OPERATING MANUAL & PARTS LIST 9680137

PALMGREN®

32″ 16-Speed GH Drilling Machine

Read carefully and follow all safety rules and operating instructions before first use of this product.

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Preface

Dear customer,

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

Company metal working machines offer a maximum of quality, technically company 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.

C.H.HANSON
2000 North Aurora Rd.
Naperville,IL 60563
Call 800-827-3398

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:

C.H.HANSON
2000 North Aurora Rd.
Naperville,IL 60563
Call 800-827-3398

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!

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 company, 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 will expire, if any constructive, technical or procedural changes are not performed by the company.

It is also part of the intended use that you

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

☞ "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.

The table lift drive must not be used as a drill feed.

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 setting and feed to the material and workpiece.
- ➜ Clamp workpieces firmly and free of vibration.
- ➜ The table lift drive must not be used as a drill feed.

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

- ❍ 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 machine (operation, 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 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.

1.9.1 Emergency stop button

ATTENTION!

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

1.9.2 Master switch

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

The power supply is cut off when the master switch is in the off position.

Except for the areas marked by the pictogram in the margin. In these areas there might be volt-age, 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 master switch is switched off.

1.9.3 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 posi-tion.

INFORMATION

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

1.10 Safety check

Check the geared drill before each start-up or at least once per shift. Inform the person respon-sible 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 the emergency stop button is pressed, the drilling machine must switch 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 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.

1.12 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.

1.13 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 opera-tional behavior. Any changes must be documented, the operating instructions updated and machine operators instructed accordingly.

1.13.1 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.

1.14 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!

1.14.1 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!

1.15 Accident report

Inform your supervisors and company 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.

1.16 Electronics

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 operating company 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 set 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.

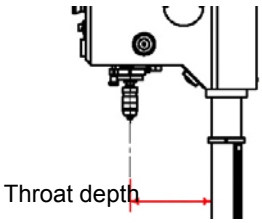
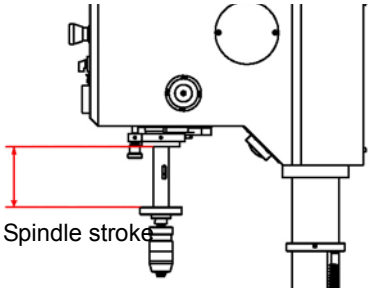
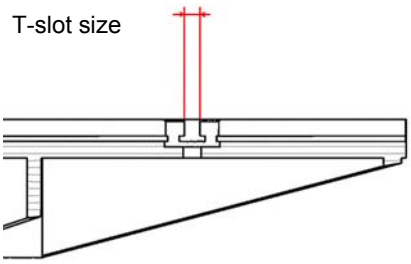
Permanently installed electrical systems and operating equipment are considered constantly monitored if they are continually serviced by qualified electricians and inspected by means of measurements in the scope of operation (e.g. monitoring the insulation resistance).

1.17 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.

Electrical connection	230 V / 3 Ph ~50 Hz (~ 60Hz)
Motor drive power stage slow	2.2 kW (3HP)
Motor drive power stage fast	2.8 kW (3.8HP)
Coolant pump motor power	0.06 kW (0.08HP)
Drilling capacity in steel (St60 - E335) [mm]	Ø 50 mm (2")
Screw tap capacity in steel (St60 - E335) [mm]	M 42 mm (M 1.65")
	405 mm (15.9")
	200 mm (7.87")
Spindle seat	MT4
Table size Length x Width of the working surface	600 x 600 mm (23.6" x 23.6")
Bearing load drilling table [kg]	350 kg (770lbs)
Tilting the table to the side	0 - 90°
Drilling table rotate	360°
 T-slot size / distance / number	18 mm/160 mm/3
Distance spindle - table [mm]	130 - 725 mm (5.1" x 28.5")
Maximum distance [mm] spindle - stand	1300 mm (51.1")

Working surface stand [mm] Length x Width of the working surface	910 x 600 mm (35.8" x 23.6")
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]	930 kg (204lbs)
Spindle speeds with connection ~ 50Hz [rpm]	45 - 2000 rpm
Spindle speeds with connection ~ 60Hz [rpm]	54 - 2400 rpm
Gear stages / motor stages	8 / 2
Column diameter [mm]	Ø 200 mm (7.87")
Environmental conditions temperature	5 - 35 °C
Environmental conditions Relative humidity	25-80%
Gear operating material	6 litres Mobilgear 629 ☞ "Lubricant“ on page 65
Operating material Toothed rod and drill column	acid-free oil
Coolant system	max. 9 litres ☞ "Lubricant“ on page 65

2.1 Emissions

CAUTION!

The user must wear noise protection and hearing protection.

The A-weighted sound pressure level L_{pA} is 86 to 89 dB.

The A-weighted sound power level L_{WA} is 104 to 108 dB.

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.

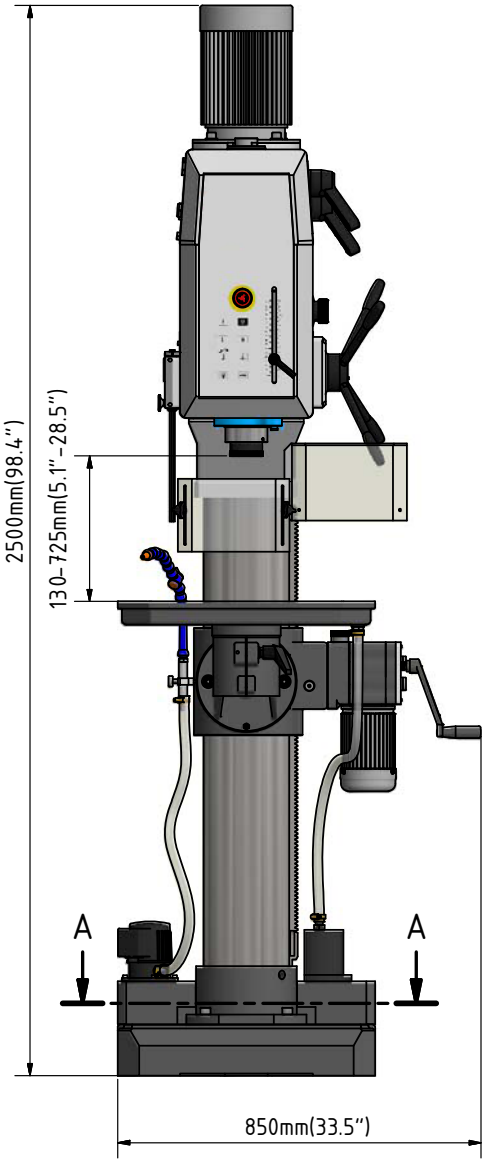
The following factors influence the actual degree of the noise exposure of the operator:

- 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.

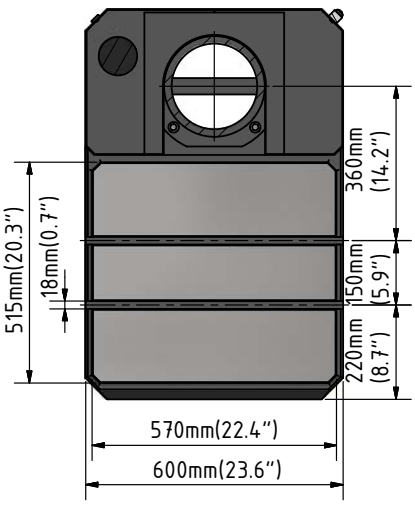
Furthermore, it is possible that the admissible exposure level might be different from country to country due to national regulations.

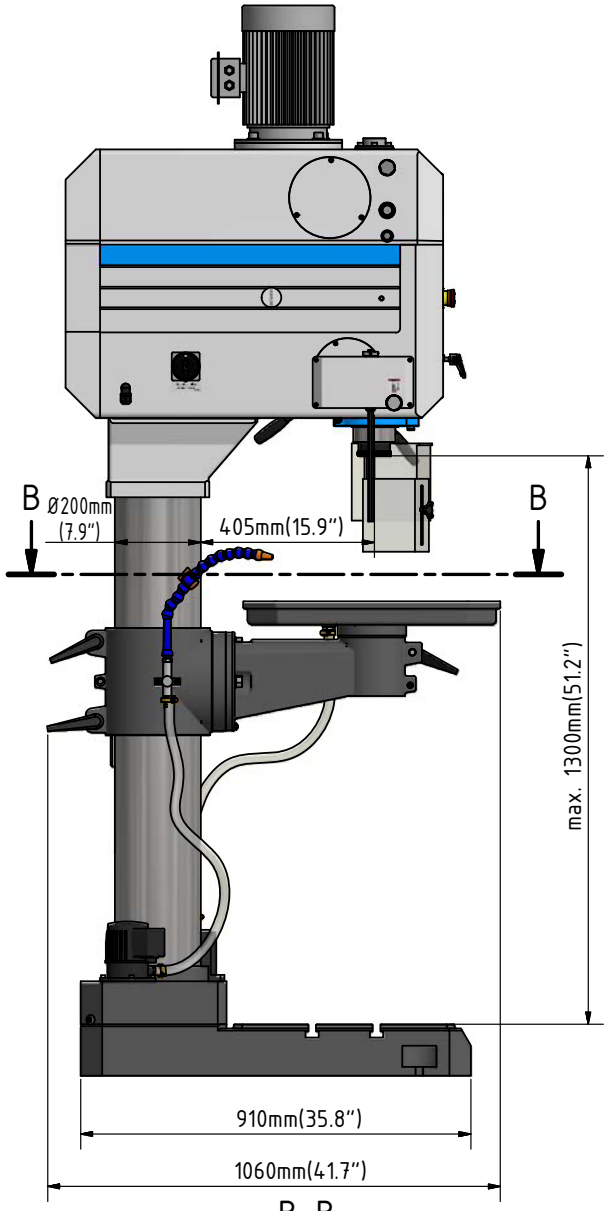
This information about the noise emission should, however, allow the operator of the machine to more easily evaluate the hazards and risks.

2.2 Dimensions

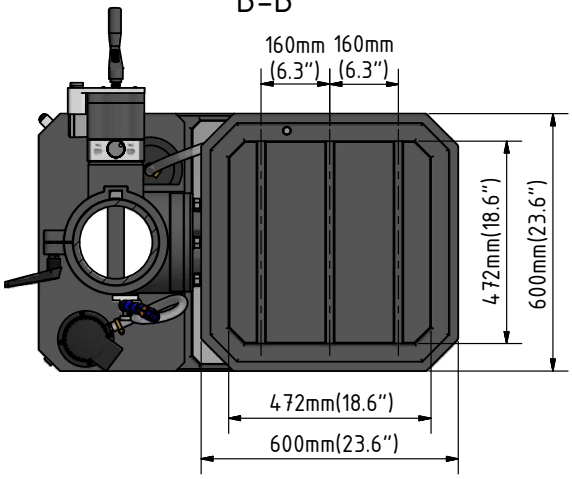


A-A





B-B



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.

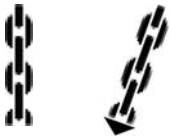
3.2 Interdepartmental transport

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)**

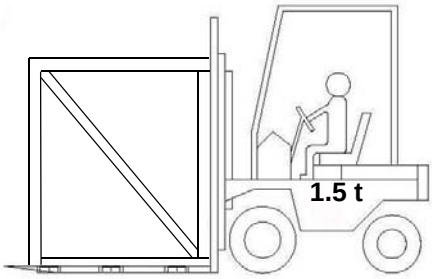
- **Means of transport to be used**
- **Weights**

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!

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 35mm 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

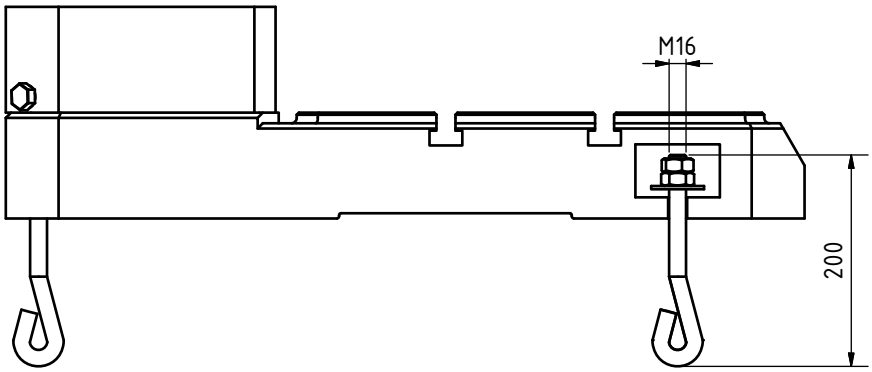
➜ Check the ground. The ground must bear the load.

➜ 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.

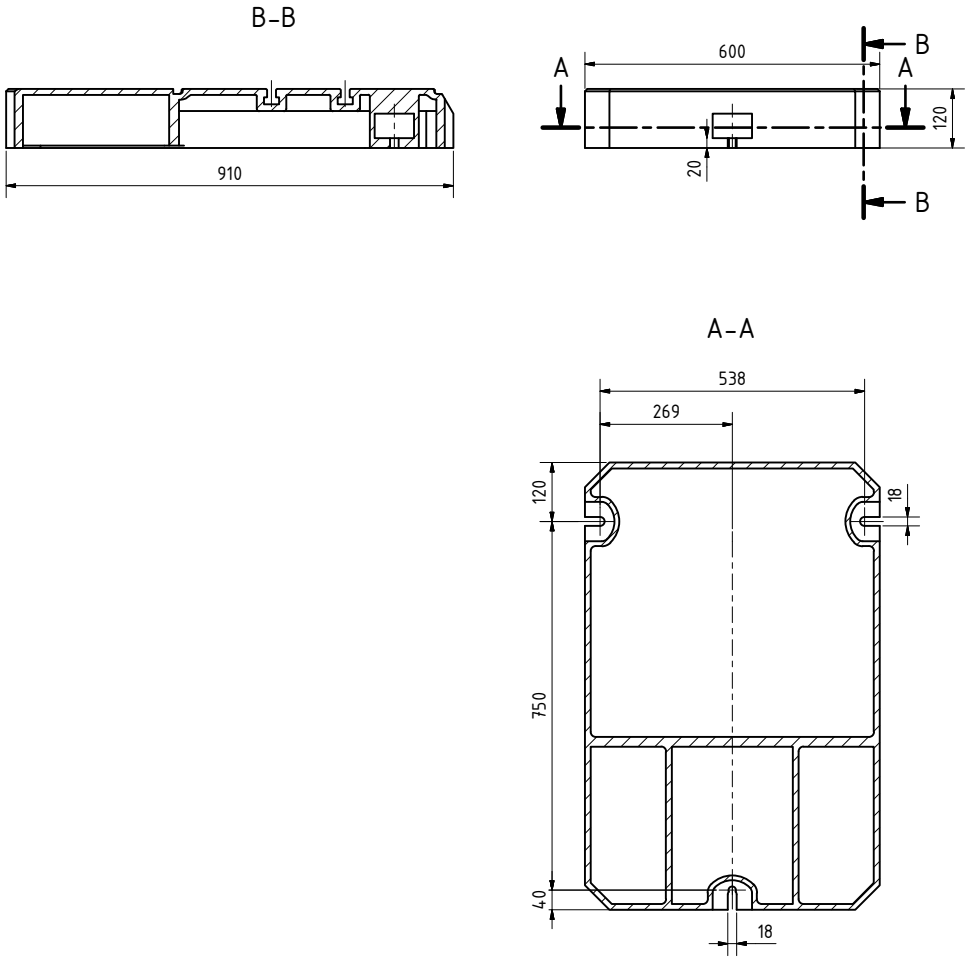


ATTENTION!

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.

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 sight glass. Filling quantity about 6 litres.

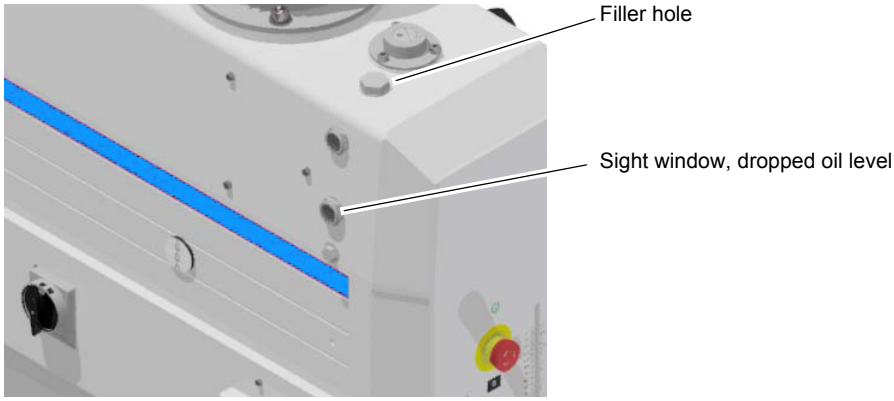
➜ The oil must be changed 200 hours after being filled for the first time, then after every 2000 operating hours.

➜ Use the oil types recommended in the reference table ☞ "Lubricant“ on page 65. 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 9 litres. Fill the coolant tank over the drilling table.

3.7.1 Gear

☞ "Refilling oil“ on page 39



3.7.2 Coolant equipment

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 company.

Only use tool holders in the intended admissible speed range.

Tool holders may only be modified in compliance with the recommendation of company 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.

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

☞ "Qualification of personnel“ on page 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!

Arrange the machine's connection cable in such a way that it will not cause a tripping hazard.

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.

➜ Main Fuse 16A.

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

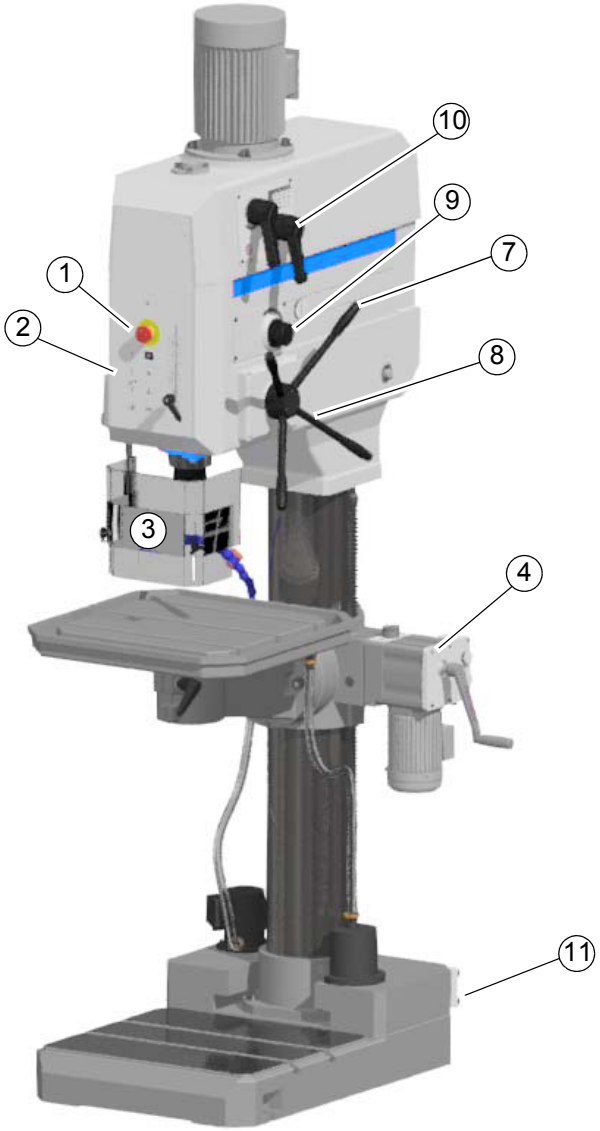
ATTENTION!

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.

4 Operation

4.1 Control and indicating elements



Img.4-1: Control and indicating elements

Pos.	Designation	Pos.	Designation
1	Emergency stop switch	2	☞ "Control panel“ on page 27
3	Drill chuck guard	4	☞ "Drill table height adjustment“ on page 30
7	Activation quill feed	8	Lever for spindle sleeve feed
9	Feed selector	10	Speed gear lever
11	Level of coolant tank		

4.2 Control panel

1. Push button ON
2. Push button Off
3. Push button motor stage slow
4. Push button motor stage fast
5. Spindle rotation direction push button
6. Push button thread tapping
7. Machine illumination ON / OFF
8. Coolant pump ON / OFF
9. Emergency stop switch
10. Drill depth stop
11. Direct run
12. Feed push button

INFORMATION

The control system switches off, once the drill feed 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 coolant pump.

Machine illumination ON / OFF

Switches the LED light on or off.

Master switch

Interrupts or connects the power supply.

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.

Feed push button

Activates or deactivates the spindle sleeve feed via the magnetic coupling.

4.3 Switching on the machine

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed and the locking pin of integrated drill drift is in drifting position.

- ➜ 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 master switch.

4.5 Gear selector switch

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

Only switch during standstill of drilling spindle. Use the direct run to make it easier to engage the gear levers.

INFORMATION

Close the chuck guard so that the direct run can be used.

4.5.1 Speed table

Gear stage

Motor stage		A	B	C	D
L	I	165	320	55	100
	II	840	1620	285	470
H	I	250	480	80	150
	II	1260	2430	425	705

Img.4-2: ~ 60Hz connection

4.6 Spindle sleeve feed

CAUTION!

Danger by bumping due to the drill levers at the end of the manual or automatic spindle sleeve feed The return spring biases and discharges the stored energy.

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

4.6.1 Manual spindle sleeve feed

CAUTION!

Danger by bumping due to the drill levers at the end of the manual or automatic spindle sleeve feed The return spring biases and discharges the stored energy.

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.

4.6.2 Automatic spindle sleeve feed

INFORMATION

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

The feed is activated by pressing the push buttons in the spindle sleeve lever. The feed is performed by an electromagnetic coupling. The feed is switched off by means of the drill depth indicator, or by pressing the push button again in the spindle sleeve lever or by pressing the optional foot switch.

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

❍ 0.1 mm/rev
❍ 0.15 mm/rev
❍ 0.2 mm/rev

INFORMATION

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.

➜ Adjust the drill depth stop .

➜ Press the push button in the spindle sleeve lever. The electromagnetic spindle sleeve feed is activated.

➜ Press the push button in the spindle sleeve lever again. The electromagnetic spindle sleeve feed will deactivated.

❍ When the preset drilling depth is reached, the drilling feed is deactivated. The drilling sleeve returns to the top position by spring force.

4.7 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.

4.7.1 Use of the drill chuck

CAUTION!

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

4.7.2 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.

INFORMATION

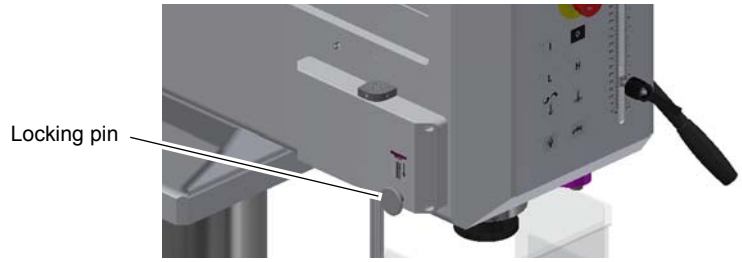
The integrated drill drift is equipped with a limit switch. The spindle drive only runs when the integrated drill drift is in the correct position.

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.



4.7.3 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.

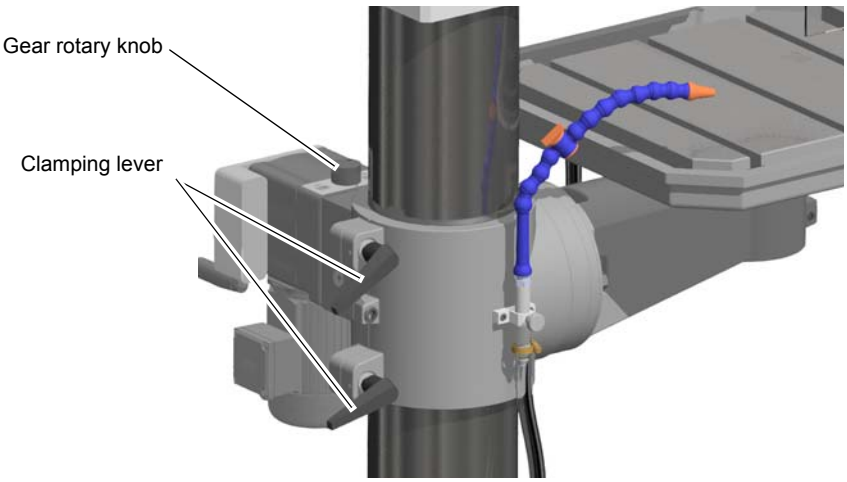
➜ Press the taper mandrel into the drill spindle.

4.8 Drill table height adjustment

For positioning the drilling table during the set-up process.

ATTENTION!

Loosen the clamping levers on the drilling table first and then tighten again.



Img.4-3:

CAUTION!

Always turn the rotary knob on the gearbox permanently to <Hand crank> to prevent unintentional actuation of the motorized height adjustment.

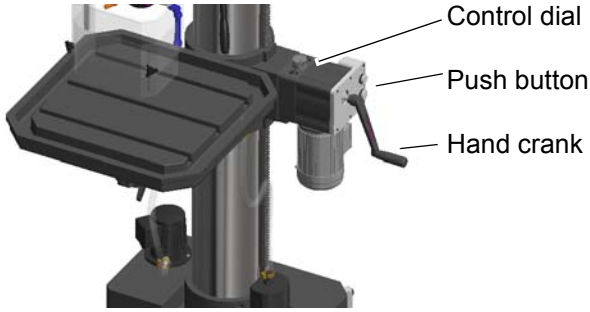
ATTENTION!

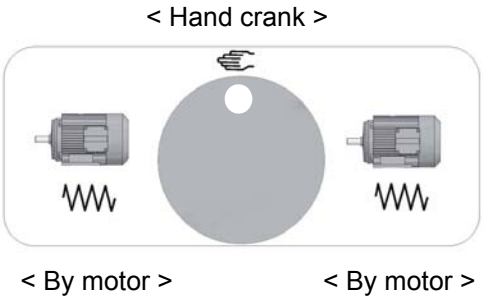
Do not use the height adjustment as a drilling feed.

4.8.1 By motor

The motorized traversing speed is less than 2 meters per minute.

➜ Release clamping lever on the drilling table.
➜ Turn the control dial to the < By motor > position.
➜ Press the side push button for the desired direction of height adjustment.
➜ Then turn the control dial back to the <Hand crank> position.
➜ Clamp the clamping lever on the drilling table again.





4.8.2 Mechanically

➜ Release clamping lever on the drilling table.
➜ Turn the control dial to the < Hand crank > position.
➜ Push in the hand crank and adjust the height.
➜ Clamp the clamping lever on the drilling table again.

4.9 Tilting the drilling table

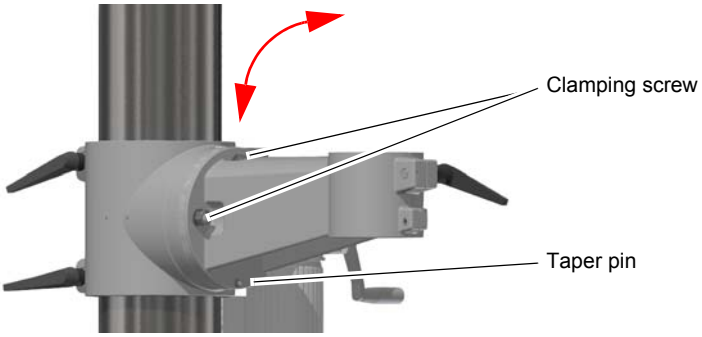
The drilling table can be tilted sideways.

➜ Pull out the taper pin.

➜ Release three clamping screws.

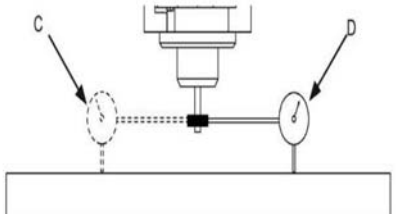
➜ Tilt the table.

➜ Re-tighten the clamping screws.



INFORMATION

The drilling table should be checked after reassembly of the taper pin with a dial gauge.



4.10 Coolant system

➜ 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 Make sure you do not get the cooling lubricants on the floor. Spilled on the floor cooling agents 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 43**

6.4.1 “Inspection plan for water-mixed cooling lubricants“ on page 44

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

4.11 Footswitch - Rotation reversal

Use the optional foot switch for a reversal of direction for tapping.

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

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

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

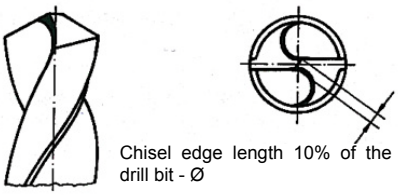
Set a speed on your drilling machine which is less than the determined speed.

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.

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 envi-ronment 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 12

WARNING!

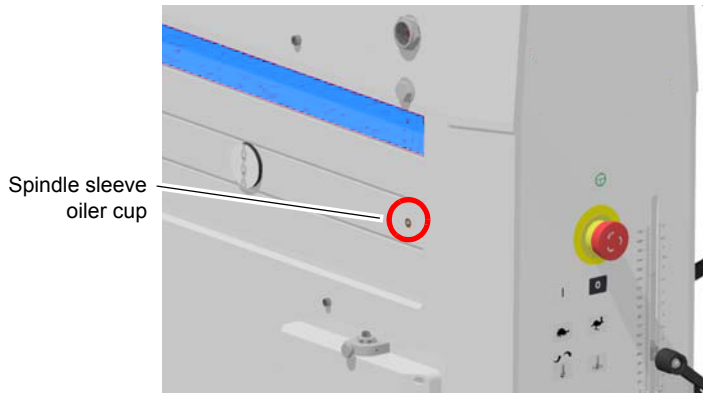
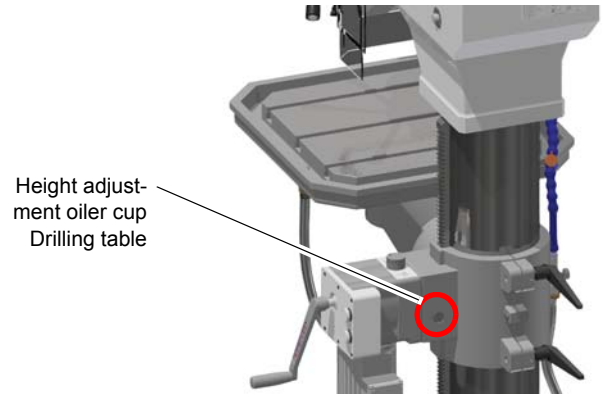
Before starting the machine you must be sure that

- ❍ **no dangers generated for persons,**
- ❍ **the machine is not damaged.**

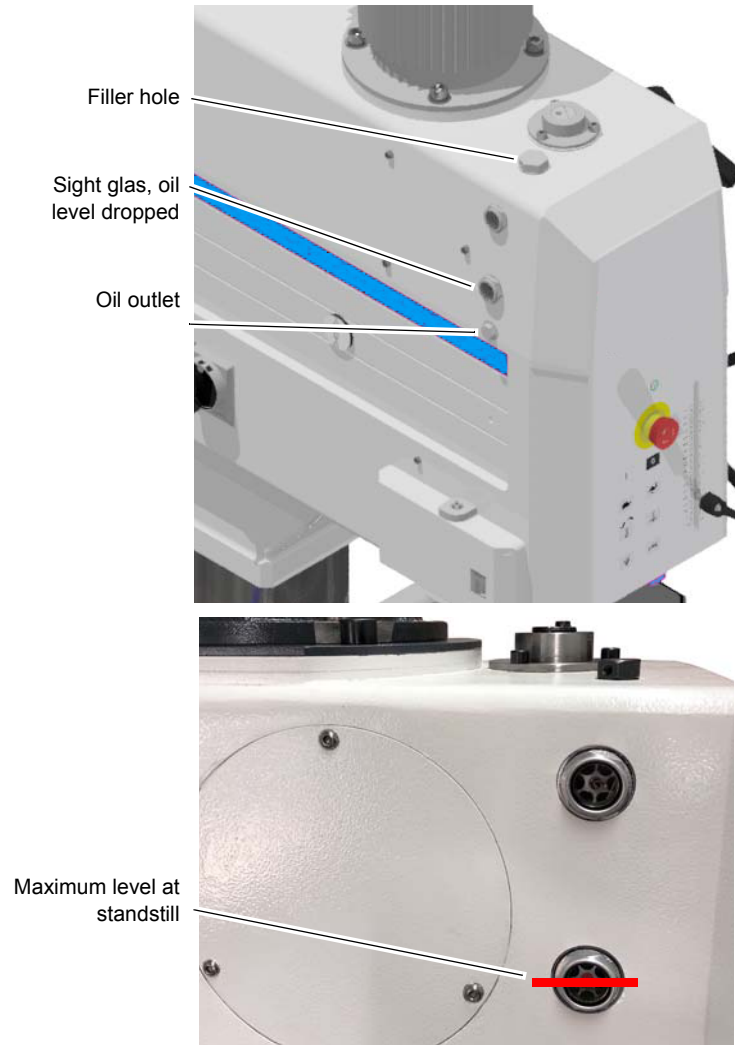
6.2 Inspection and maintenance

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.

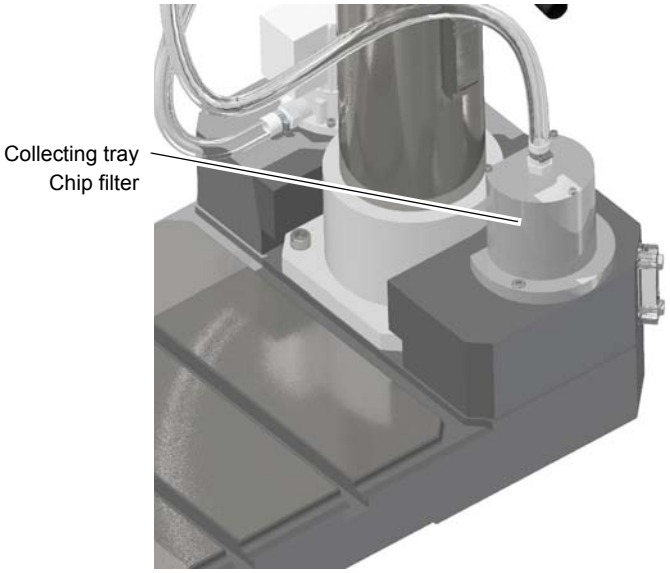
Interval	Where?	What ?	How?
Start of shift After each maintenance or repair work	**Geared drill**	Examination for outside damages. ☞ "Safety check“ on page 12	
Every month	**Drill column and toothed rack**	**Oiling**	➜ Lubricate the drill column regularly with commercial oil, machine oil, engine oil. ➜ Lubricate the toothed rod regularly with commercial grease (e.g. friction bearing grease).

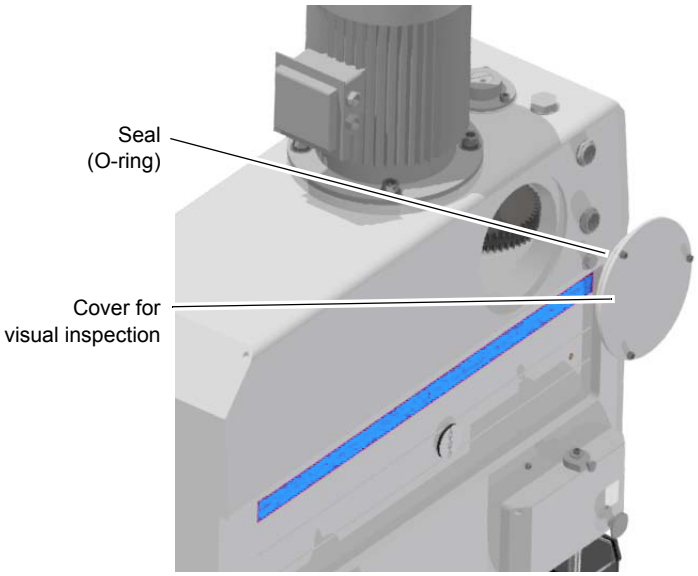
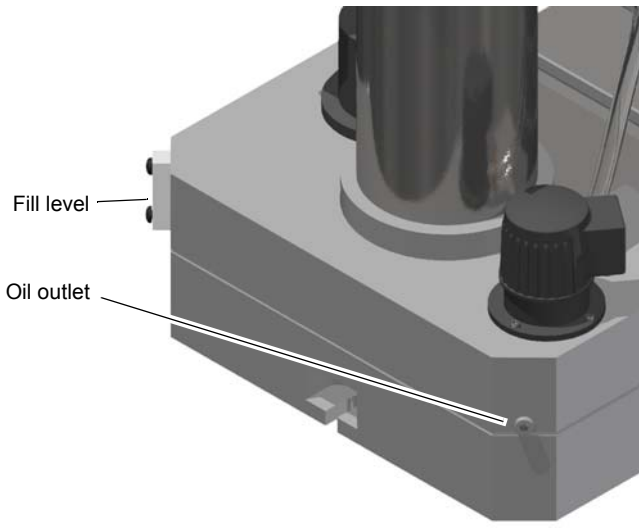
Interval	Where?	What ?	How?
Every month	**Oiler cup**	**Oiling**	Lubricate all oiler cups on, ❍ drilling table height adjustment, ❍ spindle sleeve, with machine oil, do not use grease guns or the like. ☞ "Operating material“ on page 17  

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 6 litres 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

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.  Img.6-2: Chip filter

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 fixing screws to press off the cover.
at least annually	Cooling lubricant system	Replace Cleaning	☞ "Cooling lubricants and tanks“ on page 43 ☞ "Inspection plan for water-mixed cooling lubricants“ on page 44 

Interval	Where?	What ?	How?
based on operator's historic values in accordance with German DGUV (BGV A3)	Electronics	Electrical inspection	☞ "Obligations of the operating company“ on page 10 ☞ "Electronics“ on page 14
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. Con-tact your specialist dealer if you do not have customer service's information or contact company who can provide you with a specialist dealer's contact informa-tion. Optionally, the can provide a customer service technician, however, the request for a customer service techni-cian 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.

Company 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 company.

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.

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:

7 Malfunctions

Malfunction	Cause/ possible effects	Solution
Motor is hot	• Wrong electrical connection of 400V machines	•
Automatic feed does not work. Spindle running will switched off.	• Wrong direction of spindle rotation • Wrong phase sequence • Electromagnetic clutch is damaged	• Switch to correct spindle rotation • Check electrical connection • Replace clutch
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
The drill chuck or the taper mandrel cannot be inserted.	• 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 • Locking pin for integrated drill drift in drift position	• Have it checked by qualified • Close drill chuck guard • Check the position of locking pin
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
The drilling spindle cannot be moved downwards.	• Integrated drill drift in drift position • Drill depth adjustment no released	• Position the integrated drill drift properly • Release drill depth adjustment

Malfunction	Cause/ possible effects	Solution
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 Spare parts

8.1 *Ordering spare parts*

Please indicate the following :

- ❍*Serial No.*
- ❍*Machines name*
- ❍*Date of manufacture*
- ❍*Article no.*

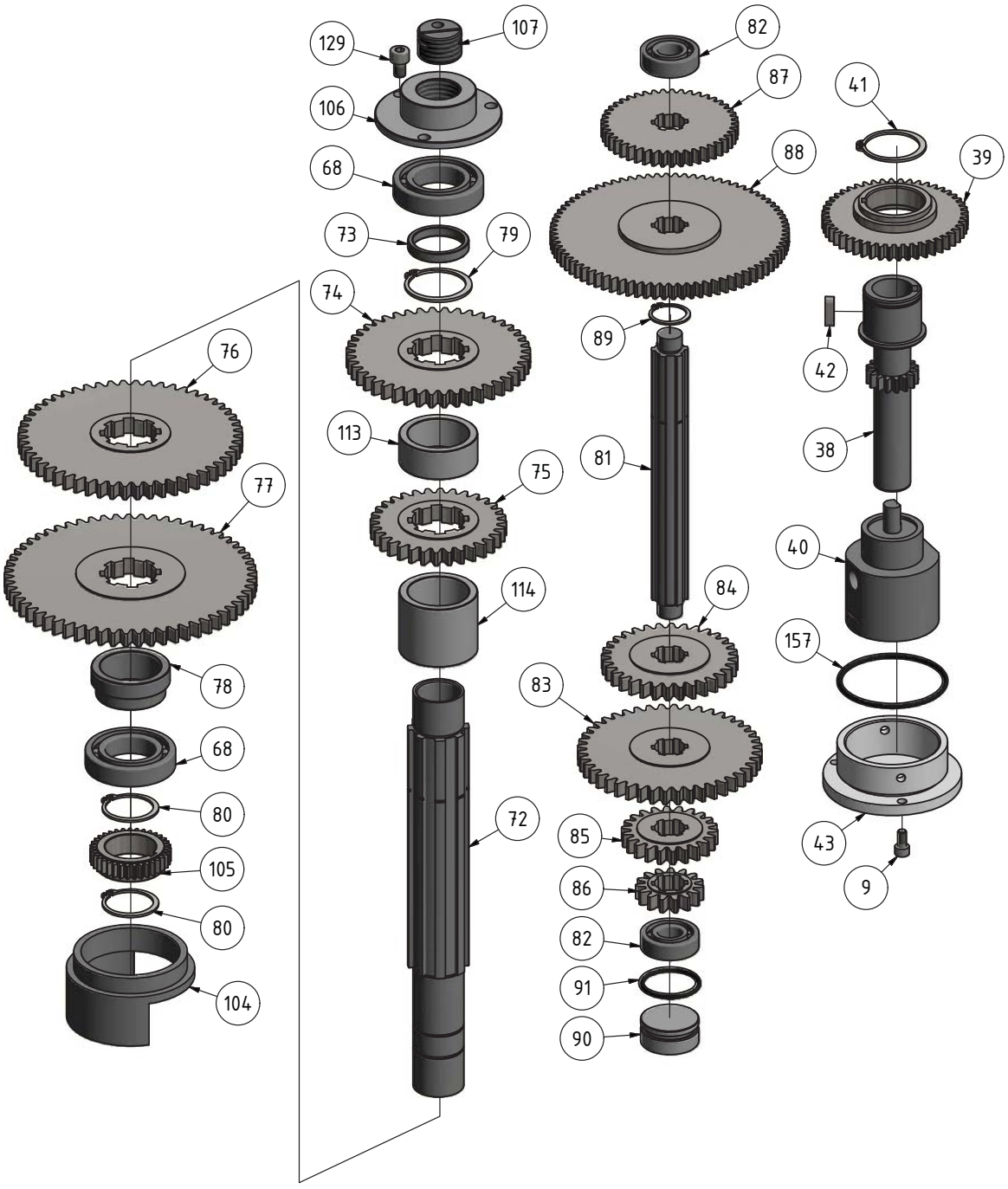
Die Seriennummer befindet sich am Typenschild. *The serial no. is on the type plate.*

8.2 Electrical spare parts

Wiring diagram
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.

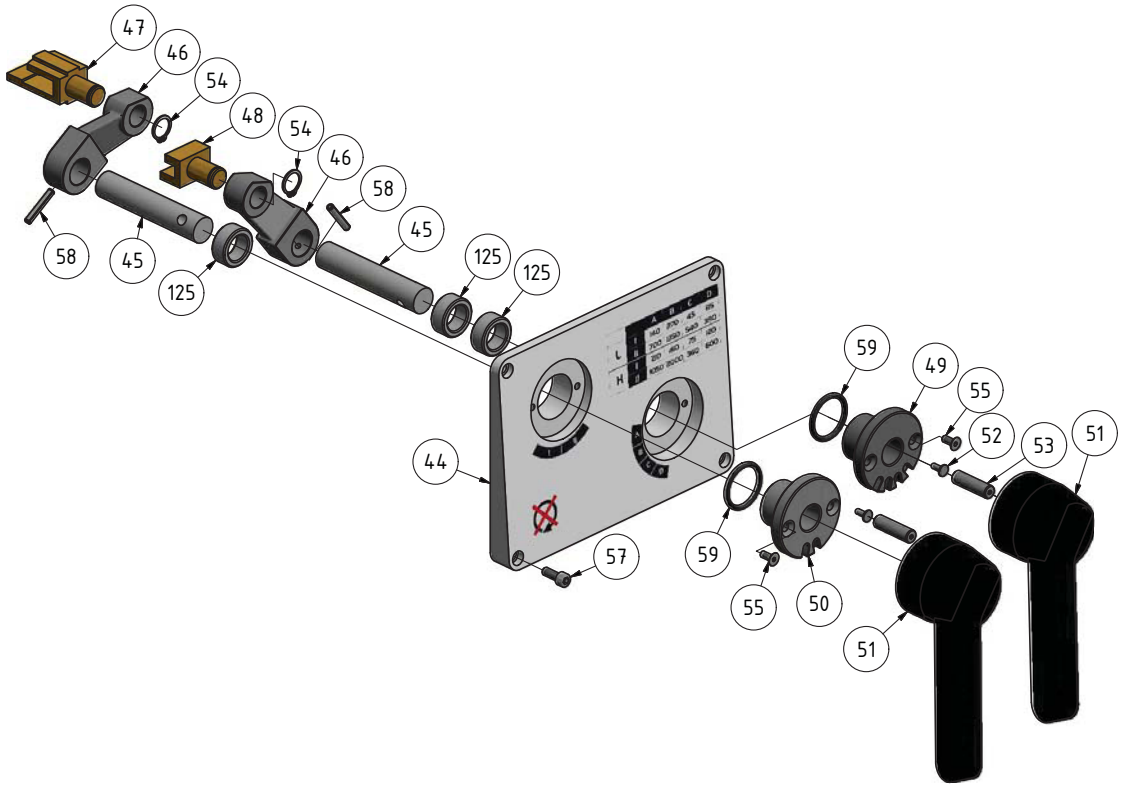
8.3 DH55G

8.3.1 Gear part A



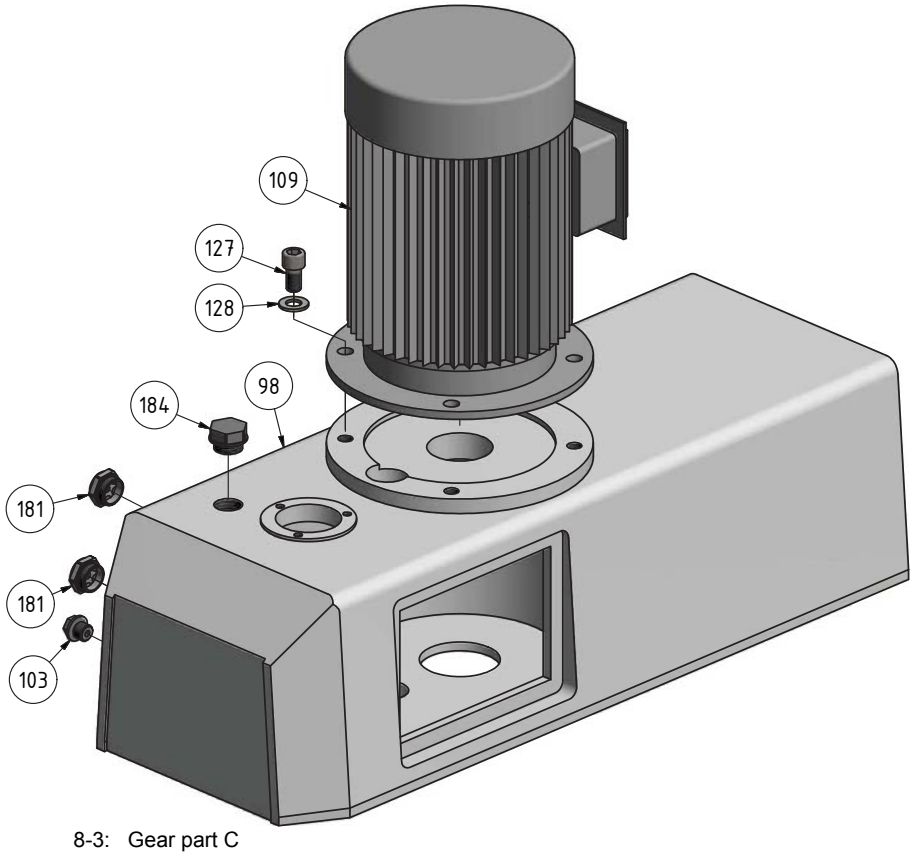
8-1: Gear part A

8.3.2 Gear part B



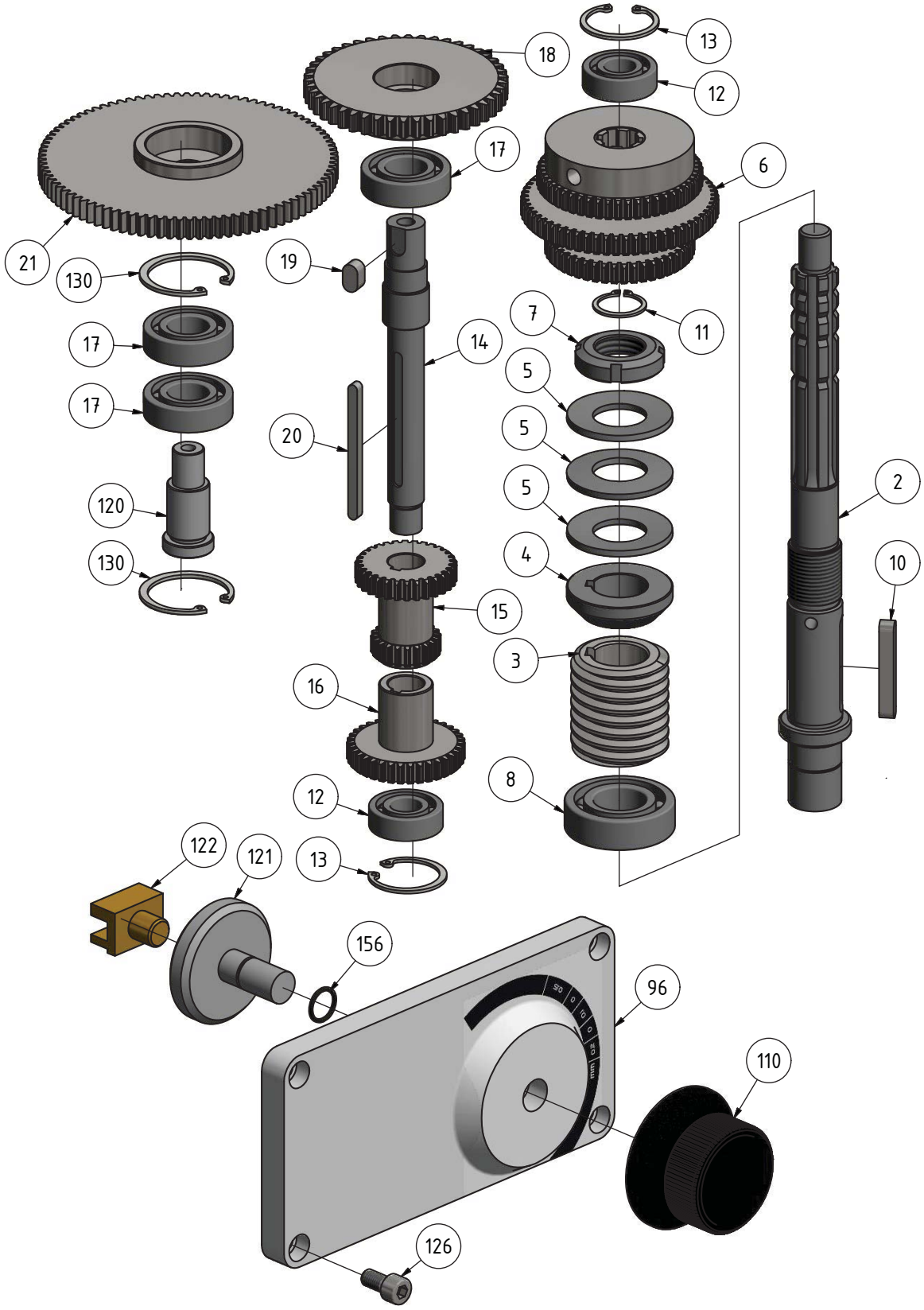
8-2: Gear part B

8.3.3 Gear part C



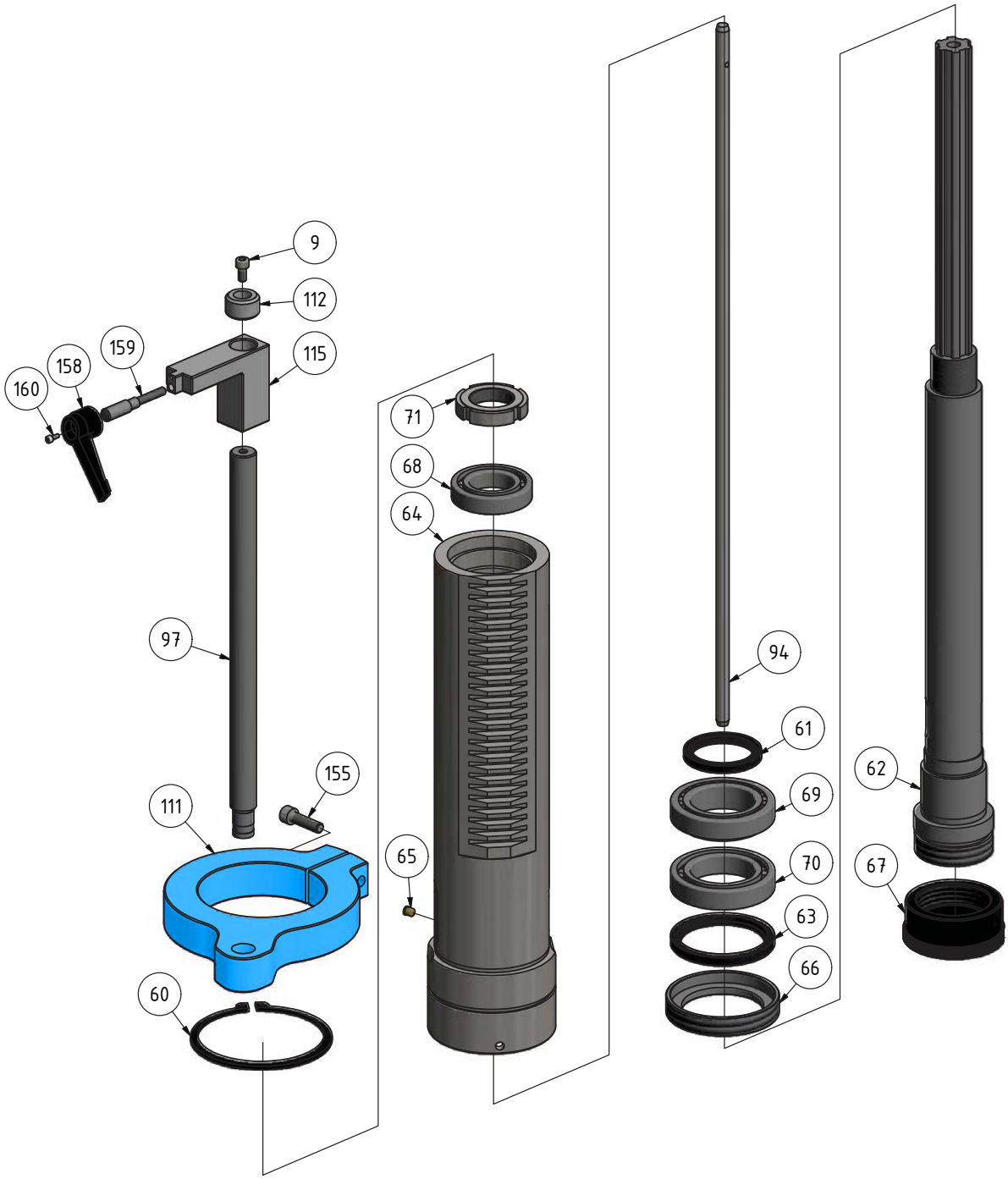
8-3: Gear part C

8.3.4 Gear part D



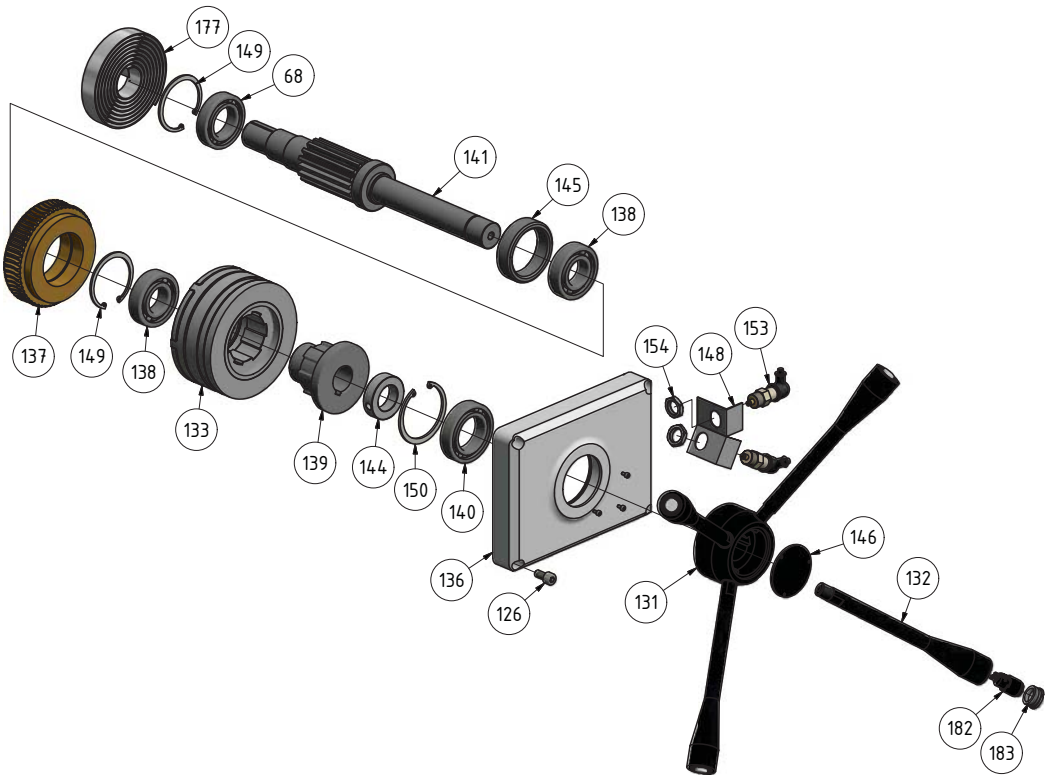
8-4: Getriebe Teil D - Gear part D

8.3.5 Gear part E



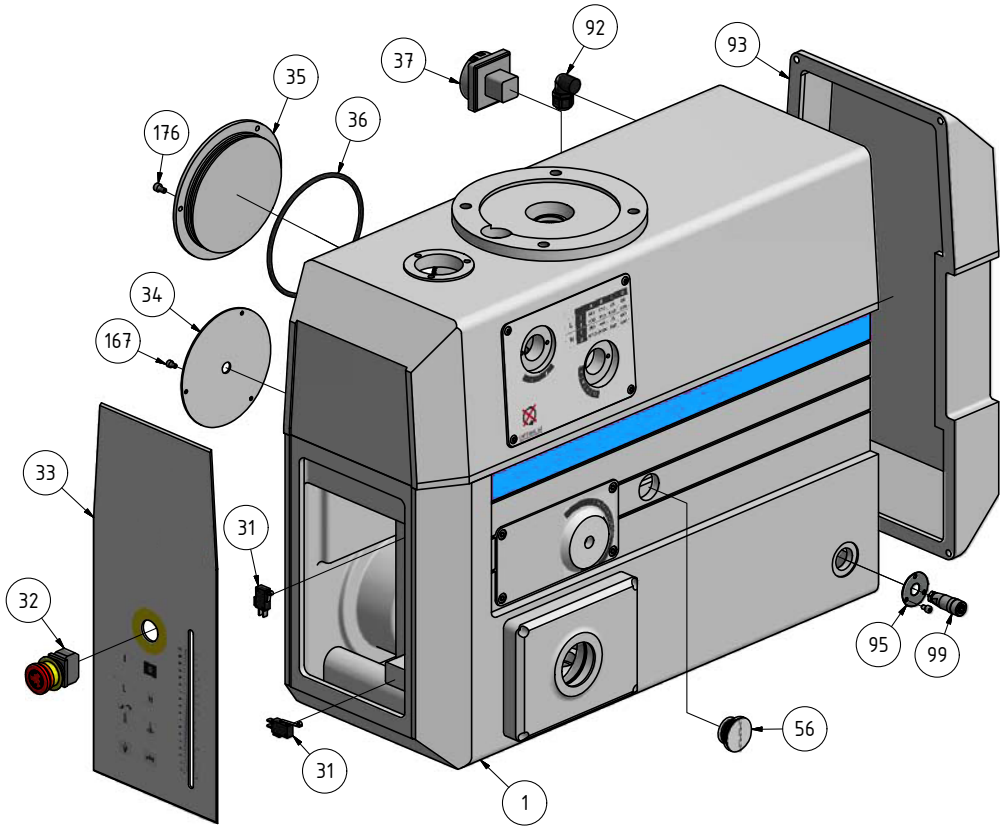
8-5: Gear part E

8.3.6 Gear part F



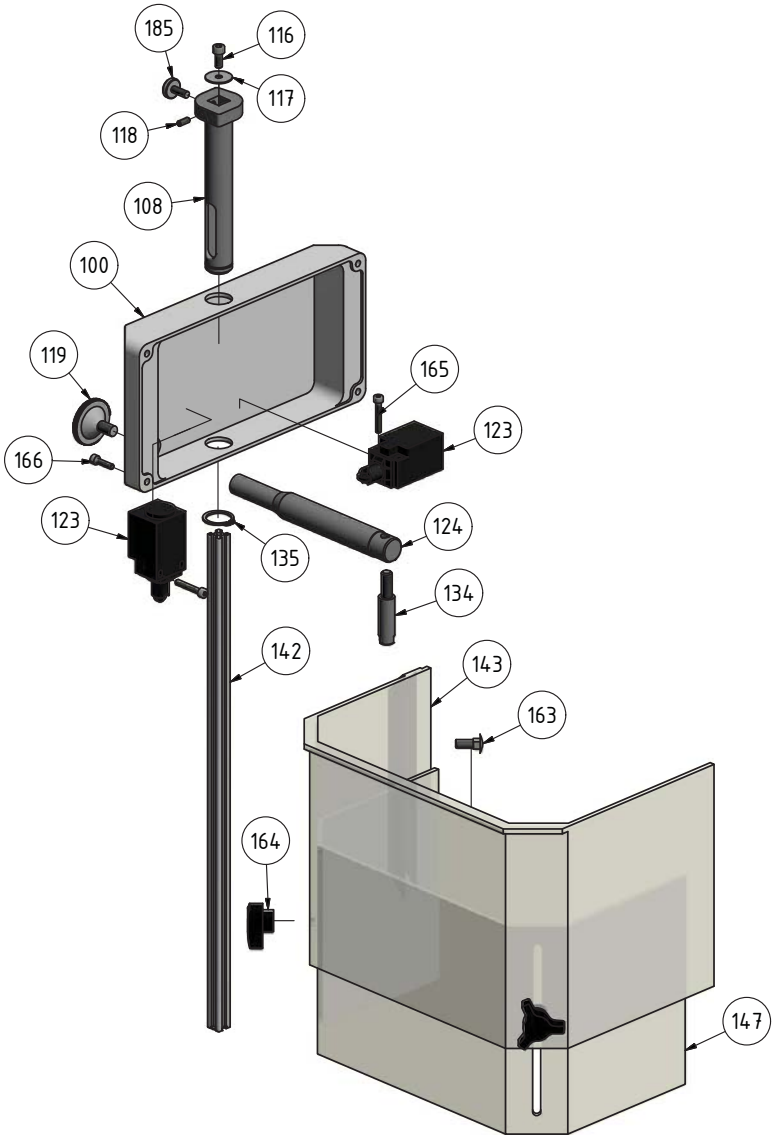
8-6: Gear part F

8.3.7 Gear part G



8-7: Gear part G

8.3.8 Drill chuck protection



8-8: Gear part H

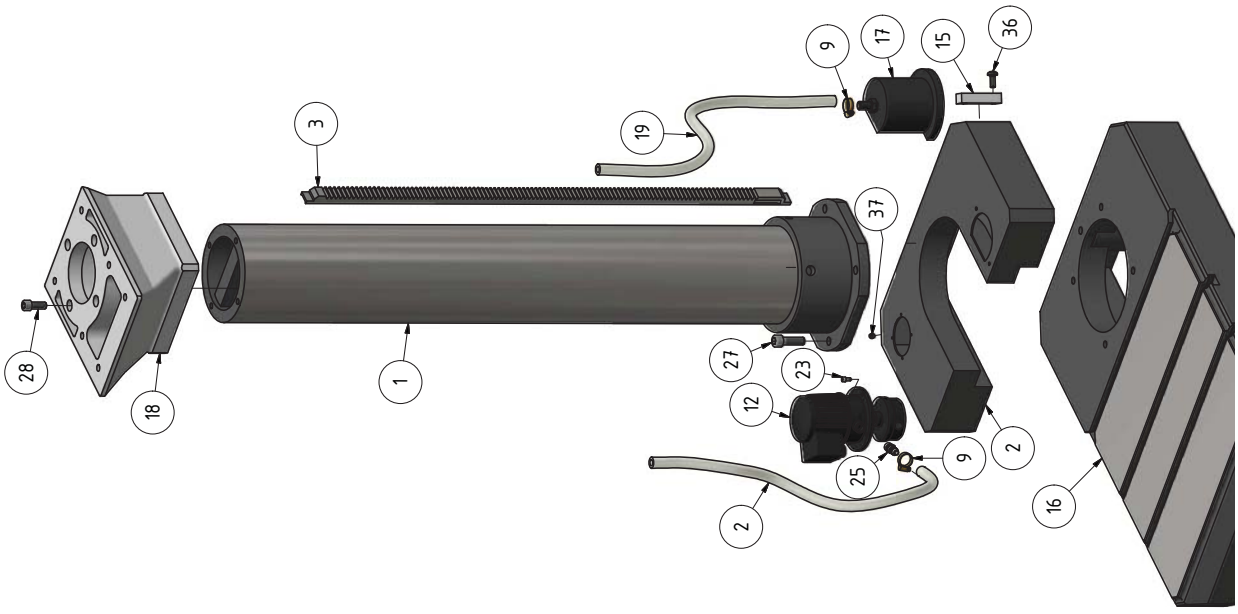
Spare part list

Pos.	Description	Qty.	Size	Item no.
1	Housing	1		0303426501
2	Shaft	1		0303426502
3	Worm	1		0303426503
4	Plug	2		0303426504
5	Plate spring	3		0303426505
6	Gear	1		0303426506
7	Groove nut	1	M25X1.5	0303426507
8	Ball bearing	1	6205	0406205
9	Socket head screw	7	ISO 4762 - M6 x 12	
10	Fitting key	1	DIN 6885 - A 8 x 7 x 50	0303426510
11	Retaining ring	1	DIN 471 - 22x1,2	0303426511
12	Ball bearing	2	6202	0406202
13	Retaining ring	2	DIN 472 - 35 x 1,5	0303426513
14	Shaft	1		0303426514
15	Gear	1		0303426515
16	Gear	1		0303426516
17	Ball bearing	3	6004	0406004
18	Gear	1		0303426518
19	Fitting key	1	DIN 6885 - A 8 x 7 x 18	0303426519
20	Fitting key	1	DIN 6885 - A 5 x 5 x 50	0303426520
21	Gear	1		0303426521
31	Micro switch	1		0303426531
32	Emergency stop button	1		0303426532
33	Control panel	1		0303426533
34	Cover	1		0303426534
35	Cover	1		0303426535
36	O-ring	1		0303426536
37	Main switch	1		0303426537
38	Shaft	1		0303426538
39	Gear	1		0303426539
40	Block	1		0303426540
41	Retaining ring	1	DIN 471 - 40x1,75	0303426541
42	Fitting key	1	DIN 6885 - A 6 x 6 x 22	0303426542
43	Flange	1		0303426543
44	Cover	1		0303426544
45	Shaft	2		0303426545
46	Plate	2		0303426546
47	Fork	1		0303426547
48	Fork	1		0303426548
49	Flange	1		0303426549
50	Flange	1		0303426550
51	Lever	2		0303426551
52	Pin	2		0303426552
53	Pin	2		0303426553
54	Retaining ring	2	DIN 471 - 16x1	0303426554
55	Screw	4	DIN 7991 - M5x12	0303426555
56	Plug	2		0303426556
57	Socket head screw	2	ISO 4762 - M6 x 16	0303426557
58	Spring pin	2	ISO 8752 - 5 x 30	0303426558
59	O-ring	2	DIN 3771 - 30 x 3,55	0303426559
60	Retaining ring	1		0303426560
61	Seal	1		0303426561
62	Drill spindle	1		0303426562
63	Seal	1		0303426563
64	Sleeve	1		0303426564
65	Lubrication cup	1		0303426565
66	Clamping nut	1		0303426566
67	Sleeve	1		0303426567
68	Ball bearing	4	6007	0406007
69	Taper roller bearing	1	32010	04032010
70	Taper roller bearing	1	6010	0406010
71	Groove nut	1	DIN 1804 - M35	0303426571
72	Shaft	1		0303426572
73	Ring	1		0303426573
74	Gear	1		0303426574
75	Gear	1		0303426575
76	Gear	1		0303426576
77	Gear	1		0303426577
78	Sleeve	1		0303426578
79	Retaining ring	1	DIN 471 - 42x1,75	0303426579
80	Retaining ring	2	DIN 471 - 35x1,5	0303426580
81	Shaft	1		0303426581
82	Ball bearing	2	6203	0406203
83	Gear	1		0303426583
84	Gear	1		0303426584
85	Gear	1		0303426585
86	Gear	1		0303426586
87	Gear	1		0303426587
88	Gear	1		0303426588
89	Retaining ring	1		0303426589
90	Plug	1		0303426590
91	O-ring	1	DIN 3771 - 35,5 x 3,55	0303426591
92	Strain	1		0303426592
93	Cover	1		0303426593
94	Rod	1		0303426594
95	Flange	1		0303426595
96	Cover	1		0303426596
97	Shaft	1		0303426597
98	Housing	1		0303426598
99	Connector plug	1		0303426599
100	Housing	1		03034265100
102	Plug screw	2		03034265102
103	Drain screw	1		03034265103

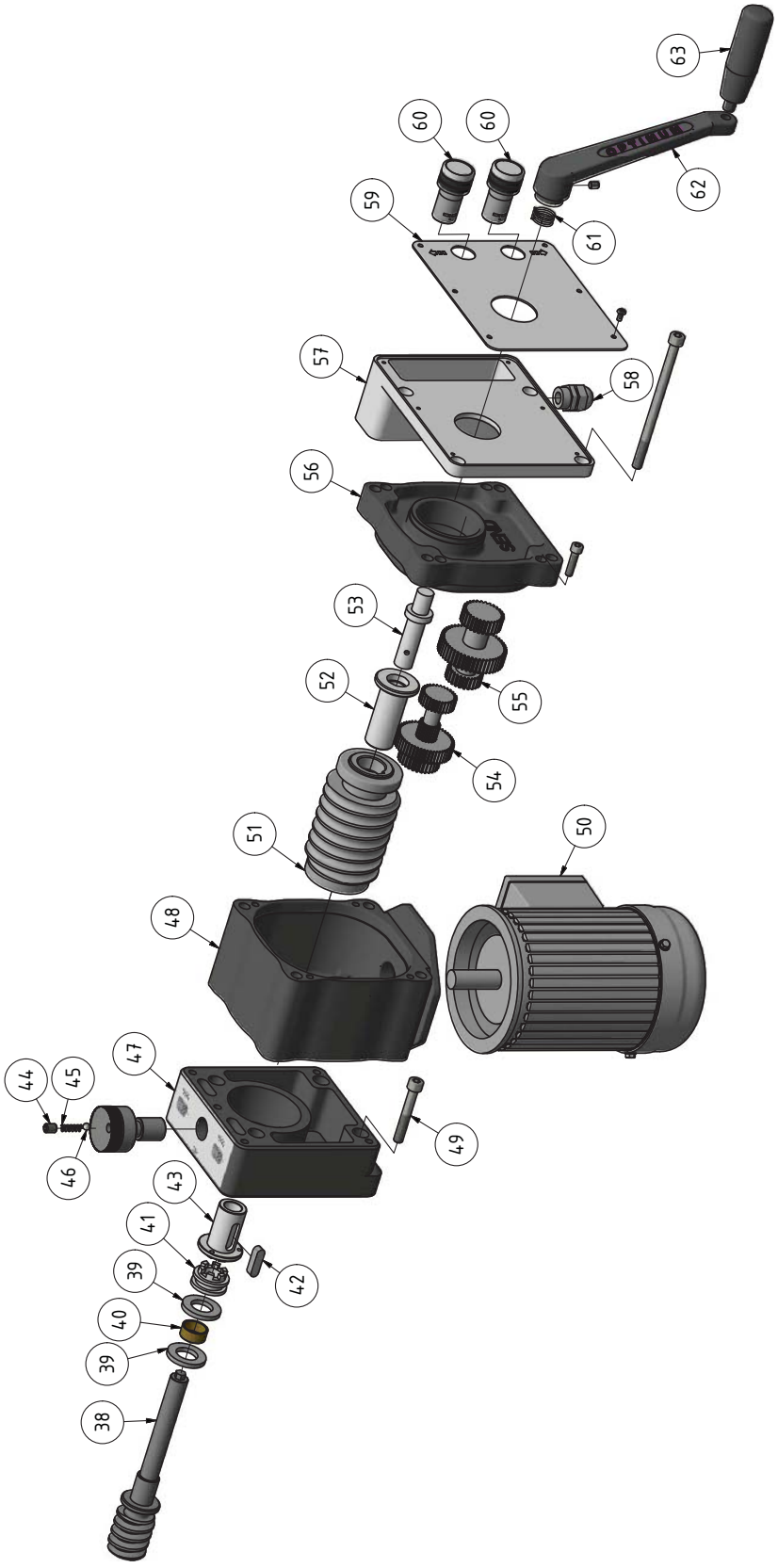
Spare part list				
Pos.	Description	Qty.	Size	Item no.
104	Sleeve	1		03034265104
105	Gear	1		03034265105
106	Flange	1		03034265106
107	Plug	1		03034265107
108	Sleeve	1		03034265108
109	Motor	1		03034265109
110	Mode switch	1		03034265110
111	Collet	1		03034265111
112	Bushing	1		03034265112
113	Bushing	1		03034265113
114	Bushing	1		03034265114
115	Holder	1		03034265115
116	Screw	1		03034265116
117	Washer	1		03034265117
118	Grub screw	1		03034265118
119	Knob	1		03034265119
120	Shaft	1		03034265120
121	Eccentric	1		03034265121
122	Fork	1		03034265122
123	Switch	2		03034265123
124	Shaft	1		03034265124
125	Bushing	3		03034265125
126	Socket head screw	8	ISO 4762 - M8 x 16	
127	Socket head screw	4	ISO 4762 - M14 x 25	
128	Washer	4	DIN 125 - A 15	
129	Socket head screw	3	ISO 4762 - M8 x 12	
130	Retaining ring	2	DIN 472 - 42 x 1,75	03034265130
131	Hub	1		03034265131
132	Clamping lever	4		03034265132
133	Magnetic clutch	1		03034265133
134	Bolt	1		03034265134
135	Retaining ring	1		03034265135
136	Cover	1		03034265136
137	Worm gear	1		03034265137
138	Ball bearing	2	6206	03034265138
139	Bushing	1		03034265139
140	Ball bearing	1	6008	03034265140
141	Shaft	1		03034265141
142	Aluminium rod	1		03034265142
143	Drill chuck cover	1		03034265143
144	Ring	1		03034265144
145	Ring	1		03034265145
146	Cover	1		03034265146
147	Drill chuck cover	1		03034265147
148	Holder	1		03034265148
149	Retaining ring	2	DIN 472 - 62 x 2	03034265149
150	Retaining ring	1	DIN 472 - 68 x 2,5	03034265150
153	Brush	2		03034265153
154	Hexagon nut	2		03034265154
155	Socket head screw	1	ISO 4762 - M8 x 30	
156	O-ring	1	DIN 3771 - 14 x 1,8	03034265156
157	O-ring	1	DIN 3771 - 69 x 3,55	03034265157
158	Clamping lever	1		03034265158
159	Bolt	2		03034265159
160	Socket head screw	1	ISO 4762 - M3 x 8	
163	Bolt	2		03034265163
164	Clamping lever	2		03034265164
165	Screw	4		03034265165
166	Screw	4		03034265166
167	Screw	6	M5x10	03034265167
168	Socket head screw	4	ISO 4762 - M4 x 16	
176	Screw	3		03034265176
177	Retaining spring	1		03034265177
180	Socket head screw	3	ISO 4762 - M3 x 6	
181	Oil sight glass	1		03034265181
182	Feed button	4		03034265182
183	Plug	4		03034265183
184	Plug screw	1		03034265184
185	Clamping screw	1		03034265185

8.3.9 Drill column and table

8-9: Drill column and table



8-10: Drill column and the table

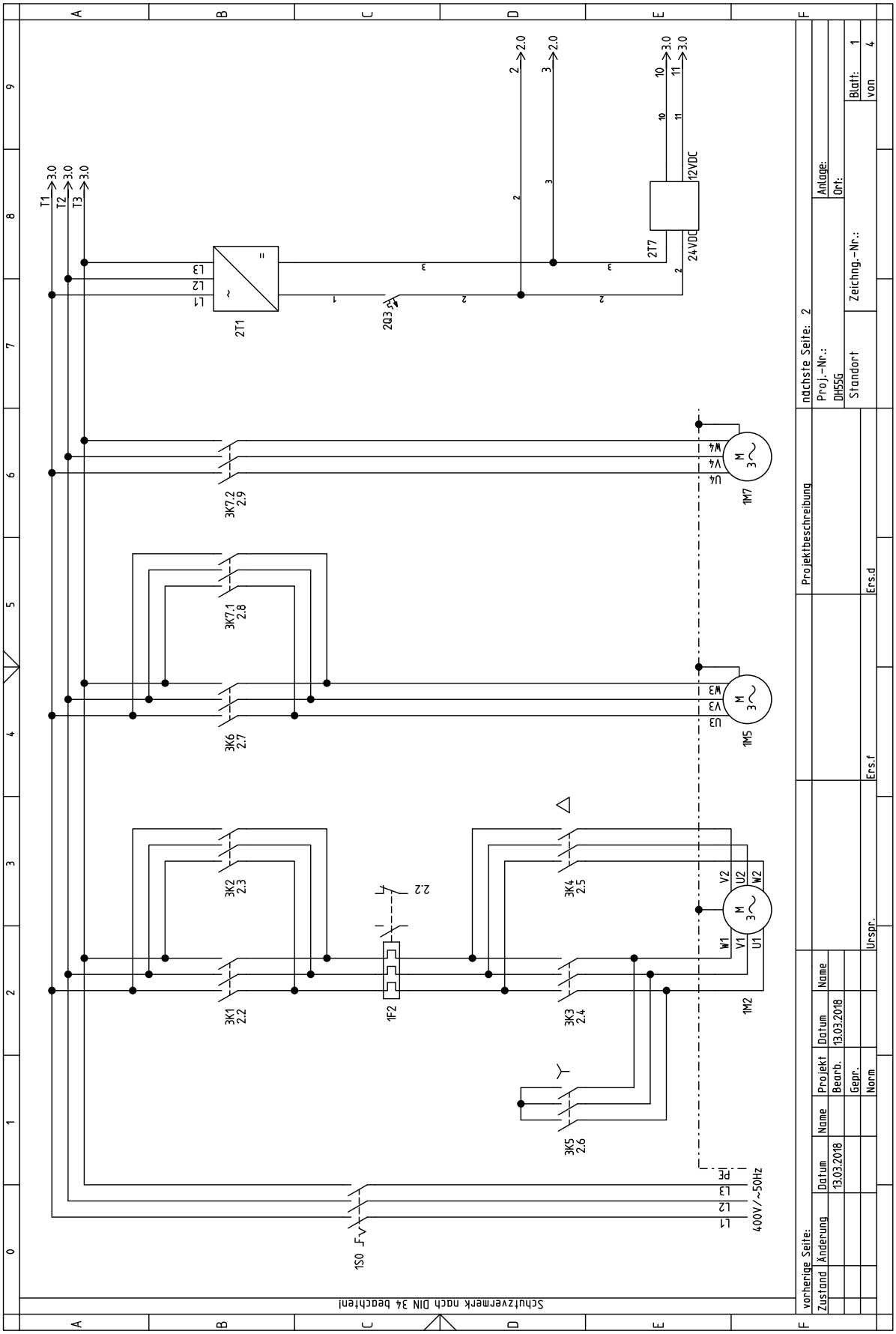


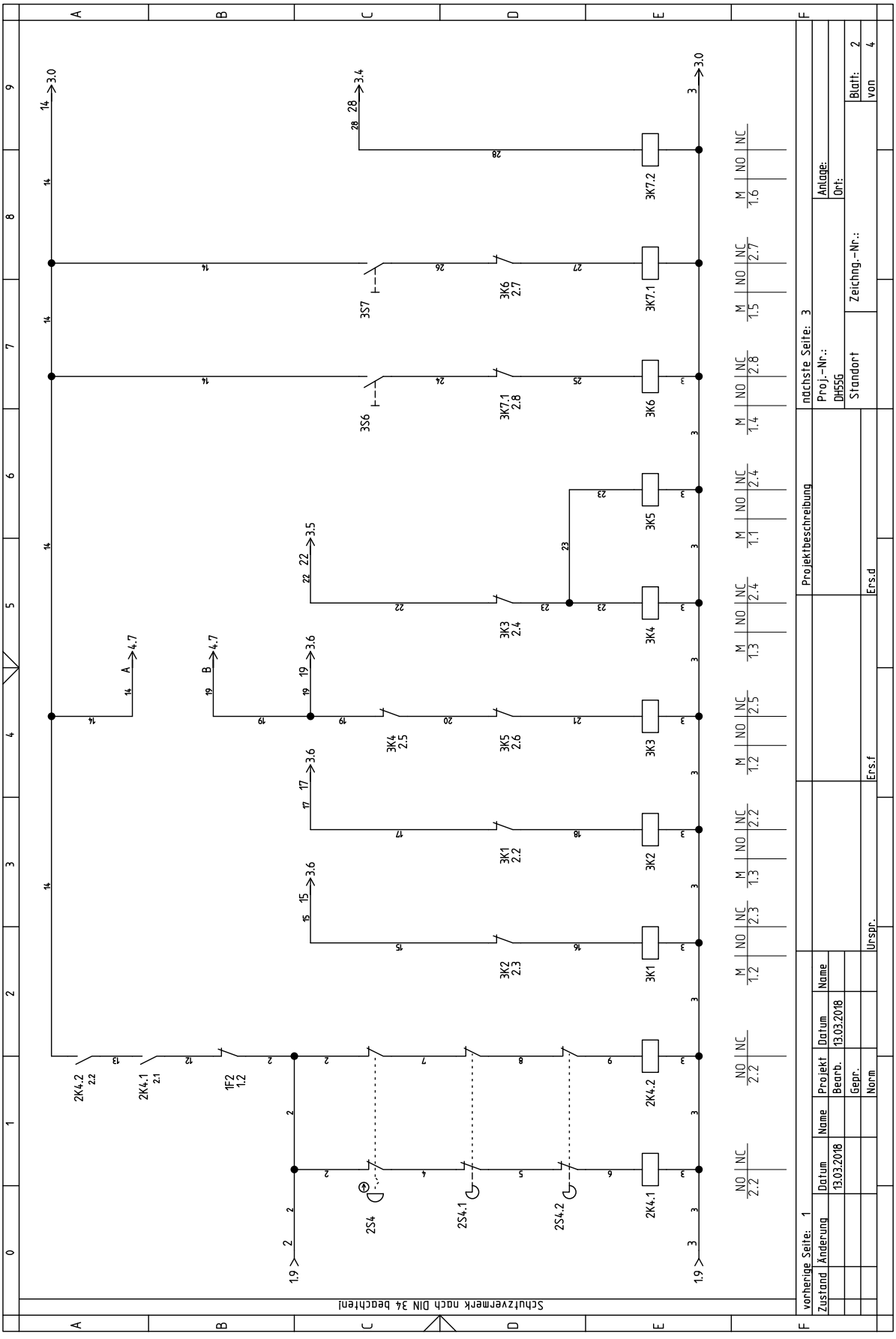
8-11: Drill column and the table

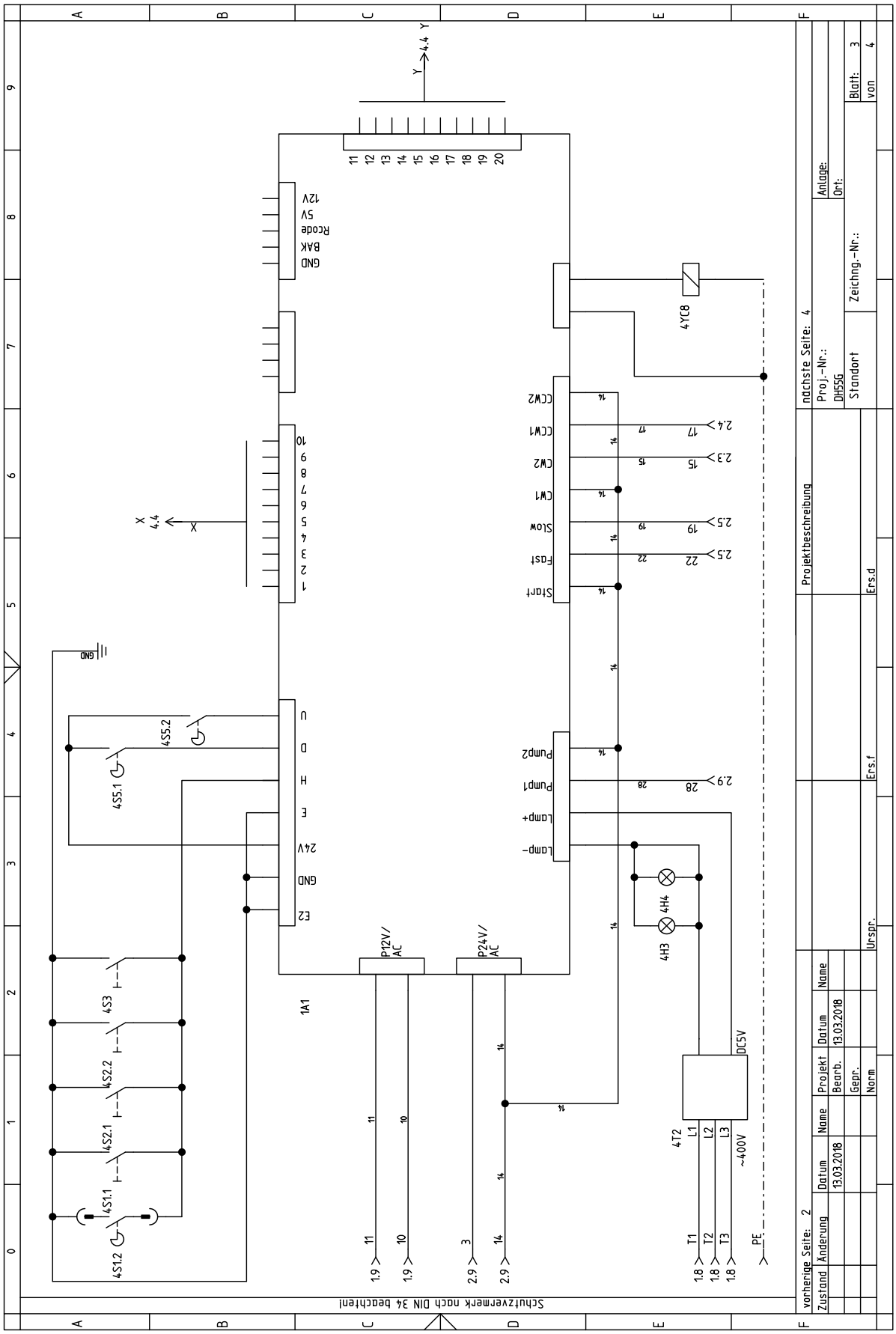
Spare part list drill column, drill table

Pos.	Description	Qty.	Size	Item no.
1	Column	1		03034265101
2	Coolant hose	1		03034265102
3	Rack	1		03034265103
4	Holder	1		03034265104
5	Drill table	1		03034265105
6	Gear	1		03034265106
7	Bolt	1		03034265107
8	Plug	1		03034265108
9	Coolant hose clamp	4		03034265109
10	Coolant hose	1		03034265110
11	Holder	1		03034265111
12	Coolant pump	1		03034265112
13	Bolt	3		03034265113
14	Washer	3		03034265114
15	Sight glass	1		03034265115
16	Drill foot	1		03034265116
17	Filter	1		03034265117
18	Holder	1		03034265118
19	Coolant hose	1		03034265119
20	Lubrication cup	2		03034265120
21	Guide	1		03034265121
22	Clamping lever	3		03034265122
23	Socket head screw	1	ISO 4762 - M6 x 12	
24	Tube	1		03034265124
25	Plug	2		03034265125
26	Grub screw	1		03034265126
27	Socket head screw	4	ISO 4762 - M16 x 50	
28	Socket head screw	5	ISO 4762 - M14 x 35	
29	Screw	3	4512664-1	03034265129
30	Screw	3	DIN 125 - A 17	
31	Hexagon nut	3	ISO 4032 - M16	
32	Hexagon nut	1	ISO 4032 - M8	
33	Socket head screw	1	ISO 4762 - M8 x 30	
34	Socket head screw	2	ISO 4762 - M6 x 20	
35	Clamping screw	1		03034265135
36	Screw	2		03034265136
37	Plug screw	1		03034265137
38	Shaft	1		03034265138
39	Washer	2		03034265139
40	Bushing	1		03034265140
41	Clutch	1		03034265141
42	Fitting key	1		03034265142
43	Clutch	1		03034265143
44	Grub screw	1		03034265144
45	Spring	1		03034265145
46	Mode switch	1		03034265146
47	Plate	1		03034265147
48	Housing	1		03034265148
49	Screw	4		03034265149
50	Motor	1		03034265150
51	Shaft	1		03034265151
52	Sleeve	1		03034265152
53	Shaft	1		03034265153
54	Gear shaft	1		03034265154
55	Gear shaft	1		03034265155
56	Cover	1		03034265156
57	Cover	1		03034265157
58	Strain	1		03034265158
59	Cover	1		03034265159
60	Button	2		03034265160
61	Spring	1		03034265161
62	Crank	1		03034265162
63	Handle	1		03034265163

8.4 Schaltplan - Wiring diagram




Schutzvermerk nach DIN 34 beachten!
vorherige Seite: 1
nächste Seite: 3
Projektbeschreibung
Anlage:
Ort:
Proj.-Nr.: DH55G
Standort
Zeichng.-Nr.:
Blatt: 2
von 4
Ers.f
Ers.d
Ursprung
Norm
Gepr.
Bearb. 13.03.2018
Projekt
Datum
Name
Zustand
Änderung
2K4.2 2.2
2K4.1 2.1
1F2 1.2
2S4
2S4.1
2S4.2
2K4.1
2K4.2
3K1
3K2
3K3
3K4
3K5
3K6
3K7.1
3K7.2
3S6
3S7
1.9
3.0
3.4
3.5
3.6
4.7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Projektbeschreibung
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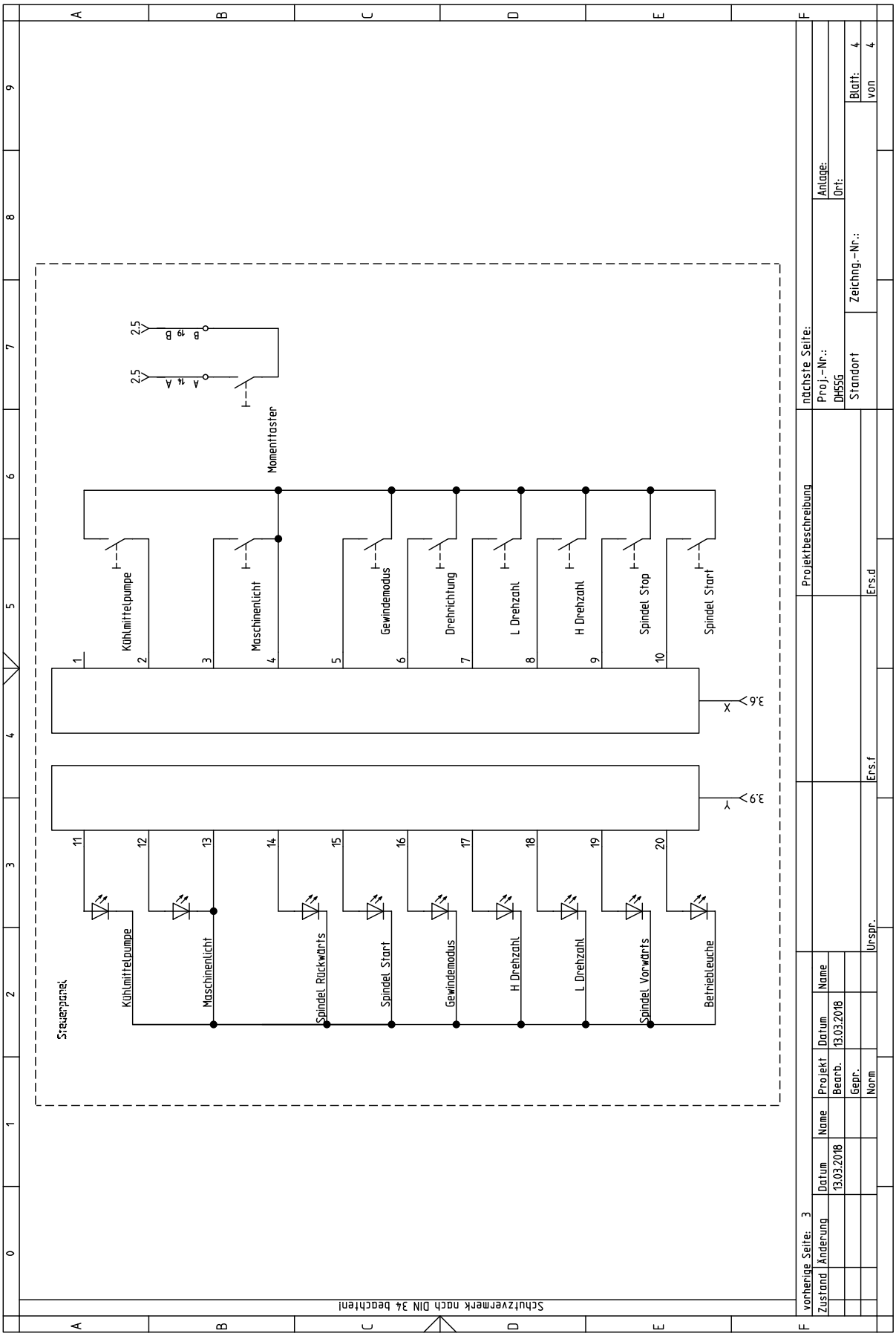
Proj.-Nr.: DH55G
Standort
Zeichng.-Nr.:
Anlage:
Ort:
Blatt: 3
von 4
vorherige Seite: 2
Zustand
Änderung
Datum
Name
Projekt
Bearb.
Gepr.
Norm
13.03.2018
Ursprr.
Ers.f
Ers.d
1A1
4S1.1
4S1.2
4S2.1
4S2.2
4S3
4S5.1
4S5.2
4H3
4H4
4T2
4YC8
GND
24V
DC5V
~400V
PE
P12V/ AC
P24V/ AC
Start
Fast
Slow
CW1
CW2
CCW1
CCW2
Pump1
Pump2
Lamp+
Lamp-
GND
BAK
Rcode
5V
12V


Schutzvermerk nach DIN 34 beachten!
Steuerpanel
Kühlmittelpumpe
Maschinenlicht
Spindel Rückwärts
Spindel Start
Gewindemodus
H Drehzahl
L Drehzahl
Spindel Vorwärts
Betriebsleuche
Momenttaster
Kühlmittelpumpe
Maschinenlicht
Gewindemodus
Drehrichtung
L Drehzahl
H Drehzahl
Spindel Stop
Spindel Start
3.6
3.9
Projektbeschreibung
nächste Seite:
Proj.-Nr.:
DH55G
Standort
Anlage:
Ort:
Zeichng.-Nr.:
Blatt: 4
von 4
vorherige Seite: 3
Zustand
Änderung
Datum
Name
Projekt
Bearb.
Gepr.
Norm
Ursprr.
Ers.f
Ers.d

Electrical spare parts				
Pos.	Description	Qty.	Size	Item no.
1S0	Main switch	1		0303426537
1M2	Spindle motor	1	230V 3PH	414822400
1F2	Motor protection switch	1		030342651F2
1M5	Motor table adjustment	1	230V 3PH	720000420
1M7	Engine coolant pump	1	230V 3PH	720402200
2Q3	Breaker	1		030342652Q3
2T1	Power supply	1	DRP024V 120W 1AA	771400113
2T7	Power supply 24 / 12VDC	1		030342652T7
2S4	Emergency stop switch	1		0303426532
2S4.2	Switch tool driver	2		03034265123
2S4.1	Switch drill chuck protection			
2K4.1 2K4.2	Relay safety control	2		030342652K4
3K1	Contactor forward	7		030342653K1
3K2	Contactor backwards			
3K3	Contactor triangle running			
3K4	Schütz star run			
3K5	Schütz star run			
3K6	Contactor Drilling table adjustment			
3K7.1	Contactor Drilling table adjustment			
3K7.2	Contactor coolant pump			
3S6 3S7	Push-button for drilling table adjust-ment	2		03034265160
4S1.2	Switch foot pedal (option)	1		0303426599
4S1.1 4S2.1 4S2.2 4S3	Feed button	4		03034265182
4T2	Power adapter	1		030342654T2
4H3 4H4	Machine lamp	2		030342654H3
1A1	Control board	1		030342651A1
4S5.1	Limit switch lower position	2		0303426531
4S5.2	Limit switch upper position			
4YC8	Electromagnet feed	1		03034265133

Schmierstoffe Lubricant Lubrifiant	Viskosität Viskosity Viscosité ISO VG DIN 51519 mm²/s (cSt)	Kennzeichnung nach DIN 51502	ARAL	BP	Esso	KLÜBER LUBRICATION	Mobil	Shell	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

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 glissières	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 Hochfrequenz-spindeln 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 Zentralschmierung (Fließfett) Grease for central lubrication Graisse pour lubrification centrale	NLGI Klasse 000 NLGI class 000		ARALUB BAB 000	Grease EP 000	Shell Gadus S4 V45AC	CENTO-PLEX GLP 500	Mobilux EP 023		Multifak 264 EP 000
Fett für Hochfrequenz-spindeln Grease for Built-in spindles Graisse pour broches à haute vitesse	METAFLUX-Fett-Paste (Grease paste) Nr. 70-8508 METAFLUX-Moly-Spray Nr. 70-82 Techno Service GmbH ; Detmolder Strasse 515 ; D-33605 Bielefeld ; (++49) 0521- 924440 ; www.metaflux-ts.de								
Kühlschmiermittel Cooling lubricants Lubrifiants de refroidis-sement			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.

9.4 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

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

- Maximum stacking height

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

Consult company if the machine and accessories are stored for more than three months or are stored under different environmental conditions than those spec-ified 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 gener-ally 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 manage-ment. 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.

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 sepa-rate 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 collec-tion station or the shop where you have purchased the product.