	2293	2548	3185	3822	4459	5096	6369	7643	10191	12739
3,0	425	637	849	1062	1274	1592	1911	2123	2654	3185	3715	4246	5308	6369	8493	10616
3,5	364	546	728	910	1092	1365	1638	1820	2275	2730	3185	3640	4550	5460	7279	9099
4,0	318	478	637	796	955	1194	1433	1592	1990	2389	2787	3185	3981	4777	6369	7962
Vc in m/min	4	6	8	10	12	15	18	20	25	30	35	40	50	60	80	100

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Drill bit **Ø** in mm	Speed **n** in rpm															
4,5	283	425	566	708	849	1062	1274	1415	1769	2123	2477	2831	3539	4246	5662	7077
5,0	255	382	510	637	764	955	1146	1274	1592	1911	2229	2548	3185	3822	5096	6369
5,5	232	347	463	579	695	869	1042	1158	1448	1737	2027	2316	2895	3474	4632	5790
6,0	212	318	425	531	637	796	955	1062	1327	1592	1858	2123	2654	3185	4246	5308
6,5	196	294	392	490	588	735	882	980	1225	1470	1715	1960	2450	2940	3920	4900
7,0	182	273	364	455	546	682	819	910	1137	1365	1592	1820	2275	2730	3640	4550
7,5	170	255	340	425	510	637	764	849	1062	1274	1486	1699	2123	2548	3397	4246
8,0	159	239	318	398	478	597	717	796	995	1194	1393	1592	1990	2389	3185	3981
8,5	150	225	300	375	450	562	674	749	937	1124	1311	1499	1873	2248	2997	3747
9,0	142	212	283	354	425	531	637	708	885	1062	1238	1415	1769	2123	2831	3539
9,5	134	201	268	335	402	503	603	670	838	1006	1173	1341	1676	2011	2682	3352
10,0	127	191	255	318	382	478	573	637	796	955	1115	1274	1592	1911	2548	3185
11,0	116	174	232	290	347	434	521	579	724	869	1013	1158	1448	1737	2316	2895
12,0	106	159	212	265	318	398	478	531	663	796	929	1062	1327	1592	2123	2654
13,0	98	147	196	245	294	367	441	490	612	735	857	980	1225	1470	1960	2450
14,0	91	136	182	227	273	341	409	455	569	682	796	910	1137	1365	1820	2275
15,0	85	127	170	212	255	318	382	425	531	637	743	849	1062	1274	1699	2123
16,0	80	119	159	199	239	299	358	398	498	597	697	796	995	1194	1592	1990
17,0	75	112	150	187	225	281	337	375	468	562	656	749	937	1124	1499	1873
18,0	71	106	142	177	212	265	318	354	442	531	619	708	885	1062	1415	1769
19,0	67	101	134	168	201	251	302	335	419	503	587	670	838	1006	1341	1676
20,0	64	96	127	159	191	239	287	318	398	478	557	637	796	955	1274	1592
21,0	61	91	121	152	182	227	273	303	379	455	531	607	758	910	1213	1517
22,0	58	87	116	145	174	217	261	290	362	434	507	579	724	869	1158	1448
23,0	55	83	111	138	166	208	249	277	346	415	485	554	692	831	1108	1385
24,0	53	80	106	133	159	199	239	265	332	398	464	531	663	796	1062	1327
25,0	51	76	102	127	153	191	229	255	318	382	446	510	637	764	1019	1274
26,0	49	73	98	122	147	184	220	245	306	367	429	490	612	735	980	1225
27,0	47	71	94	118	142	177	212	236	295	354	413	472	590	708	944	1180
28,0	45	68	91	114	136	171	205	227	284	341	398	455	569	682	910	1137
29,0	44	66	88	110	132	165	198	220	275	329	384	439	549	659	879	1098
30,0	42	64	85	106	127	159	191	212	265	318	372	425	531	637	849	1062
31,0	41	62	82	103	123	154	185	205	257	308	360	411	514	616	822	1027
32,0	40	60	80	100	119	149	179	199	249	299	348	398	498	597	796	995
33,0	39	58	77	97	116	145	174	193	241	290	338	386	483	579	772	965
34,0	37	56	75	94	112	141	169	187	234	281	328	375	468	562	749	937
35,0	36	55	73	91	109	136	164	182	227	273	318	364	455	546	728	910
36,0	35	53	71	88	106	133	159	177	221	265	310	354	442	531	708	885
37,0	34	52	69	86	103	129	155	172	215	258	301	344	430	516	689	861
38,0	34	50	67	84	101	126	151	168	210	251	293	335	419	503	670	838
Vc in m/min	4	6	8	10	12	15	18	20	25	30	35	40	50	60	80	100

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Drill bit Ø in mm	Speed **n** in rpm															
39,0	33	49	65	82	98	122	147	163	204	245	286	327	408	490	653	817
40,0	32	48	64	80	96	119	143	159	199	239	279	318	398	478	637	796
41,0	31	47	62	78	93	117	140	155	194	233	272	311	388	466	621	777
42,0	30	45	61	76	91	114	136	152	190	227	265	303	379	455	607	758
43,0	30	44	59	74	89	111	133	148	185	222	259	296	370	444	593	741
44,0	29	43	58	72	87	109	130	145	181	217	253	290	362	434	579	724
45,0	28	42	57	71	85	106	127	142	177	212	248	283	354	425	566	708
46,0	28	42	55	69	83	104	125	138	173	208	242	277	346	415	554	692
47,0	27	41	54	68	81	102	122	136	169	203	237	271	339	407	542	678
48,0	27	40	53	66	80	100	119	133	166	199	232	265	332	398	531	663
49,0	26	39	52	65	78	97	117	130	162	195	227	260	325	390	520	650
50,0	25	38	51	64	76	96	115	127	159	191	223	255	318	382	510	637

5.3 Examples to calculatory determine the required speed for your drilling machine

The necessary speed is depending on the diameter of the drill bit, on the material which is being machined as well as on the cutting material of the drill bit.

Material which needs to be drilled: St37

Cutting material (drill bit): HSS spiral bit

Set point of the cutting speed [V_c] according to the table: 40 meters per minute

Diameter [d] of your drill bit: 30 mm = 0,03 m [meters]

Selected infeed [f] according to the table: about 0.35 mm/rev

Speed $n = \frac{\vartheta c}{\pi \times d} = \frac{40m}{min \times 3,14 \times 0,03m} = 425(rpm)$

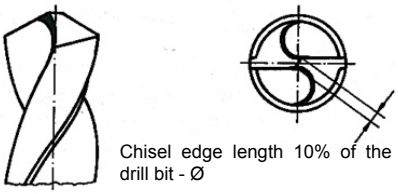
Set a speed on your drilling machine which is less than the determined speed.

INFORMATION

In order to facilitate the production of larger drill holes they need to be pre-drilled. This way, you reduce the cutting forces and improve the guiding of the drill bit.

The pre-drilling diameter is depending on the length of the chisel edge. The chisel edge does not cut, but it squeezes the material. The chisel edge is positioned at an angle of 55° to the major cutting edge.

As a general rule of thumb it applies: The pre-drilling diameter is depending on the length of the chisel edge.



Chisel edge length 10% of the drill bit - Ø

Recommended working steps for a drilling diameter of 30 mm

Example:

1st working step: Pre-drilling with Ø 5 mm.

2nd working step: Pre-drilling with Ø 15 mm.

3rd working step: Drilling with Ø 30 mm.

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6 Maintenance

In this chapter you will find important information about

- Inspection,
- Maintenance and
- Repair.

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

- **operational safety,**
- **failure-free operation,**
- **long service life of the machine and**
- **the quality of the products which you manufacture.**

Installations and equipment from other manufacturers must also be in good order and condition.

ENVIRONMENTAL PROTECTION

During work on the spindle head, please make sure that

- **collecting containers with sufficient capacity for the amount of liquid to be collected are used.**
- **liquids and oils should not be split on the ground.**

Clean up any spilt liquid or oils immediately using proper oil-absorption methods and dispose of them in accordance with current legal requirements on the environment.

Collect leakages

Do not re-introduce liquids spilt outside the system during repair or as a result of leakage from the reserve tank; collect them in a collecting container for disposal.

Disposal

Never dump oil or other environmentally hazardous substances which are harmful to the environment in water inlets, rivers or channels.

Used oils must be delivered to a collection centre. Please consult your supervisor for further information on your nearest collection point.

6.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

- **very serious injury to personnel working on the machine,**
- **damage to the machine.**

Only qualified personnel should carry out maintenance and repair work on the machine.

6.1.1 Preparation

WARNING!

Only work on the machine if it has been disconnected from the power supply.

Attach a warning sign which secures against unauthorized switching on.

6.1.2 Restarting

Before restarting, run a safety check.

☞ "Safety check“ on page 11

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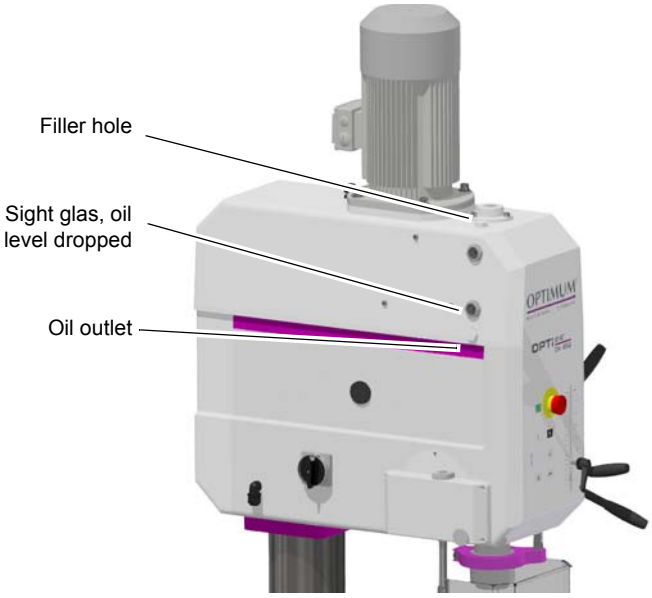
WARNING!

Before starting the machine you must be sure that
- ❍ **no dangers generated for persons,**
- ❍ **the machine is not damaged.**

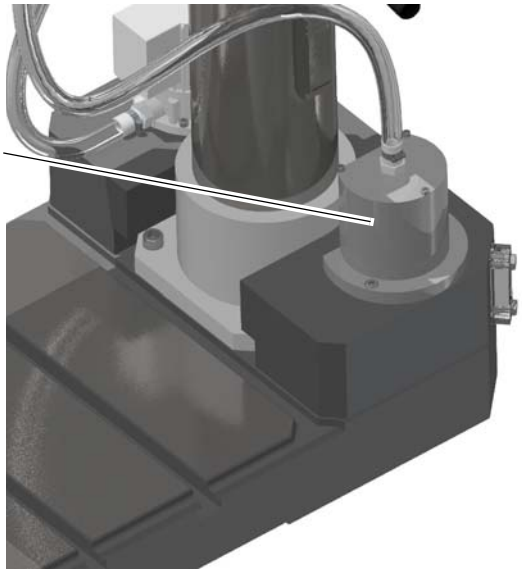
6.2 Inspection and maintenance

The type and level of wear depends to a large extent on the individual usage and operating conditions. Any indicated intervals therefore are only valid for the corresponding approved conditions.

Interval	Where?	What?	How?
Start of shift After each maintenance or repair work	**Geared drill**	Examination for outside damages. ☞ "Safety check“ on page 11	
Every month	**Drill column and toothed rack**	**Oiling**	➜ Lubricate the drill column regularly with commercial oil, machine oil, engine oil. ➜ Lubricate the toothed rod regularly with commercial grease (e.g. friction bearing grease).
Every month	**Oiler cup**	**Oiling**	➜ Lubricate all oiler cups (height adjustment drilling table) with machine oil, do not use grease guns or the like. ☞ "Operating material“ on page 17

Interval	Where?	What?	How?
the first time after 200 hours of operation, then every 2000 hours	**Gear**	**Refilling oil Oil change**	➜ For oil change use an appropriate collecting tray of sufficient capacity. ➜ Remove the filler hole plug. ➜ Remove the oil drain plug. ➜ If necessary use sealing tape for drain plug. ➜ Fill in the open lubricating system of the geared drill about 3 liters of oil. ➜ Check if the oil level is correct via the sight glass. The sight glass (oil level dropped) must be half covered.  Img.6-1: Gear oil level

DH45G_GB_6.fm

Interval	Where?	What?	How?
Every month	**Chip filter**	**Cleaning**	The chip filter prevents the reflux of chips in the coolant tank. Clean the chip filter regularly. Impurities in the cooling lubricant cause blockages and reducing the life of the cooling lubricant pump. Replace the cooling agent regularly, depending on usage. ➜ To do so, unscrew the chip filter and remove the chips or other soiling. ➜ Empty and clean the collecting tray. Collecting tray Chip filter  Img.6-2: Chip filter

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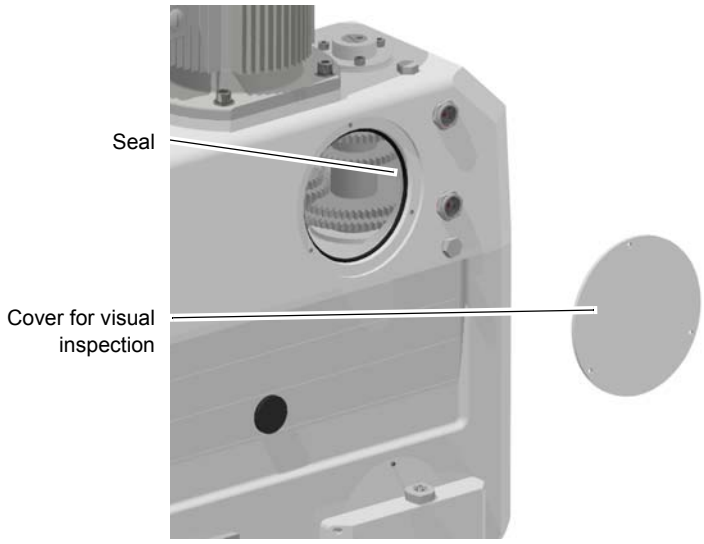
Interval	Where?	What?	How?
as required	Gear	Visual inspection	The transmission can be subjected to a visual inspection relatively easily. For this purpose, the gear head does not have to be disassembled, or largely disassembled.  ➜ Drain the oil. ➜ Fully unscrew the mounting screws of the cover. ➜ Slightly twist the cover in the sealing seat. ➜ Then use the mounting screws to press the cover off the seal.
at least annually	Cooling lubricant system	Replace Cleaning Disinfect	☞ "Cooling lubricants and tanks“ on page 40 ☞ "Inspection plan for water-mixed cooling lubricants“ on page 41
based on operator's empirical values in accordance with German DGUV (BGV A3)	Electronics	Electrical inspection	☞ "Obligations of the operating company“ on page 10 ☞ "Electrical system“ on page 14

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Interval	Where?	What?	How?
as required	Spindle return spring	Readjusting	**ATTENTION!** **Parts may fly off at high speed. When disassembling the key housing, please make sure that the machine is only maintained and prepared by qualified staff.**

INFORMATION

The spindle bearing is lifetime-lubricated. It is not necessary to lubricate it again.

6.3 Repair

6.3.1 Customer service technician

For any repair work request the assistance of an authorised customer service technician. Contact your specialist dealer if you do not have customer service's information or contact Stürmer Maschinen GmbH in Germany who can provide you with a specialist dealer's contact information. Optionally, the

Stürmer Maschinen GmbH

Dr.-Robert-Pfleger-Str. 26

D- 96103 Hallstadt

can provide a customer service technician, however, the request for a customer service technician can only be made via your specialist dealer.

If the repairs are carried out by qualified technical personnel, they must follow the indications given in these operating instructions.

Optimum Maschinen Germany GmbH accepts no liability nor does it guarantee against damage and operating malfunctions resulting from failure to observe these operating instructions.

For repairs, only use

- faultless and suitable tools,
- original parts or parts from series expressly authorised by Optimum Maschinen Germany GmbH.

6.4 Cooling lubricants and tanks

CAUTION!

The cooling lubricant can cause diseases. Avoid direct contact with cooling lubricant or parts covered in cooling lubricant.

Cooling lubricant circuits and tanks for water-cooling lubricant mixtures must be completely emptied, cleaned and disinfected as needed, but at least once per year or every time the cooling lubricant is replaced.

If fine chips and other foreign matters are accumulated in the coolant tank, the machine can no longer be correctly supplied with coolant. Furthermore, the lifetime of the coolant pump is reduced.

When processing cast iron or similar materials generating fine chips, cleaning the coolant tank more often is recommended.

Limit values

The cooling lubricant must be replaced, the cooling lubricant circuit and tank emptied, cleaned and disinfected if

- the pH value drops by more than 1 based on the value during initial filling. The maximum permissible pH value during initial filing is 9.3
- there is a perceivable change in the appearance, odour, floating oil or increase of the bacteria to more than 10/6/ml
- there is an increase in nitrite content to more than 20 ppm (mg/1) or nitrate content to more than 50 ppm (mg/1)
- there is an increase in the N-nitrosodiethanolamine (NDELA) to more than 5 ppm (mg/a)

CAUTION!

Comply with the manufacturer's specifications for mixture ratios, hazardous substances, e.g. system cleaners, including their permissible minimum use times.

CAUTION!

Since the cooling lubricant escapes under high pressure, pumping out the coolant by using the existing cooling lubricant pump via a pressure hose into a suitable tank is not recommended.

ENVIRONMENTAL PROTECTION

During work on the cooling lubricant equipment please make sure that

- **collector tanks are used with sufficient capacity for the amount of liquid to be collected.**
- **liquids and oils should not be spilled on the ground.**

Clean up any spilled liquid or oils immediately using proper oil-absorption methods and dispose of them in accordance with current statutory environmental regulations.

Collect leakages

Do not re-introduce liquids spilled outside the system during repair or as a result of leakage from the reserve tank, instead collect them in a collecting container for disposal.

Disposal

Never dump oil or other substances which are harmful to the environment into water inlets, rivers or channels. Used oils must be delivered to a collection centre. Consult your supervisor if you do not know where the collection centre is.

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6.4.1 Inspection plan for water-mixed cooling lubricants

Company: No.: Date: used cooling lubricant			
size to be checked	Inspection methods	Inspection intervals	Procedure and comment
noticeable changes	Appearance, odour	daily	Find and rectify causes, e.g. skim off oil, check filter, ventilate cooling lubricant system
pH value	Laboratory techniques electrometric with pH meter (DIN 51369) Local measurement method: with pH paper (Special indicators with suitable measuring range)	weekly [1)]	if pH value decreases > 0.5 based on initial filing: Measures in accordance manufacturer's recommendations > 1.0 based on initial filing: Replace cooling lubricant, clean cooling lubricant circulation system
Usage concentration	Manual refractometer	weekly [1)]	Method results in incorrect values with tramp oil content
Base reserve	Acid titration in accordance with Manufacturer's recommendation	as required	Method is independent of tramp oil content
Nitrite content	Test sticks method or laboratory method	weekly [1)]	> 20 mg/L nitrite: Replace cooling lubricant or part or inhibiting additives; otherwise NDELA (N-nitrosodiethanolamine) in the cooling lubricant system and in the air must be determined > 5 mg/L NDELA in the cooling lubricant system: Replacement, clean and disinfect cooling lubricant circulation system, find nitrite source and, if possible, rectify.
Nitrate/nitrite content of the preparation water, if this is not removed from the public grid	Test sticks method or laboratory method	as required	Use water from the public grid if there is water from the pubic grid has > 50 mg/l nitrate: Inform the waterworks

[1)] The specified inspection intervals (frequency) are based on continuous operation. Other operational conditions can result in other inspection intervals; exceptions are possible in accordance with Sections 4.4 and 4.10 of the TGS 611.

Editor:

Signature:

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7 Malfunctions

Malfunction	Cause/ possible effects	Solution
Motor is hot	• Wrong electrical connection of 400V machines	•
Automatic feed does not work. Spindel running will switched off.	• Wrong direction of spindle rotation • Wrong phase sequence • Clutch is damaged	• Switch to correct spindle rotation • Check electrical connection • Replace clutch
Noise during work.	• Spindle is too little lubricated • Tool is blunt or wrongly clamped • Gear is too little lubricated	• Lubricate spindle (only possible when disassembled) • Use new tool and check tension (fixed setting of the bit, drill chuck and taper mandril) • Lubricate gear
Bit „burnt“	• Drill speed too high /feed too high • Chips do not come out of the drill hole. • Drill blunt • No or too little cooling	• Select another speed • Extract drill more often during work • Sharpen or use new drill • Use cooling agent
Drill tip is running off centre, the drilled hole is non-round	• Hard points on the workpiece • Length of the cutting spirals/or angles on the tool are unequal • Drill deformed	• Use new drill
Drill is defective	• No base / support used.	• Use support and clamp it with the workpiece
Drill is running non-round or shaking	• Bit deformed • Bearing worn down • Drill is not correctly clamped. • Drill chuck defective	• Use new drill • Have the spindle bearings replaced • Correctly clamp drill • Replace the drill chuck
It is not possible to insert the drill chuck or the taper man-drel	• Dirt, grease or oil on the taper inside of the drill chuck or on the taper surface of the drill spindle • Positioning the follower in the drill spindle is not considered	• Clean surfaces well • Keep surfaces free of grease
Motor does not start.	• Motor is wrongly connected • Fuse is defective • Drill chuck guard not closed	• Have it checked by qualified • Close drill chuck guard
Motor is overheating and there is no power	• Motor overloaded? • Too low mains voltage • Motor is wrongly connected	• Reduce feed Disconnect immediately and have it checked by authorized personnel • Have it checked by qualified
Precision of the work deficient	• Irregularly heavy or tensed work-piece • Inexact horizontal position of the work-piece holder	• Balance the piece statically and secure without straining • Adjust workpiece-holder
Drilling spindle sleeve does not return to its initial position	• Spindle return spring does not work	• Check spindle return spring, replace it, if necessary

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Malfunction	Cause/ possible effects	Solution
The drilling spindle cannot be moved downwards.	• Integrated drill has been swiveled inwards • Drill depth adjustment no released	• Swivel integrated drill drift out • Release drill depth adjustment
Spindle bearing overheating	• Bearing worn down • Bearing pretension is too high • Working at high drilling speed over a longer period of time.	• Replace • Increase bearing clearance for fixed bearing (taper roller bearing) • Reduce drill speed and feed rate
Rattle the spindle if the work-piece surface is rough.	• Excessive slack in bearing. • Spindle moves up and down • Clamping chuck is loose • Tool is blunt. • Workpiece is loose	• Reduce bearing clearance or replace bearing • Readjust bearing clearance (fixed bearing)? • Check, re-tighten • Sharpen or renew the tool. • Clamp the workpiece firmly.

8 Ersatzteile - Spare parts

8.1 Ersatzteilbestellung - *Ordering spare parts*

Bitte geben Sie folgendes an - *Please indicate the following :*

- Seriennummer - *Serial No.*
- Maschinenbezeichnung - *Machines name*
- Herstellungsdatum - *Date of manufacture*
- Artikelnummer - *Article no.*

Die Artikelnummer befindet sich in der Ersatzteilliste. *The article no. is located in the spare parts list.*

Die Seriennummer befindet sich am Typenschild. *The serial no. is on the type plate.*

8.2 Elektrische Ersatzteile - Electrical spare parts

8.3 Schaltplan - Wiring diagram

Der aktuelle Schaltplan mit Ersatzteilliste befindet sich im Schaltschrank Maschine oder befindet sich als gedruckte Kopie in dieser Anleitung.
The current circuit diagram and spare parts list is located in the control cabinet of the machine or is located as printed paper in this manual.

8.4 DH45G

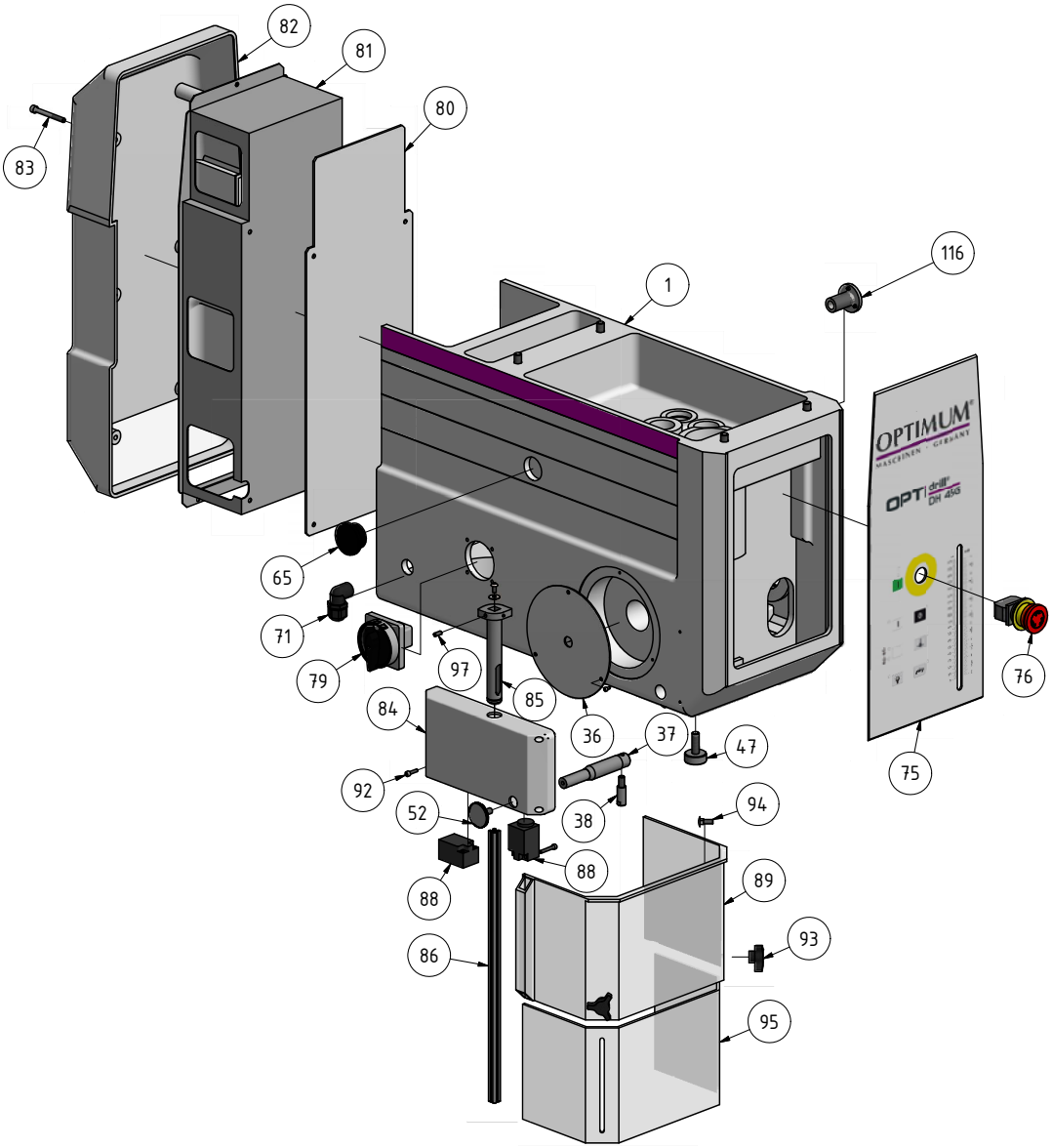

Abb.8-1: Getriebe Teil B - Gear part B

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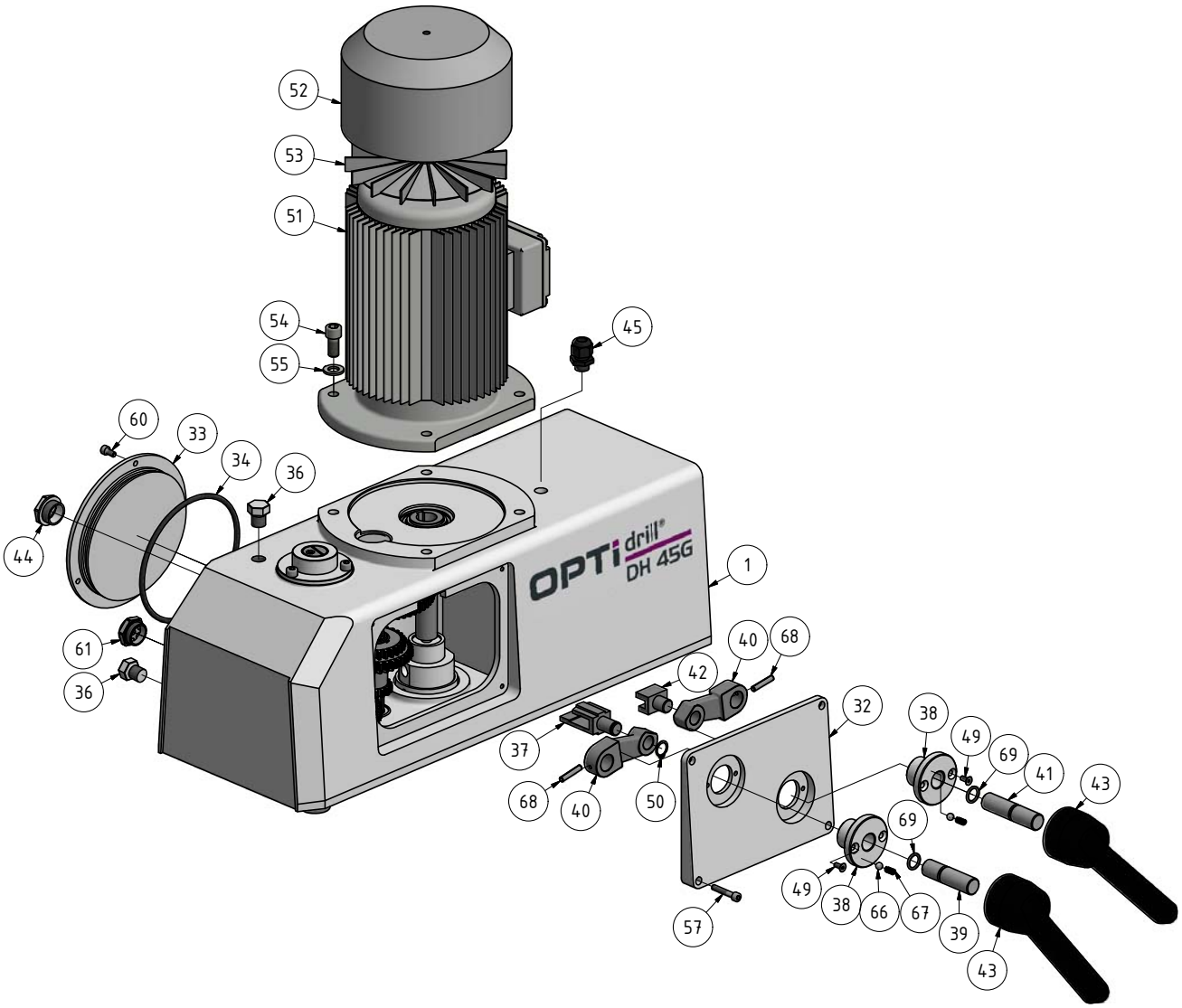

Abb. 8-2: Getriebe Teil A - Gear part A

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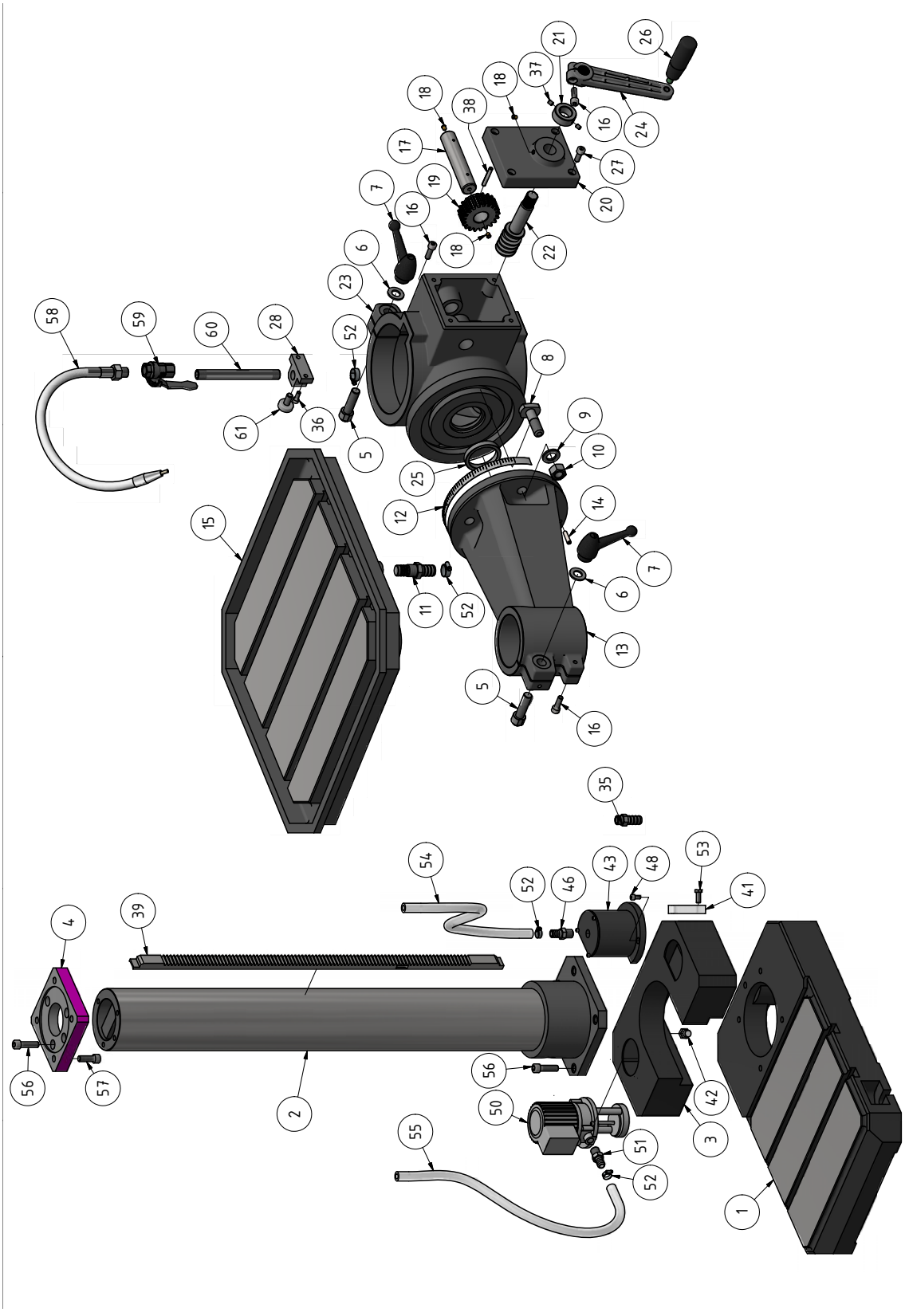

Abb. 8-3: Bohrsäule und Bohrtisch - Drill column and the table

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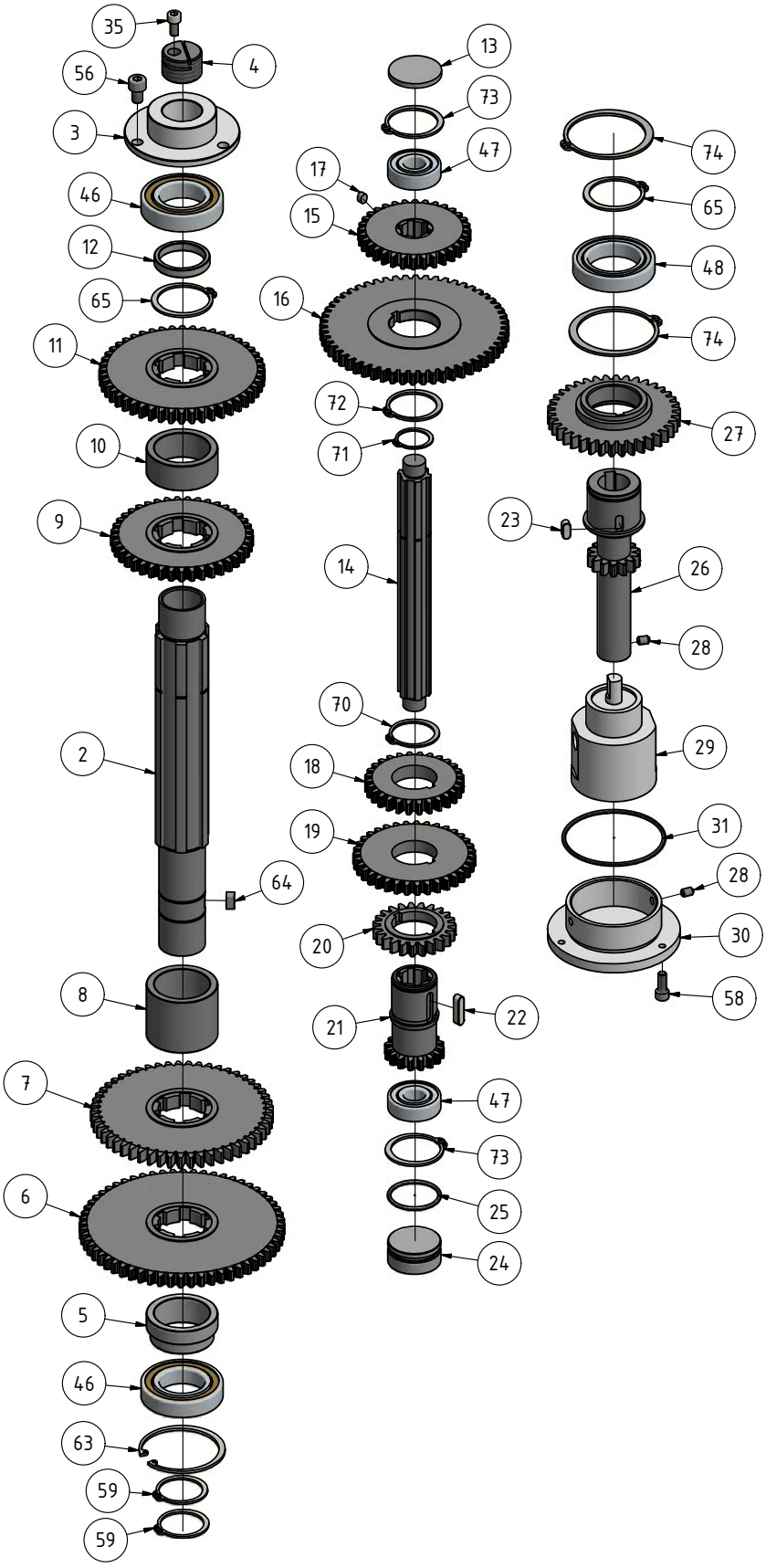

Abb. 8-4: Getriebe Teil A - Gear part A

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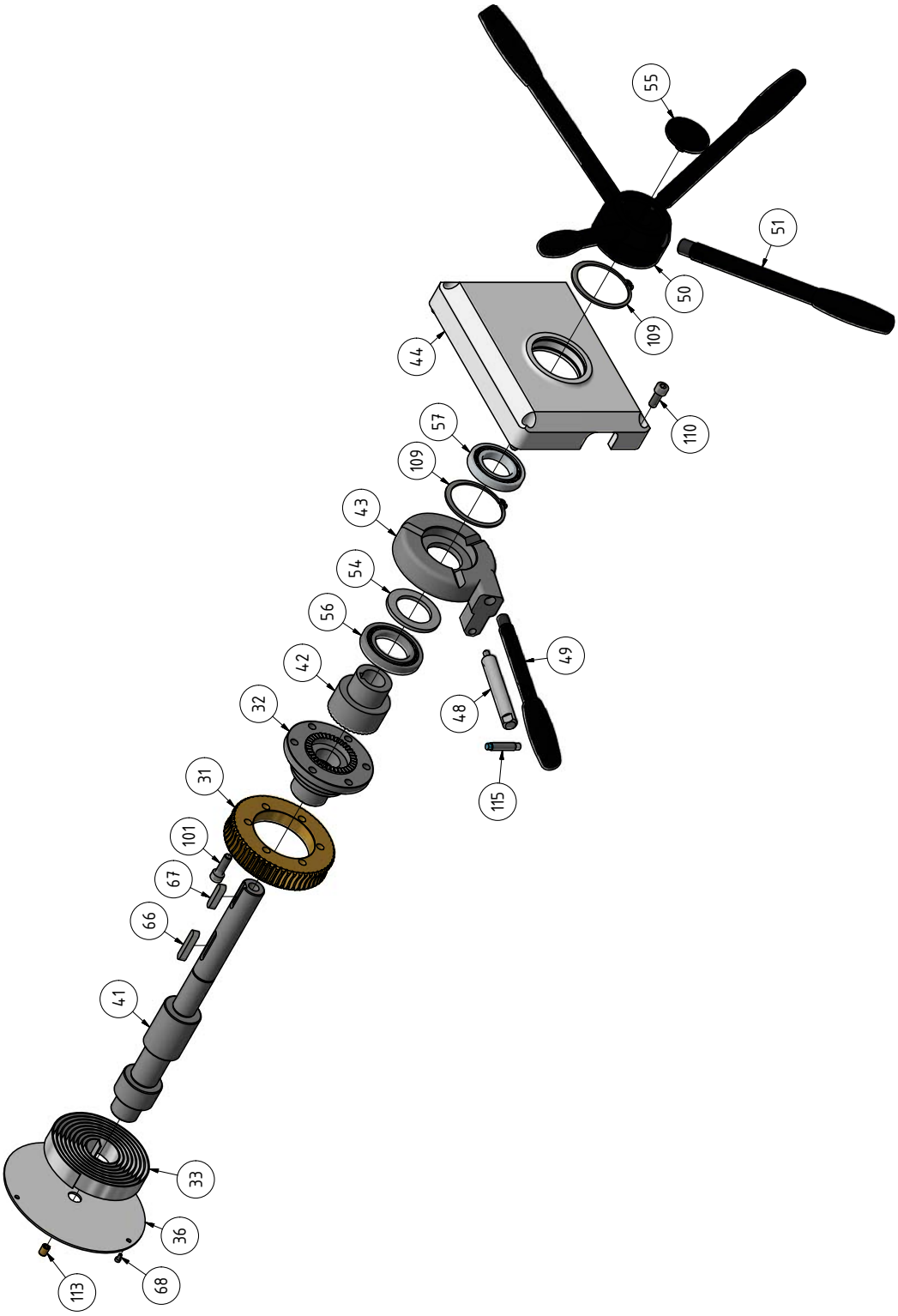

Abb. 8-5: Getriebe Teil B - Gear part B

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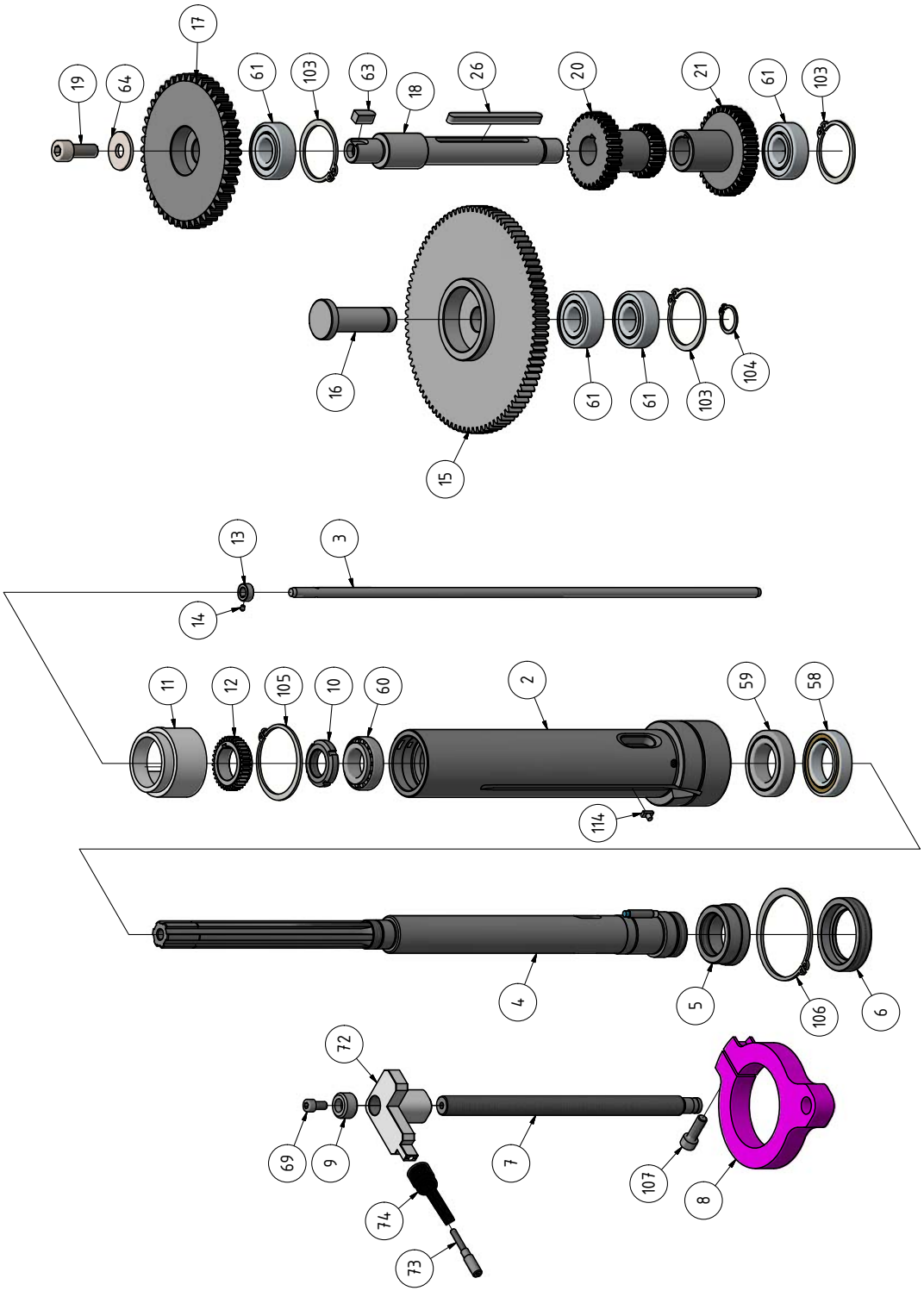

Abb.8-6: Getriebe Teil B - Gear part B

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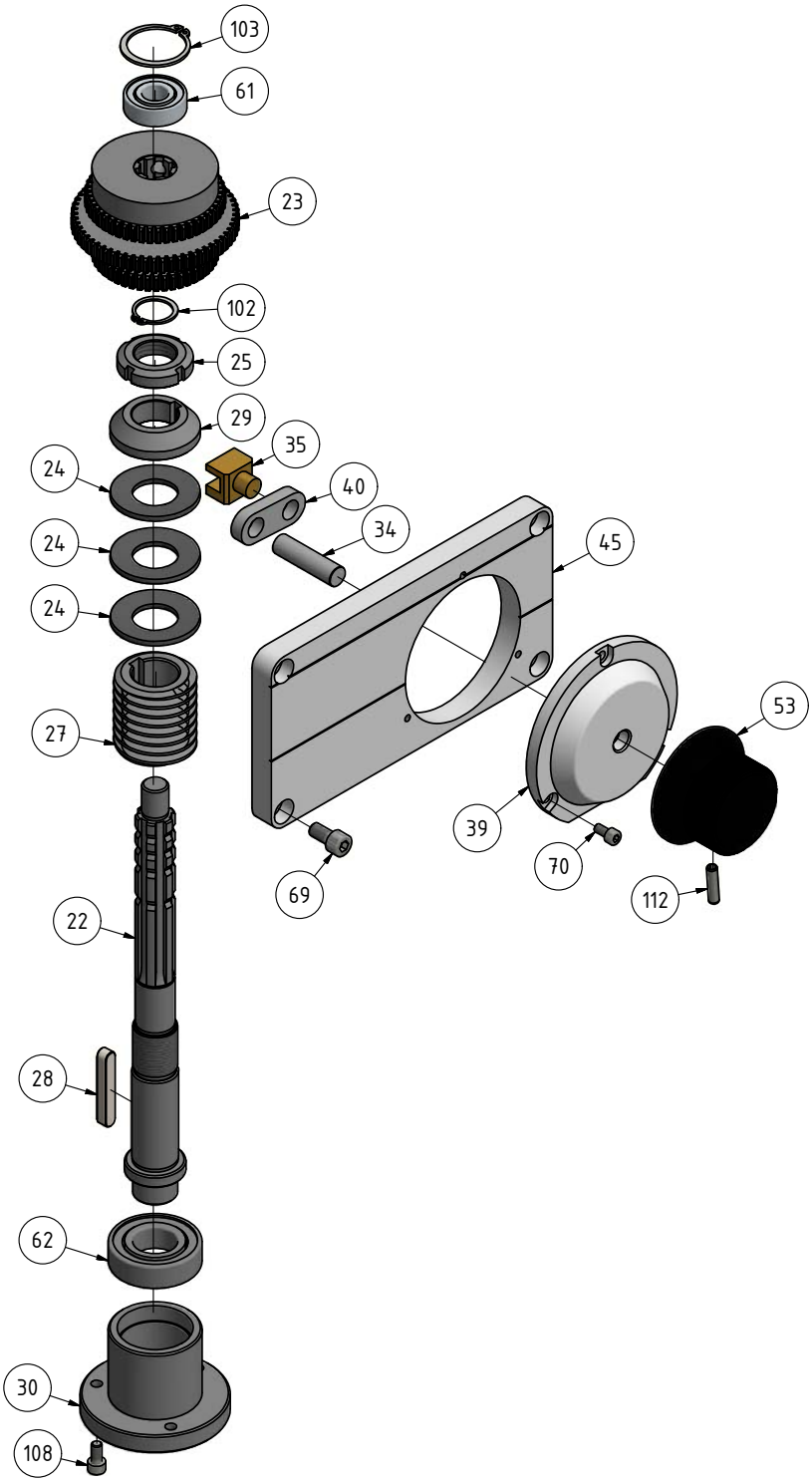

Abb.8-7: Getriebe Teil B - Gear part B

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Ersatzteilliste - Teil Getriebe Teil A - Spare part list - Gear part A

Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Gehäuse	Housing	1		030342550101
2	Welle	Shaft	1		030342550102
3	Flansch	Flange	1		030342550103
4	Gewindebolzen	Thread bolt	1		030342550104
5	Buchse	Buching	1		030342550105
6	Zahnrad	Gear	1		030342550106
7	Zahnrad	Gear	1		030342550107
8	Buchse	Bushing	1		030342550108
9	Zahnrad	Gear	1		030342550109
10	Buchse	Bushing	1		030342550110
11	Zahnrad	Gear	1		030342550111
12	Ring	Ring	1		030342550112
13	Ring	Ring	1		030342550113
14	Welle	Shaft	1		030342550114
15	Zahnrad	Gear	1		030342550115
16	Zahnrad	Gear	1		030342550116
17	Passfeder	Fitting key	1	6x8	
18	Zahnrad	Gear	1		030342550118
19	Zahnrad	Gear	1		030342550119
20	Zanhrad	Gear	1		030342550120
21	Zahnrad	Gear	1		030342550121
22	Passfeder	Fitting key	1	6x25	
23	Passfeder	Fitting key	2	6x14	
24	Buchse	Bushing	1		030342550124
25	O-Ring	O-Ring	1		030342550125
26	Zahnritzel	Gear shaft	1		030342550126
27	Zahnrad	Gear	1		030342550127
28	Gewindestift	Grub screw	3	6x10	
29	Block	Block	1		030342550129
30	Flansch	Flange	1		030342550130
31	O-Ring	O-Ring	1	73x2.65	
32	Platte	Plate	1		030342550132
33	Abdeckung	Cover	1		030342550133
34	O-Ring	O-Ring	1	150x5.3	
35	Innensechskantschraube	Socket head screw	1	6x12	
36	Verschlussschraube	Plug screw	2		030342550136
37	Schaltgabel	Switch lever	1		030342550137
38	Flansch	Flange	2		030342550138
39	Bolzen	Bolt	1		030342550139
40	Platte	Plate	2		030342550140
41	Welle	Shaft	1		030342550141
42	Schaltgabel	Switch fork	1		030342550142
43	Schalthebel	Switch lever	2		030342550143
44	Ölschauglas Betrieb	Oil sight glass, operation	1		030342550144
45	Zugentlastung	Strain relief	1		030342550145
46	Kugellager	Ball bearing	2	6007	0406007
47	Kugellager	Ball bearing	2	6203	0406203
48	Kugellager	Ball bearing	1	1908	0401908
49	Schraube	Screw	4	DIN 7991 - M5x12	
50	Sicherungsring	Retaining ring	1	DIN 471 - 16x1	
51	Motor	Motor	1		030342550151
52	Motorabdeckung	Motor cover	1		030342550152
53	Lüfter	Fan	1		030342550153
54	Innensechskantschraube	Socket head screw	4	ISO 4762 - M12 x 25	
55	Scheibe	Washer	4	DIN 125 - A 13	
56	Innensechskantschraube	Socket head screw	3	ISO 4762 - M8 x 12	
57	Innensechskantschraube	Socket head screw	4	ISO 4762 - M6 x 35	
58	Innensechskantschraube	Socket head screw	3	ISO 4762 - M6 x 16	
59	Sicherungsring	Retaining ring	2	DIN 471 - 35x1,5	
60	Innensechskantschraube	Socket head screw	3	ISO 4762 - M6 x 12	
61	Ölschauglas, Öl abgesetzt	Oil sight glass, oil dropped	1		030342550161
63	Sicherungsring	Retaining ring	1	DIN 472 - 62x2	
64	Passfeder	Fitting key	1	DIN 6885 - A 6 x 6 x 14	
65	Sicherungsring	Retaining ring	2	DIN 471 - 42x1,75	
66	Stahlkugel	Steel ball	2		030342550166
67	Feder	Spring	2		030342550167
68	Stift	Pin	2	ISO 13337 - 6 x 32	
69	O-Ring	O-Ring	2	DIN 3771 - 15 x 2,65	
70	Sicherungsring	Retaining ring	1	DIN 471 - 34x1,5	
71	Sicherungsring	Retaining ring	1	DIN 471 - 25x1,2	
72	Sicherungsring	Retaining ring	1	DIN 471 - 38x1,75	
73	Sicherungsring	Retaining ring	2	DIN 471 - 40x1,75	
74	Sicherungsring	Retaining ring	2	DIN 471 - 62x2	

Ersatzteilliste - Teil Getriebe Teil B - Spare part list - Gear part B

Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Gehäuse	Housing	1		030342550201
2	Pinole	Sleeve	1		030342550202
3	Welle	Shaft	1		030342550203
4	Bohrspindel	Drill spindle	1		030342550204
5	Buchse	Bushing	1		030342550205
6	Klemmmutter	Clamping nut	1		030342550206
7	Spindel	Spindle	1		030342550207
8	Aufnahme	Collet	1		030342550208
9	Buchse	Bushing	1		030342550209
10	Nutmutter	Groove nut	1	M30X1.5	030342550210
11	Buchse	Bushing	1		030342550211
12	Zahnrad	Gear	1		030342550212
13	Buchse	Bushing	1		030342550213
14	Gewindestift	Grub screw	1	M4X6	

Ersatzteilliste - Teil Getriebe Teil B - Spare part list - Gear part B

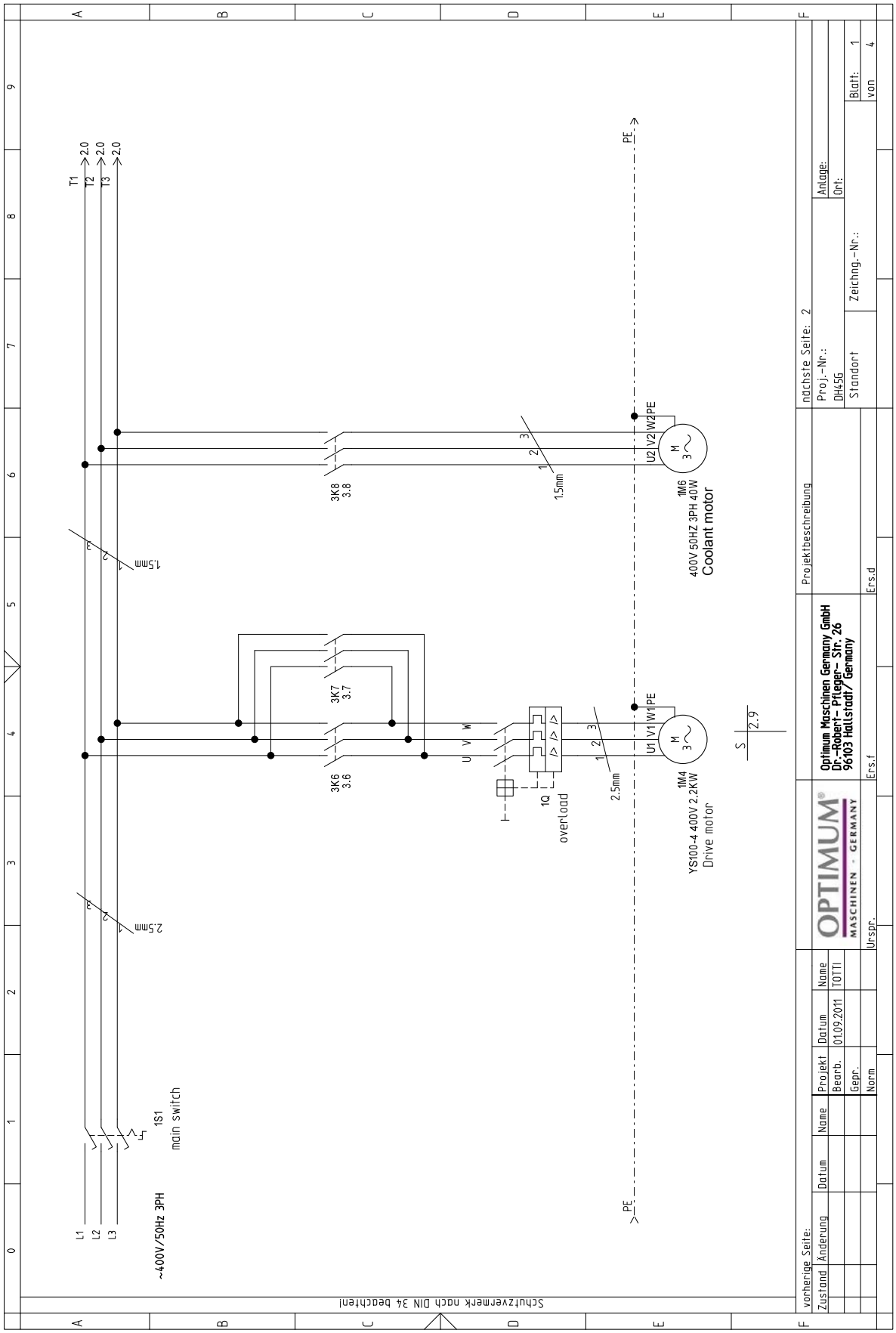
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
15	Zahnrad	Gear	1		030342550215
16	Bolzen	Bolt	1		030342550216
17	Zahnrad	Gear	1		030342550217
18	Welle	Shaft	1		030342550218
19	Innensechskantschraube	Socket head screw	1	M8X20	
20	Zahnrad	Gear	1		030342550220
21	Zahnrad	Gear	1		030342550221
22	Welle	Shaft	1		030342550222
23	Zahnrad	Gear	1		030342550223
24	Scheibe	Washer	3		030342550224
25	Nutmutter	Groove nut	1	M25X1.5	030342550225
26	Passfeder	Fitting key	1	5X70	
27	Schnecke	Worm	1		030342550227
28	Passfeder	Fitting key	1	8X50	
29	Buchse	Bushing	1		030342550229
30	Flansch	Flange	1		030342550230
31	Schneckenrad	Worm gear	1		030342550231
32	Flansch	Flange	1		030342550232
33	Rückholfeder	Rretaining spring	1		030342550233
34	Bolzen	Bolt	1		030342550234
35	Schaltgabel	Switch fork	1		030342550235
36	Abdeckung	Cover	1		030342550236
37	Welle	Shaft	1		030342550237
38	Bolzen	Bolt	1		030342550238
39	Abdeckung	Cover	1		030342550239
40	Platte	Plate	1		030342550240
41	Welle	Shaft	1		030342550241
42	Zahnrad	Gear	1		030342550242
43	Block	Block	1		030342550243
44	Abeckung	Cover	1		030342550244
45	Platte	Plate	1		030342550245
47	LED Leuchte	LED light	2		030342550247
48	Bolzen	Bolt	1		030342550248
49	Handhebel	Handle lever	1		030342550249
50	Nabe	Collet	1		030342550250
51	Handhebel	Handle lever	4		030342550251
52	Schraube	Screw	1		030342550252
53	Wahlschalter	Mode switch	1		030342550253
54	Scheibe	Washer	1		030342550254
55	Schraube	Screw	1		030342550255
56	Kugellager	Ball bearing	1	16008	04016008
57	Kugellager	Ball bearing	1	16007	04016007
58	Kugellager	Ball bearing	1	6008	0406008
59	Kegelrollenlager	Taper roller bearing	1	32008	04032008
60	Kegelrollenlager	Taper roller bearing	1	32006	04032006
61	Kugellager	Ball bearing	5	6202	0406202
62	Kugellager	Ball bearing	1	6205	0406205
63	Passfeder	Fitting key	1	6x11	
64	Scheibe	Scheibe	1		030342550264
65	Verschluss	Plug	2		030342550265
66	Paßfeder	Fitting key	1	DIN 6885 - A 8 x 7 x 40	
67	Paßfeder	Fitting key	1	DIN 6885 - A 8 x 7 x 32	
68	Innensechskantschraube	Socket head screw	3	ISO 4762 - M3 x 6	
69	Innensechskantschraube	Socket head screw	5	ISO 4762 - M8 x 16	
70	Innensechskantschraube	Socket head screw	3	ISO 4762 - M5 x 10	
71	Zugentlastung	Strain relief	1		
72	Führung	Guide	1		030342550272
73	Bolzen	Bolt	1		030342550273
74	Klemmhebel	Clamping lever	1		030342550274
75	Frontabdeckung	Front cover	1		030342550275
76	Not-Halt Schalter	Emergency stop button	1		030342550276
79	Hauptschalter	Main switch	1		030342550279
80	Abdeckung	Cover	1		030342550280
81	Gehäuse	Housing	1		030342550281
82	Abdeckung	Cover	1		030342550282
83	Innensechskantschraube	Socket head screw	6	ISO 4762 - M6 x 55	030342550283
84	Abdeckung	Cover	1		030342550284
85	Bolzen	Bolt	1		030342550285
86	Aluprofil	Aluminium profile	1		030342550286
88	Endschalter	End switch	2	KEDU QKS7	030342550288
89	Bohrfutterschutz	Drill chuck protection	1		030342550289
92	Innensechskantschraube	Socket head screw	4	ISO 4762 - M4 x 16	
93	Klemmschraube	Clamping screw	2		030342550293
94	Schraube	Screw	2		030342550294
95	Bohrfutterschutz	Drill chuck protection	1		030342550295
97	Innensechskantschraube	Socket head screw	1	DIN 913 - M5 x 12	
101	Innensechskantschraube		6	ISO 4762 - M8 x 25	
102	Sicherungsring		1	DIN 471 - 22x1,2	
103	Sicherungsring		4	DIN 471 - 35x1,5	
104	Sicherungsring		1	DIN 471 - 15x1	
105	Sicherungsring		1	DIN 471 - 72x2,5	
106	Sicherungsring		1	DIN 471 - 88x3	
107	Innensechskantschraube		1	ISO 4762 - M10 x 30	
108	Innensechskantschraube		3	ISO 4762 - M6 x 12	
109	Sicherungsring		2	DIN 471 - 62x2	
110	Innensechskantschraube		4	ISO 4762 - M8 x 20	
112	Spannstift		1	ISO 13337 - 6 x 24	
113	Schmiernippel		1	8	0303425502113
114	Führungsstück		1		0303425502114
115	Sensor		1		0303425502115
116	Anschlussstecker mit Deckel	Connector with cover	1		0303425502116

DH45G_parts.fm

Ersatzteilliste - Bohrsäule und Bohrtisch - Drill column and the table

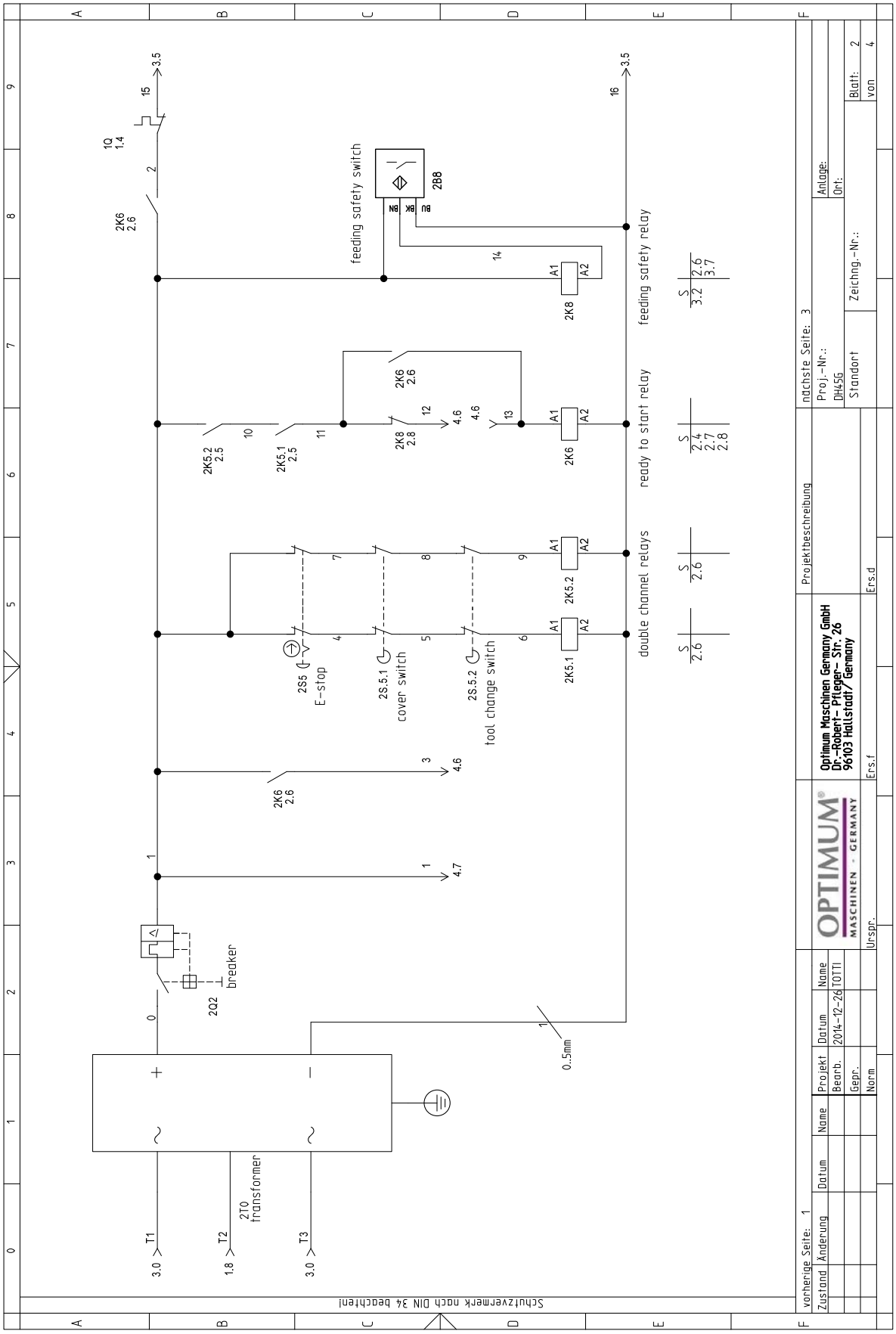
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Grundplatte	Ground plate	1		030342550301
2	Bohrsäule	Drill column	1		030342550302
3	Kühlmittelbehälter	Coolant tank	1		030342550303
4	Flansch	Flange	1		030342550304
5	Gewindebolzen	Threaded bolt	3		030342550305
6	Scheibe	Washer	3		030342550306
7	Spannhebel	Clamping lever	3		030342550307
8	Bolzen	Bolt	3		030342550308
9	Scheibe	Washer	3		030342550309
10	Sechskantmutter	Hexagon nut	3		030342550310
11	Anschluss	Plug	1		030342550311
12	Skalenring	Scale ring	1		030342550312
13	Führung	Guide	1		030342550313
14	Zylinderstift	Cylindrical pin	1	6x26	030342550314
15	Bohrtisch	Drill table	1		030342550315
16	Innensechskantschraube	Socket head screw	3	ISO 4762 - M8 x 25	
17	Welle	Shaft	1		030342550317
18	Schmiernippel	Lubrication cup	3		030342550318
19	Zahnrad	Gear	1		030342550319
20	Platte	Plate	1		030342550320
21	Buchse	Bushing	1		030342550321
22	Zahnritzel	Gear shaft	1		030342550322
23	Gehäuse	Housing	1		030342550323
24	Kurbel	Crank	1		030342550324
25	Ring	Ring	1		030342550325
26	Handhebel	Handle	1		030342550326
27	Innensechskantschraube	Socket head screw	4	ISO 4762 - M8 x 20	
28	Halter	Holder	1		030342550328
35	Anschluss	Plug	1		030342550335
36	Innensechskantschraube	Socket head screw	2	ISO 4762 - M6 x 16	
37	Gewindestift	Grub screw	2	DIN 913 - M6 x 8	
38	Spannstift	Spring pin	1	ISO 13337 - 6 x 40	
39	Zahnstange	Rack	1		030342550339
41	Schauglas	Sight glas	1		030342550341
42	Verschlussschraube	Plug screw	1		030342550342
43	Filter	Filter	1		030342550343
44	Deckel	Cover	1		030342550344
45	Filter	Filter	1		030342550345
46	Anschluss	Plug	1		030342550346
48	Innensechskantschraube	Socket head screw	2	ISO 4762 - M8 x 16	
50	Kühlmittelpumpe	Coolant pump	1		030342550350
51	Anschluss	Plug	1		030342550351
52	Schlauchbinder	Hose clamping	4		
53	Sechskantschraube	Socket head screw	2	ISO 4017 - M10 x 25	
54	Kühlmittelschlauch	Coolant hose	1		030342550354
55	Kühlmittelschlauch	Coolant hose	1		030342550355
56	Innensechskantschraube	Socket head screw	8	ISO 4762 - M14 x 50	
57	Innensechskantschraube	Socket head screw	4	ISO 4762 - M14 x 40	
58	Flexibles Kühlmittelrohr	Flexible coolant tube			030342550358
59	Kugelhahn Messing	Brass ball valve	1		030342550359
60	Anschlussverlängerung	Connection extension	1		030342550360
61	Klemmschraube	Clamping screw	1		030342550361

8.5 Schaltplan - Wiring diagram 1-4



DH45G_parts.fm

8.6 Schaltplan - Wiring diagram 2-4



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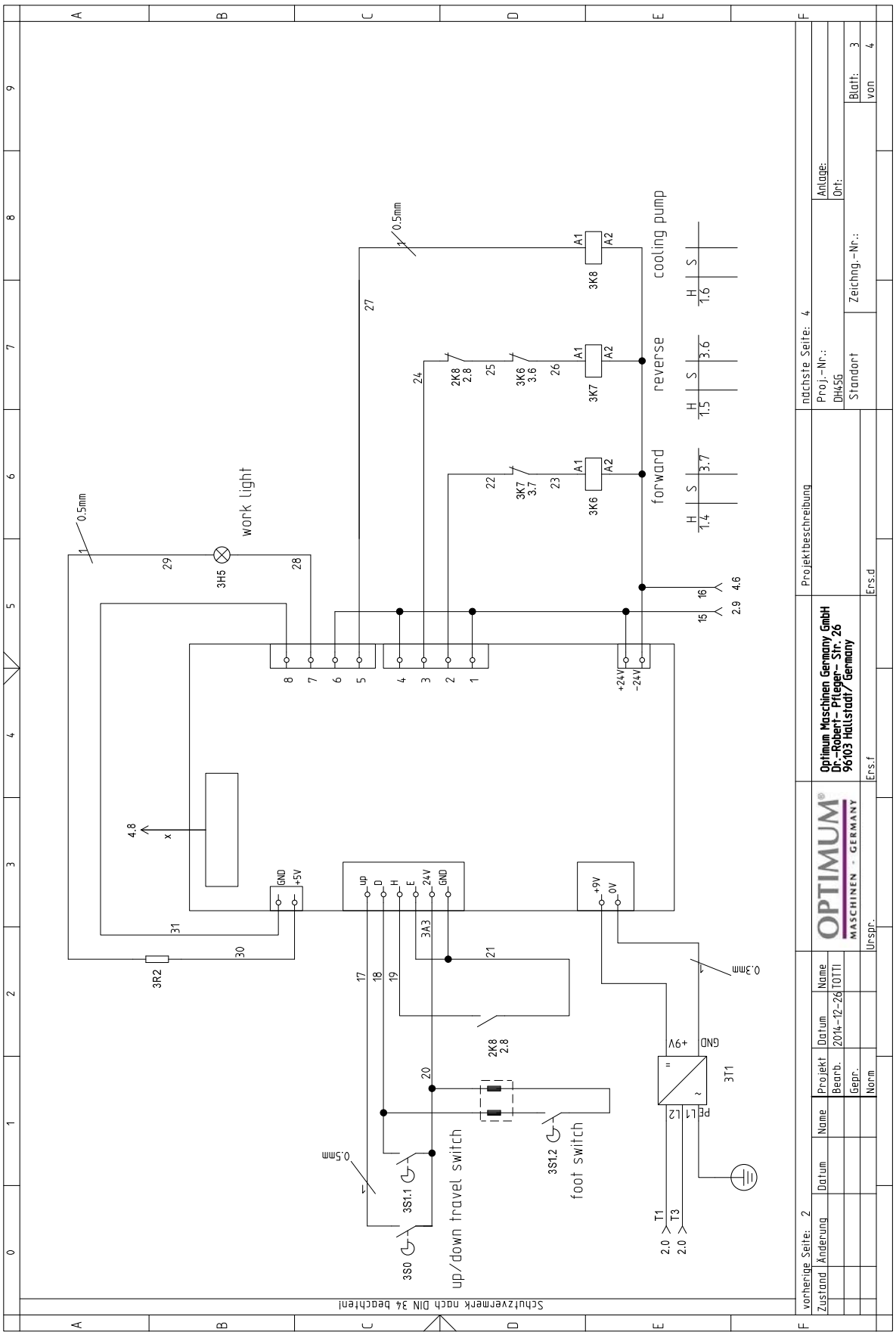
8.7 Schaltplan - Wiring diagram 3-4



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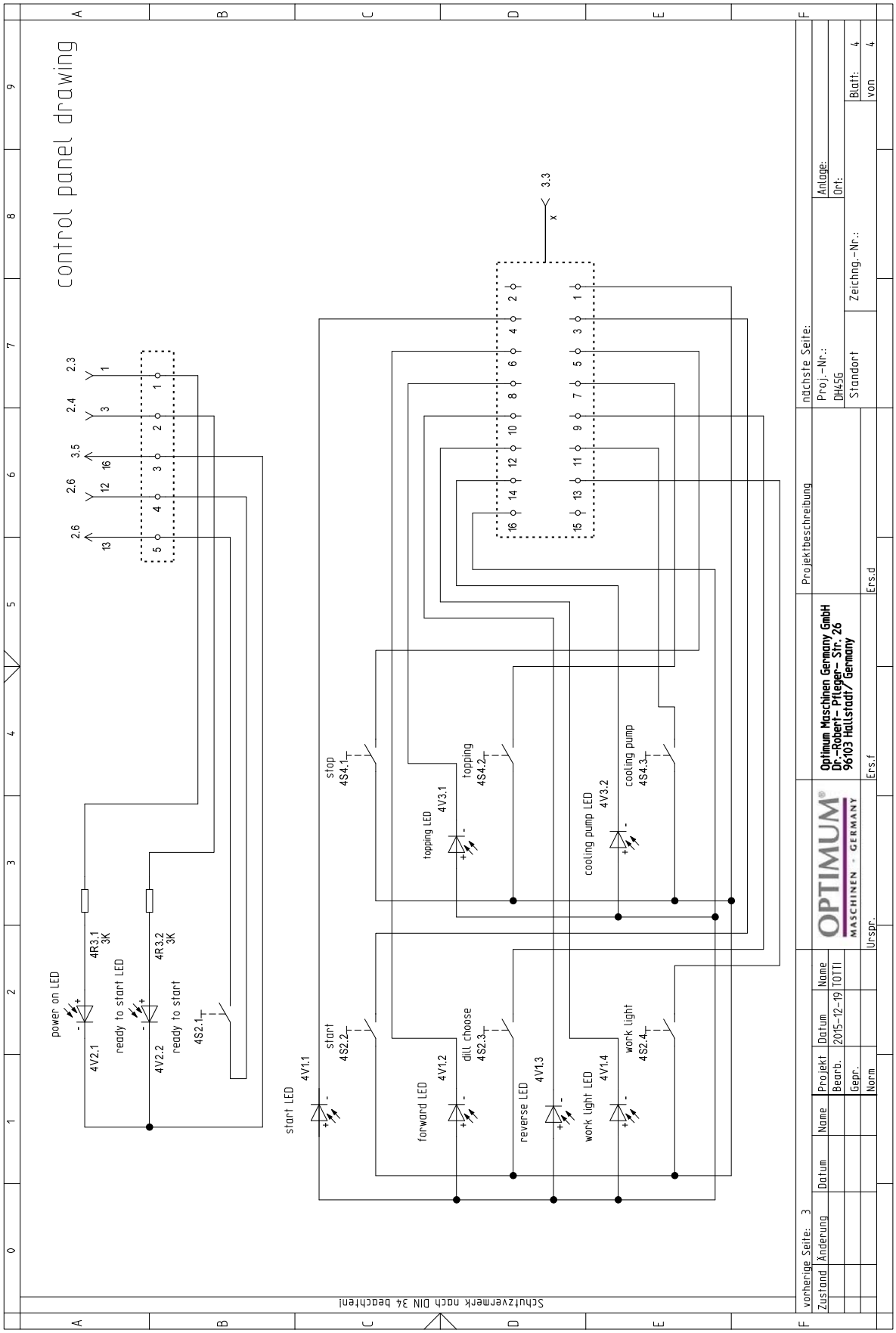
8.8 Schaltplan - Wiring diagram 4-4



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Ersatzteilliste Elektrik - Electrical spare parts

Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1M4	Antriebsmotor	Drive motor	1	YS100-4 400V 2.2 kW	030342551M4
1M6	Motor Kühlmittelpumpe	Coolant pump motor	1	400V 50Hz 3PH 40W	030342551M6
1Q	Motorschutzschalter	Motor safety switch	1	Kedu LR-K0314	030342551Q
1S1	Hauptschalter	Main switch	1	Kedu ZH-20	030342551S1
2B8	Sensor Vorschub	Feed sensor	1	Omron TL-Q5MC1-Z	0303425502115
2K5.1	Relais Sicherheitssteuerung	Safety control relay	2	Omron MY2N-J DC24V	030342552K5.1
2K5.2	Relais Sicherheitssteuerung	Safety control relay			
2K6	Relais Steuerung	Control relay	1	Omron MY4N-J DC24V	030342552K6
2K8	Relais Steuerung Vorschub	Feed control relay	1		030342552K8
2Q2	Sicherungsautomat	Automatical fuse	1	DZ47N1C6	030342552Q2
2S5	Not-Halt-Schlagschalter	Emergency stop button	1	HY57B-17	030342550276
2S5.1	Sicherheitschalter Abdeckung	Cover safety switch	1	Kedu QK7	030342552S5.1
2S5.2	Schalter Werkzeugausbau	Tool change switch	1	Kedu QK7	030342552S5.2
2T0	Netzteil	Power pack	1	S8VT-112024E	030342552T0
3A3	Steuerung	Control	1		030342553A3
3S0	Endschalter Obere Stellung	Top position end switch	2		030342553S0
3S1.1	Endschalter Untere Stellung	Down position end switch			
3S1.2	Schalter Fusspedal (optional)	Foot pedal switch (option)	1		030342553S1.2
3H5	Maschinenleuchte	Machine light	1		030342553H5
3K6	Relais Spindel Vorlauf	Spindle CW rotation relay	1	Schneider LP1-K901BD	030342553K6
3K7	Relais Spindel Rücklauf	Spindle CCW rotation relay	1		
3K8	Relais Kühlmittelpumpe	Coolant pump relay	1		
3R2	Wiederstand	Resistor	1		030342553R2
3T1	Netzteil	Power pack	1	AC400 DC5V	030342553T1

DH45G_parts.fm

Schmierstoffe Lubricant Lubrifiant	Viskosität Viskosity Viscosité ISO VG DIN 51519 mm²/s (cSt)	Kennzeich- nung nach DIN 51502	ARAL	BP	ESSO	KLÜBER LUBRICATION	Mobil		TEXACO
Getriebeöl Gear oil Huile de réducteur	VG 680	CLP 680	Aral Degol BG 680	BP Energol GR-XP 680	SPARTAN EP 680	Klüberoil GEM 1-680	Mobilgear 636	Shell Omala 680	Meropa 680
	VG 460	CLP 460	Aral Degol BG 460	BP Energol GR-XP 460	SPARTAN EP 460	Klüberoil GEM 1-460	Mobilgear 634	Shell Omala 460	Meropa 460
	VG 320	CLP 320	Aral Degol BG 320	BP Energol GR-XP 320	SPARTAN EP 320	Klüberoil GEM 1-320	Mobilgear 632	Shell Omala 320	Meropa 320
	VG 220	CLP 220	Aral Degol BG 220	BP Energol GR-XP 220	SPARTAN EP 220	Klüberoil GEM 1-220	Mobilgear 630	Shell Omala 220	Meropa 220
	VG 150	CLP 150	Aral Degol BG 150	BP Energol GR-XP 150	SPARTAN EP 150	Klüberoil GEM 1-150	Mobilgear 629	Shell Omala 150	Meropa 150
	VG 100	CLP 100	Aral Degol BG 100	BP Energol GR-XP 100	SPARTAN EP 100	Klüberoil GEM 1-100	Mobilgear 627	Shell Omala 100	Meropa 100
	VG 68	CLP 68	Aral Degol BG 68	BP Energol GR-XP 68	SPARTAN EP 68	Klüberoil GEM 1-68	Mobilgear 626	Shell Omala 68	Meropa 68
	VG 46	CLP 46	Aral Degol BG 46	BP Bartran 46	NUTO H 46 (HLP 46)	Klüberoil GEM 1-46	Mobil DTE 25	Shell Tellus S 46	Anubia EP 46
	VG 32	CLP 32	Aral Degol BG 32	BP Bartran 32	NUTO H 32 (HLP 32)	Klübersynth GEM 4- 32 N	Mobil DTE 24	Shell Tellus S 32	Anubia EP 32
Hydrauliköl Hydraulic oil Huile hydraulique	VG 32	CLP 32	Aral Vitam GF 32	BP Energol HLP HM 32	NUTO H 32 (HLP 32)	LAMORA HLP 32	Mobil Nuto HLP 32	Shell Tellus S2 M 32	Rando HD HLP 32
	VG 46	CLP 46	Aral Vitam GF 46	BP Energol HLP HM 46	NUTO H 46 (HLP 46)	LAMORA HLP 46	Mobil Nuto HLP 46	Shell Tellus S2 M 46	Rando HD HLP 46
Getriebefett Gear grease Graisse de réducteur		G 00 H-20	Aral FDP 00 (Na-verseift) Aralub MFL 00 (Li-verseift)	BP Energrease PR-EP 00	FIBRAX EP 370 (Na-verseift)	MICRO-LUBE GB 00	Mobilux EP 004	Shell Alvania GL 00 (Li-verseift)	Marfak 00

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Spezialfette, wasserabweisend Special greases, water resistant Graisses spéciales, déperlant			Aral Aralub	Energrease PR 9143		ALTEMP Q NB 50 Klüberpaste ME 31-52	Mobilux EP 0 Mobil Grea-serex 47		
Wälzlagerfett Bearing grease Graisse de roulement		K 3 K-20 (Li-verseift)	Aralub HL 3	BP Energrease LS 3	BEACON 3	CENTO-PLEX 3	Mobilux 3	Shell Alvania R 3 Alvania G 3	Multifak Premium 3
Öle für Gleitbahnen Oils for slideways Huiles pour glis-sières	VG 68	CGLP 68	Aral Deganit BWX 68	BP Maccurat D68	ESSO Febis K68	LAMORA D 68	Mobil Vactra Oil No.2	Shell Tonna S2 M 68	Way lubricant X 68
Öle für Hochfre-quenzspindeln Oils for Built-in spindles Huiles pour broches à haute vitesse	VG 68		Deol BG 68	Emergol HLP-D68	Spartan EP 68		Drucköl KLP 68-C	Shell Omala 68	
Fett für Hochfre-quenzspindeln Grease for Built-in spindles Graisse pour bro-ches à haute vitesse	METAFLUX-Fett-Paste (Grease paste) Nr. 70-8508 METAFLUX-Moly-Spray Nr. 70-82								
Kühlschmiermittel Cooling lubricants Lubrifiants de refro-idissement	Schneidöl Aquacut B, 5 L Gebinde, Artikel Nr. 3601751 EG Sicherheitsdatenblatt http://www.optimum-daten.de/data-sheets/EG-Datenblatt_Aquacut-B.pdf		Aral Emusol	BP Sevora	Esso Kutwell		Mobilcut	Shell Adrana	Chevron Soluble Oil B

9 Appendix

9.1 Copyright

9.2 Terminology/Glossary

Term	Explanation
Drill drift	Tool to release the bit or the drill chuck from the drill spindle
Drill chuck	Drill bit adapter
Drill head	Upper part of the geared drill
Drill sleeve	Fixed hollow shaft which runs in the drill spindle.
Drilling spindle	Shaft activated by the motor
Drilling table	Supporting surface, clamping surface
Taper mandrel	Cone of the drill or of the drill chuck
Spindle sleeve lever	Manual operation for the drill feed
Quick-action drill chuck	Drill holding fixture to be clamped manually.
Workpiece	Part to be drilled, part to be machined.
Tool	Drill bit, countersink, etc.

9.2.1 Change information operating manual

Chapter	Short summary	new version number
3	Notes on coolant device for transportation purposes. Notes on correct rotation field.	1.0.1

9.3 Liability claims/warranty

Besides the legal liability claims for defects of the customer towards the seller, the manufacturer of the product, OPTIMUM GmbH, Robert-Pfleger-Straße 26, D-96103 Hallstadt, does not grant any further warranties unless they are listed below or were promised as part of a single contractual provision.

- Liability or warranty claims are processed at OPTIMUM GmbH's discretion either directly or through one of its dealers.
  Any defective products or components of such products will either be repaired or replaced by components which are free from defects. Ownership of replaced products or components is transferred to OPTIMUM Maschinen Germany GmbH.
- The automatically generated original proof of purchase which shows the date of purchase, the type of machine and the serial number, if applicable, is the precondition in order to assert liability or warranty claims. If the original proof of purchase is not presented, we are not able to perform any services.
- Defects resulting from the following circumstances are excluded from liability and warranty claims:
  - Using the product beyond the technical options and proper use, in particular due to overstraining of the machine.
  - Any defects arising by one's own fault due to faulty operations or if the operating manual is disregarded.
  - Inattentive or incorrect handling and use of improper equipment
  - Unauthorized modifications and repairs
  - Insufficient installation and safeguarding of the machine
  - Disregarding the installation requirements and conditions of use
  - atmospheric discharges, overvoltage and lightning strokes as well as chemical influences
- The following items are also not subject to liability or warranty claims:
  - Wearing parts and components which are subject to a standard wear as intended such as e.g. V-belts, ball bearings, illuminants, filters, sealings, etc.
  - Non reproducible software errors
- Any services, which OPTIMUM GmbH or one of its agents performs in order to fulfil any additional warranty are neither an acceptance of the defects nor an acceptance of its obligation to compensate. These services neither delay nor interrupt the warranty period.
- The court of jurisdiction for legal disputes between businessmen is Bamberg.
- If any of the aforementioned agreements is totally or partially inoperative and/or invalid, a provision which nearest approaches the intent of the guarantor and remains within the framework of the limits of liability and warranty which are specified by this contract is deemed agreed.

9.4 Storage

ATTENTION!

Incorrect and improper storage might result in damage or destruction of electrical and mechanical machine components.

Store packed and unpacked parts only under the intended environmental conditions.

Follow the instructions and information on the transport box.

- Fragile goods
  (Goods require careful handling)

- Protect against moisture and humid environment

☞ "Environmental conditions“ on page 17

- Prescribed position of the packing case
  (Marking the top surface - arrows pointing up)

- Maximum stacking height

  Example: not stackable - do not stack a second packing case on top of the first one.

Consult Optimum Maschinen Germany GmbH if the machine and accessories are stored for more than three months or are stored under different environmental conditions than those specified here.

9.5 Advice for disposal / Options of reuse:

Please dispose of your equipment in an environmentally friendly manner, by not placing waste in the environment but in a professional manner.

Please do not simply throw away the packaging and later the disused machine, but dispose of both in accordance with the guidelines laid down by your city council/local authority or by an authorised disposal company.

9.5.1 Decommissioning

CAUTION!

Used devices need to be decommissioned in a professional way in order to avoid later misuses and endangerment of the environment or persons.

- **Unplug the power cord.**
- **Cut the connection cable.**
- **Remove all operating materials from the used device which are harmful to the environment.**
- **If applicable remove batteries and accumulators.**
- **Disassemble the machine if required into easy-to-handle and reusable assemblies and component parts.**
- **Dispose of machine components and operating fluids using the intended disposal methods.**

9.5.2 Disposal of new device packaging

All used packaging materials and packaging aids from the machine are recyclable and generally need to be supplied to the material reuse.

The packaging wood can be supplied to the disposal or the reuse.

Any packaging components made of cardboard box can be chopped up and supplied to the waste paper collection.

The films are made of polyethylene (PE) and the cushion parts are made of polystyrene (PS). These materials can be reused after reconditioning if they are passed to a collection station or to the appropriate waste management enterprise.

Only forward the packaging materials correctly sorted to allow direct reuse.

9.5.3 Disposal of the old device

INFORMATION

Please take care in your interest and in the interest of the environment that all component parts of the machine are only disposed of in the intended and admitted way.

Please note that the electrical devices comprise a variety of reusable materials as well as environmentally hazardous components. Please ensure that these components are disposed of separately and professionally. In case of doubt, please contact your municipal waste management. If appropriate, call on the help of a specialist waste disposal company for the treatment of the material.

9.5.4 Disposal of electrical and electronic components

Please make sure that the electrical components are disposed of professionally and according to the statutory provisions.

The device is composed of electrical and electronic components and must not be disposed of as household waste. According to the European Directive 2011/65/EU regarding electrical and electronic used devices and the implementation of national legislation, used power tools and electrical machines need to be collected separately and supplied to an environmentally friendly recycling centre.

As the machine operator, you should obtain information regarding the authorised collection or disposal system which applies for your company.

Please make sure that the electrical components are disposed of professionally and according to the legal regulations. Please only throw depleted batteries in the collection boxes in shops or at municipal waste management companies.

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9.5.5 Disposal of lubricants and coolants

ATTENTION!

Please imperatively make sure to dispose of the used coolant and lubricants in an environmentally compatible manner. Observe the disposal instructions of your municipal waste management companies.

INFORMATION

Used coolant emulsions and oils should not be mixed since it is only possible to reuse oils without pre-treatment when they have not been mixed.

The disposal instructions for used lubricants are made available by the manufacturer of the lubricants. If necessary, request the product-specific data sheets.

9.6 Disposal via municipal collection facilities

Disposal of used electrical and electronic components
(Applicable in the countries of the European Union and other European countries with a separate collecting system for those devices).

The sign on the product or on its packing indicates that the product must not be handled as common household waste, but that is needs to be disposed of at a central collection point for recycling. Your contribution to the correct disposal of this product will protect the environment and the public health. Incorrect disposal constitutes a risk to the environment and public health. Recycling of material will help reduce the consumption of raw materials. For further information about the recycling of this product, please consult your District Office, municipal waste collection station or the shop where you have purchased the product.

9.7 RoHS, 2011/65/EU

The symbol on the product or on its packing indicates that this product complies with the European directive 2011/65/EU.

9.8 Product follow-up

We are required to perform a follow-up service for our products which extends beyond shipment.

We would be grateful if you could send us the following information:

- Modified settings
- Any experiences with the geared drill which might be important for other users
- Recurring malfunctions

Optimum Maschinen Germany GmbH
Dr.-Robert-Pfleger-Str. 26

D-96103 Hallstadt

Fax +49 (0) 951 - 96 555 - 888
email: info@optimum-maschinen.de

OPTIMUM

MASCHINEN - GERMANY

EC Declaration of Conformity

in accordance with the Machinery Directive 2006/42/EC Annex II 1.A

The manufacturer/ distributor:	Optimum Maschinen Germany GmbH Dr.-Robert-Pfleger-Str. 26 D - 96103 Hallstadt

hereby declares that the following product

Product designation:	Geared drill
Type designation:	DH45G
Serial number:	_ __ __ __ __
Year of manufacture:	20__

Manual drilling machine for private persons, as well as for craft and industrial plants which meets all the relevant provisions of the above mentioned Directive 2006/42/EC as well as the other directives applied (below) including their amendments in force at the time of declaration. The following other EU Directives have been applied:

2014/30/EU - Electromagnetic compatibility

2014/35/EU - Electrical equipment designed for use within certain voltage limits

The safety objective meet the requirement of EC Directive 2006/42/EC.

The following harmonized standards were applied:

EN 12717: 2001 - Machine tools - Safety - Drilling machines

EN 60204-1:2006/A1:2009 -Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN 1837:1999+A1:2009 - Safety of machinery - Integral lighting of machines

EN ISO 13849 - Safety of machinery - Safety-related parts of control systems

EN ISO 12100:2010
Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

Responsible for documentation: Kilian Stürmer
Phone: +49 (0) 951 96555 - 800

Address:	Dr.-Robert-Pfleger-Str. 26 D - 96103 Hallstadt

Kilian Stürmer
(CEO, General Manager)

Hallstadt, 2016-08-08

Index