quantum
MASCHINEN - GERMANY

Operating manual

Version 1.2.1

Geared drill

◯ B28 GS

◯ B30 GS

◯ B30 GT

Keep for future reference!

Table of Contents

1 Safety

Glossary of symbols

☞	gives additional indications
➔	calls on you to act
•	Enumerations

This part of the operating manual

- explains the meaning and use of the warning references contained in the operating manual,
- explains how to use the geared drill properly,
- highlights the dangers that might arise for you or others if these instructions are not obeyed,
- tells you how to avoid dangers.

In addition to this operating manual please observe

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

European standards must be observed during installation, operation, maintenance and repair of the geared drill.

If European standards are not applied in the national legislation of the country of destination, the specific applicable regulations of each country must be observed.

Where necessary, the required measures must be taken to comply with the specific regulations of each country before the geared drill is first used.

ALWAYS KEEP THIS DOCUMENT CLOSE TO THE GEARED DRILL FOR FUTURE REFERENCE.

INFORMATION

If you are unable to solve a problem using this manual, please contact us for advice:

OPTIMUM Maschinen GmbH
Dr. Robert-Pfleger-Str. 26

D96103 Hallstadt

1.1 Safety warnings (warning notes)

1.1.1 Classification of hazards

We classify the safety warnings into various levels. The table below gives an overview of the classification of symbols (pictograms) and warnings for the specific danger and its (possible) consequences.

Pictogram	Alarm expression	Definition/Consequences
	**DANGER!**	Imminent danger that will cause serious injury or death to personnel.
	Warning!	Risk: A danger that might cause serious injury or death to personnel.
	CAUTION!	Danger or unsafe procedure that might cause injury to personnel or damage to property.
	**ATTENTION!**	Situation that could cause damage to the machine and product and other types of damage. No risk of injury to personnel.
	**INFORMATION**	Application tips and other important or useful information and notes. No dangerous or harmful consequences for personnel or objects.

In the case of specific dangers, we replace the pictogram





or


General danger | with a warning of | injuries to hands, | hazardous electrical voltage, | rotating parts.

1.1.2 Other pictograms


Warning of automatic start-up!


Activation forbidden!


Disconnect the plug from the mains!


Use protective goggles!


Use ear protection!


Use protective gloves!


Use protective boots!


Wear a safety suit!


Protect the environment!


Contact address

1.2 Proper use

WARNING!

In the event of improper use, the machine

- **will endanger personnel,**
- **will endanger the machine and other material property of the operator,**
- **may affect proper operation of the machine.**

The geared drill is designed and manufactured to be used in environments where there is no potential danger of explosion. It may only be used for boring holes in cold metals or other non-flammable materials or that do not constitute a health hazard. It must only be used with rotating filing-stripping tools that have a number of grooves for collecting the filings.

The geared drill must only be used with a quick-action drill chuck. Drill chuck that require a key to secure the bit must not be used on this machine.

If the geared drill is used in any way other than as described above or modified without the authorisation of OPTIMUM Maschinen GmbH, then it is being used improperly. We do not take liability for damage caused by improper use.

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the machine and other material property,
- may affect proper operation of the machine.

We would like to stress that any modifications to the construction, or technical or technological modifications that have not been authorised by OPTIMUM Maschinen GmbH will also render the guarantee null and void.

It is also part of proper use that

- the maximum values for the machine are complied with,
- the operating manual is observed,
- inspection and maintenance instructions are observed.

☞ “Technical data“ on page 13

WARNING!

Very seriuos injury due to improper use.

It is forbidden to make any modifications or alterations to the operating values of the machine. These could endanger personnel and cause damage to the machine.

1.3 Possible dangers caused by the machine

The geared drill has undergone a safety inspection (analysis of danger with assessment of risks). It has been designed and built on the basis of this analysis using the latest technological advances.

Nonetheless, there remains a residual risk, since the machine operates with

- high revolutions,
- rotating parts,
- electrical voltage and currents.

We have used construction resources and safety techniques to minimise 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 operation or unsuitable maintenance.

WARNING!

THE GEARED DRILL MAY ONLY BE USED WITH THE SAFETY DEVICES ACTIVATED.

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

All additional installations carried out by the operator must incorporate the precribed safety devices.

As the machine operator, this will be your responsability! ☞ **“Safety devices“ on page 9**

INFORMATION

All personnel involved in assembly, commissioning, operation and maintenance must

- be duly qualified,
- follow this operating manual.

Disconnect the machine whenever cleaning or maintenance work is being carried out.

1.4 Qualification of personnel

1.4.1 Target group

This manual is addressed to

- operators
- users
- maintenance stuff.

The warning notes therefore refer to both operation and maintenance of the machine.

Determine clearly and unequivocally who will responsible for the different activities on the machine (use, maintenance and repair).

Vague or unclear assignment of responsibilities constitute a safety hazard!

Always disconnect the machine plug from the mains. This will prevent it being used by unauthorised personnel.

INFORMATION

All personnel involved in assembly, commissioning, operation and maintenance must

- be duly qualified,
- follow this operating manual.

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the machine and other material property,
- may affect proper operation of the geared drill.

1.4.2 Authorised personnel

WARNING!

Incorrect use and maintenance of the machine causes danger for personnel, objects and the environment.

Only authorised personnel may operate the machine!

The only personnel authorised to use this machine and perform maintenance on it are trained and instructed technical staff working for the operator and manufacturer.

1.4.3 Obligations of the operator

The operator must instruct staff at least once a year on

- all safety standards that apply to the machine,
- operation,
- accredited technical guidelines.

The operator must also

- check staff's understand,
- document training/instruction,
- require staff to confirm participation in training/instruction by a signature,
- check whether the staff are aware of safety and of dangers in the workplace and whether they observe the operating manual.

1.4.4 Obligations of the user

The user must

- have read and understood the operating manual,
- be familiar with all safety devices and regulations,
- be capable of operating the machine.

1.4.5 Additional qualification requirements

For work on the the following machine components there are additional requirements:

- This work must only be carried out by a qualified electrician or person working under the instructions and supervision of a qualified electrician.

Before carrying out work on electric components or operating units the following measures must be taken in the order given.

➔ Disconnect all poles

➔ Ensure that the machine cannot be turned on again

➔ Check that there is no voltage

1.5 User positions

The user must stand in front of the machine.

1.6 Safety devices

Use the machine only with properly functioning safety devices.

Stop the machine immediately if there is a failure in the safety device or if it is not functioning for any reason.

It is your responsibility!

If a safety device has been activated, the machine must only be used when

- the cause of the failure has been removed,
- it has been verified that there is no resulting danger for personnel or objects.

WARNING!

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

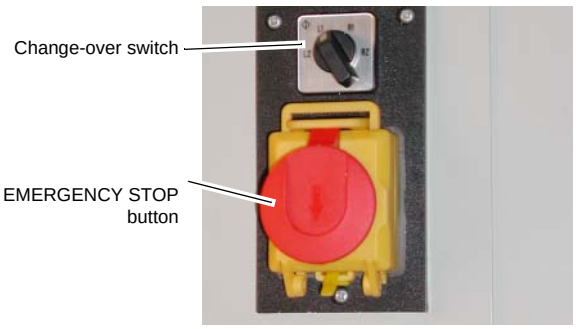
- **damage as a result of components or parts of components flying off at high speed,**
- **contact with rotating parts,**
- **fatal electrocution.**

The machine includes the following safety devices:

- Self-latching, lockable EMERGENCY STOP button
- A work table with T-shaped grooves to hold the workpiece or a vice

1.6.1 EMERGENCY STOP button

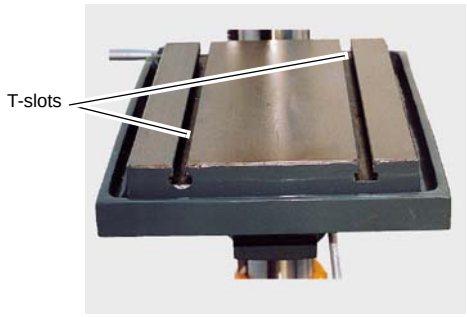
When the EMERGENCY STOP button is activated, the machine is switched off. The button engages in the "OFF" position.



Illustr. 1-1: EMERGENCY STOP button

1.6.2 Working table

The working table has T-slots for holding the workpiece or a vice. The working table can be rotated.



Illustr. 1-2: Working table B30 GS

WARNING!

Danger of injury from centrifuged parts. Secure the workpiece firmly on the working table.

1.6.3 Prohibition, warning and mandatory labels

INFORMATION

All warning labels must be legible.

Check them regularly.

1.7 Safety check

Check the machine at least once per shift. Inform the person responsible immediately of any damage, defect or change in operating function.

Also check all safety device, especially after every maintenance and repair work.

Check that the prohibition, warning and information labels and the markings on the machine can be identified and are complete.

INFORMATION

Use the following table for organising checking.

General check		
Equipment	**Check**	**OK**
Labels, markings	Installed and legible	
Date:	**Checked by (signature):**	

Run test		
Equipment	**Check**	**OK**
EMERGENCY STOP button	The geared drill must disconnect when the EMERGENCY STOP button is activated.	
Date:	**Checked by (signature):**	

1.8 Individual protection gear

For certain work, individual protection gear is required.

Protect your face and eyes: During all work, and specifically work during which your face and eyes are exposed to hazards, a safety helmet with a face guard should be worn.

Use protective gloves when handling pieces with sharp edges.

Wear safety shoes when you position, dismantle or transport heavy components.

Use ear protection if the noise level (immission) in the workplace exceeds 80 dB(A).

Before starting work, make sure that the prescribed individual protection gear is available in the workplace.

CAUTION!

Dirty or contaminated body protection gear can cause disease.

Clean it each time after it has been used and once a week.

1.9 Safety during operation

In the description of work with and on the geared drill we highlight the dangers specific to that work.

WARNING!

Prior to activating the machine please double-check that this will not lead to any danger with respect to people and cause any damage to equipment.

Avoid unsafe working practises:

- It is essential that you observe the instructions in this operating manual.
- Do not work on the machine if your concentration is reduced.
- Observe the rules for preventing accidents.
- Inform the person responsible of any danger or failure.
- Use protective goggles.
- Make sure to wear a well-fitting work suit and, where necessary, a hairnet.
- Do not use protective gloves during drilling work.
- Stay at the machine until all rotating parts have come to a halt.

1.10 Safety during maintenance

Report all safety-relevant changes of the geared drill. Document all changes, have the operating manual changed accordingly and train the machine operators.

1.10.1 Disconnecting the geared drill and making it safe

➔ Switch off the machine before beginning any maintenance or repair work.

➔ Use a padlock to secure the EMERGENCY STOP button.

All machine components and hazardous voltages and movements must have been disconnected.

➔ Place a warning sign on the geared drill.

1.10.2 Using lifting equipment

WARNING!

Use of unstable lifting equipment and load-suspension devices that break under load can cause very serious injuries or even death.

Check that the lifting equipment and load-suspension devices are of sufficient load capacity and are in perfect condition.

Observe the rules for preventing accidents issued by your association for the prevention of occupational accidents and safety in the workplace or other inspection authorities.

Hold the loads properly.

Never walk under suspended loads!

1.11 Electrical system

Have the electrical equipment of the machine checked regularly, and at least every six months.

Eliminate immediately all defects such as loose connections, defective wires, etc.

Disconnect the machine if there are any anomalies in the power supply!

☞ “Maintenance“ on page 27

1.12 Accident report

Inform your superiors and OPTIMUM Maschinen GmbH immediately in the event of accidents, possible sources of danger and any actions which almost lead to an accident (near misses).

These near misses can have many causes.

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

INFORMATION

In the description of work with and on the machine we highlight the dangers specific to that work.

2 Technical data

2.1 Characteristics plates

Illustr. 2-1: Characteristics plates

The following information gives the dimensions and weight and is the manufacturer's authorised machine data.

Power connection	B 28 GS	B 30 GS	B 30 GT
Total connection rate	3 x 400 V; 50 Hz; 0.75 KW		
Permitted voltage tolerance	380 V - 420 V		
Degree of protection	IP 54		

Drill capacity	B 28 GS	B 30 GS	B 30 GT
Drill capacity in steel [mm]	30		
Drill capacity in grey cast iron [mm]	38		
Working radius [mm]	225	315	225

Spindle holding fixture	B 28 GS	B 30 GS	B 30 GT
Spindle holding fixture	MK3		
Sleeve travel [mm]	140		

Drilling table	B 28 GS	B 30 GS	B 30 GT
Drilling table dimensions [mm]	310 x 360	480 x 375	300 x 305
T-slot size [mm]	14		
Maximum distance [mm] drilling spindle - drilling table	600	660	-

Drilling table	B 28 GS	B 30 GS	B 30 GT
Maximum distance [mm] drilling spindle - foot	1,075	1,200	405

Dimensions	B 28 GS	B 30 GS	B 30 GT
Height [mm]	1,700	1,830	1,230
Depth [mm]	550	780	580
Width [mm]	470	490	400
Total weight [kg]	270	440	140
Diameter of upright [mm]	100	125	100

Work area	B 28 GS	B 30 GS	B 30 GT
Height [mm]	2,000		
Depth [mm]	2,100		
Width [mm]	1,250		

Speeds	B 28 GS	B 30 GS	B 30 GT
Spindle speeds [rpm]	100 - 2,900		
Number of steps	8		

Environmental conditions	B 28 GS	B 30 GS	B 30 GT
Temperature	5-35 °C		
Humidity	25 - 80 %		

Operating material	B 28 GS	B 30 GS	B 30 GT
Bright metal parts	Machine tool oil CL 68 or comparable oil		
Gear	Mobilgear 627 or comparable gear oil		
Rack and upright of drill	Commercial friction bearing oil		

2.2 Emissions

The noise emitted by the geared drill is less than 70 dB(A).

INFORMATION

If the geared drill is installed in an area where various machines are in operation, the acoustic influence (immission) on the operator of the drill may exceed the legally permitted peak value in the workplace.

We recommend the use of soundproofing and ear protection.

3 Assembly

INFORMATION

The geared drill comes pre-assembled.

3.1 Extent of supply

When the geared drill is delivered, check immediately that the machine has not been damaged during shipping and that all components are included. Also check that no fastening screws have come loose. Compare the parts supplied with the information on the shipping note.

3.1.1 Available optional accesories

Name	Item no.
Universal coolant system (for self-assembly)	3352002 (230V) ; 3352001 (400V)
Clamping tool set SPW 14, 52-piece	335 2018
Reducing bush MK 3 - MK 2	305 0663
Reducing bush MK 4 - MK 2	305 0665
Reducing bush MK 4 - MK 3	305 0664
Morse taper for taper mandrel MK 2, B 16	305 0659
Morse taper for taper mandrel MK 4, B 16	305 0661
Extension bushes MK 2 - MK 3	305 0667
Extension bushes MK 3 - MK 4	305 0668
quantum precision quick-action chuck (1 - 13 mm) B 16	305 0623
quantum precision quick-action chuck (3 - 16 mm) B 16	305 0626
Titanium twist drill set 3-10 mm, 8-piece, in plastic box	305 1009
Titanium twist drill set 1-13 mm, 25-piece, in metal box	305 1010
Twist drills HSS with Morse taper MK 2: 14,5/16/18/20/22/24/ 26/28/30 mm	305 1002
Twist drills HSS with Morse taper MK 3: 14,5/16/18/20/22/24/ 26/28/30 mm	305 1003
Halogen working lamp AL 20 with magnetic base and mounting plate	335 1140
Halogen working lamp AL 30 with mounting plate	335 1150
quantum machine vices with V-blocks	
MSO 75, jaw width 75 mm, clamping capacity 60 mm	300 0075
MSO 100, jaw width 100 mm, clamping capacity 90 mm	300 0100
MSO 125, jaw width 125 mm, clamping capacity 105 mm	300 0125
MSO 150, jaw width 150 mm, clamping capacity 140 mm	300 0150
FMSN 100, jaw width 100 mm, clamping capacity 100 mm	3354110
FMSN 125, jaw width 125 mm, clamping capacity 108 mm	3354120
FMSN 150, jaw width 150 mm, clamping capacity 146 mm	3354130

3.2 Transport

WARNING!

Machine parts falling off forklift trucks or other transport vehicles could cause very serious or even fatal injuries. Follow the instructions and information on the transport case:

- **Centres of gravity**
- **Suspension points**
- **Weights**
- **Means of transport to be used**
- **Prescribed shipping position**

WARNING!

Use of unstable lifting equipment and load-suspension devices that break under load can cause very serious injuries or even death.

Check that the lifting equipment and load-suspension devices

- **have sufficient load capacity,**
- **are in perfect condition.**

Observe the rules for preventing accidents issued by your association for the prevention of occupational accidents and safety in the workplace or other inspection authorities.

Hold the loads properly.

Never walk under suspended loads!

3.3 Storage

ATTENTION!

Improper storage may cause important parts to be damaged or destroyed.

Store packed or unpacked parts only under the intended environmental conditions:

☞ “Environmental conditions“ on page 14

Consult OPTIMUM Maschinen GmbH if the geared drill or accessories have to be stored for a period of over three months or under different environmental conditions to those given here.

3.4 Installation and assembly

3.4.1 Requirements of the installation site

Organise the work area around the geared drill in accordance with local safty regulations.
☞ “Dimensions“ on page 14

Operation, maintenance and repair in the work area must not be hindered.
☞ “Work area“ on page 14

INFORMATION

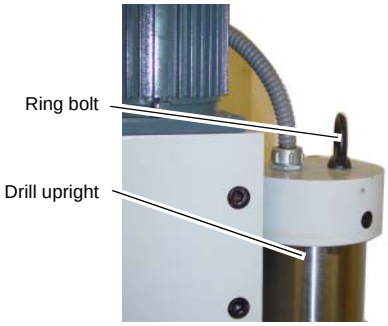
The mains plug of the geared drill must be freely accesible.

3.4.2 Suspension point

Secure the load-suspension device preferably around the drill head.

CAUTION!

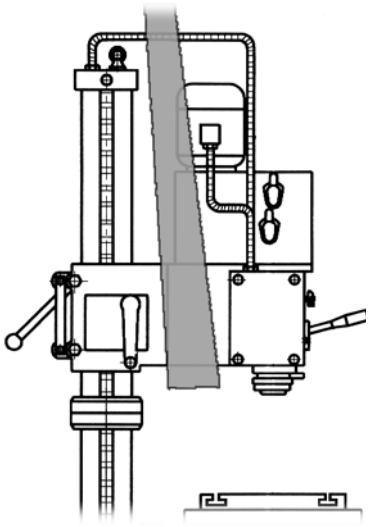
Make sure that all the clamping levers of the geared drill are tightened firmly before you lift the machine.



Illustr. 3-1: Load suspension with ring bolt

☞ “Total weight [kg]“ on page 14

➔ Make sure that no add-on pieces or paintwork are damaged due to the load suspension around the drill head.



Illustr. 3-2: Load suspension around drill head

3.4.3 Assembly

WARNING!

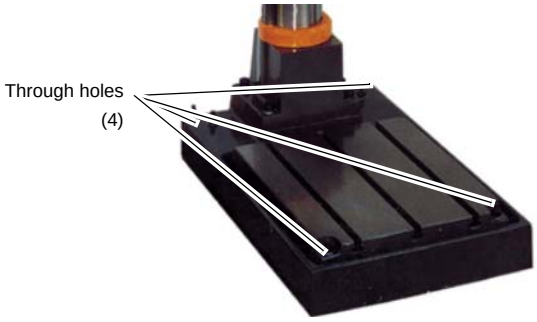
Danger of crushing and overturning.

The geared drill must be installed by at least 2 people.

3.4.4 Installing

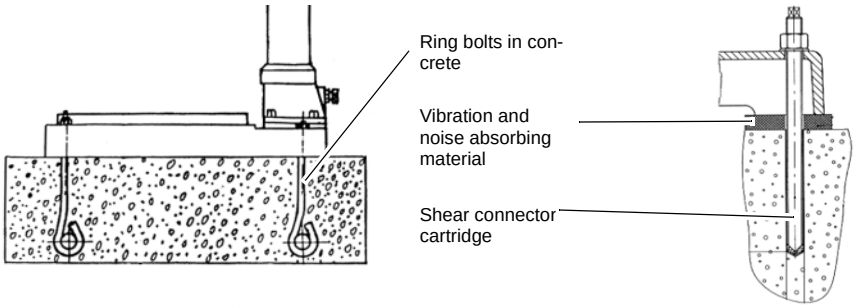
Check the horizontal orientation of the base of the geared drill with a spirit level.

Attach the geared drill to the base using the through holes in the foot.



Illustr. 3-3: Foot

Example of foundation anchorage



Illustr. 3-4: Foundation anchorage

The installation site must be designed in accordance with ergonomic workplace requirements.

ATTENTION!

Tighten the fastening screws on the geared drill only until it is firmly secured and cannot break loose or overturn during operation.

If the fastening screws are too tight and the foundation is uneven, the foot of the geared drill may break.

3.4.5 Cleaning and greasing

- ➔ Remove the anticorrosive agent applied to the machine for transport and storage purposes. We recommend the use of stove distillate.
- ➔ Do not use any solvents, thinners or other cleaning agents which might corrode the varnish on the machine. Follow the specifications and indications of the manufacturer of the cleaning agent.
- ➔ Lubricate all bright machine parts with non-corrosive lubricating oil.
- ➔ Lubricate the machine according to the lubrication chart.
  ☞ “Inspection and maintenance“ on page 28

3.5 First use

WARNING!

Personnel and equipment may be endangered if the geared drill is first used by inexpert personnel.

We do not take liability for damage caused by incorrect commissioning.

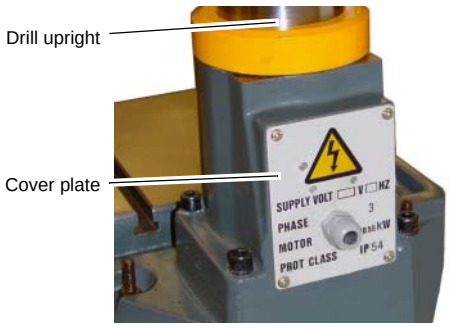
3.5.1 Power connection

- ➔ Connect the machine to the mains supply via the terminal board.

☞ “Qualification of personnel“ on page 7

☞ “” on page 33

- ➔ Check the fuse protection of your power supply against the technical data for the total connection rate of the geared drill.



Illustr. 3-5: Drill upright

➔ Connect a cable with a CEE-400V-16A plug or install a lockable main switch if you connect the geared drill directly to the mains supply.

ATTENTION!

Check the rotating field and direction of the motor.

When the rotating direction switch is in the position for right-handed rotation (R), the drilling spindle should turn clockwise.

If the motor rotates in the wrong direction, it can cause the geared drill to break down.

4 Operation

4.1 Safety

Use the geared drill only under the following conditions:

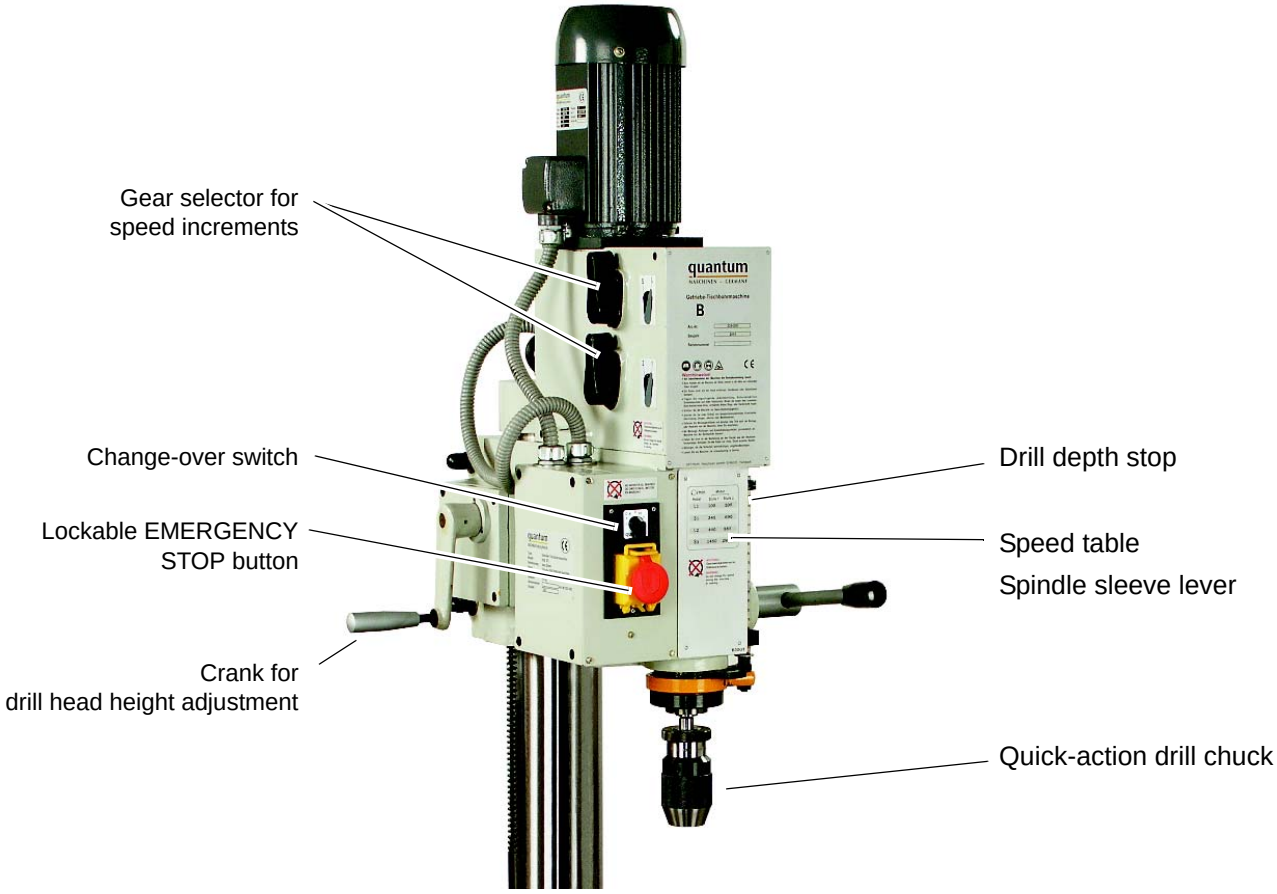
- The geared drill is in proper working order.
- The geared drill is used as prescribed.
- The operating manual is followed.
- All safety devices are installed and activated.

All anomalies should be eliminated immediately. Stop the machine immediately in the event of any abnormality in operation and make sure it cannot be started up accidentally or without authorisation.

Notify the person responsible immediately of any modification.

☞ “Safety during operation“ on page 11

4.2 Control and indicating elements



Illustr. 4-1: Drill head of geared drill

4.2.1 Operating switches

Change-over switch

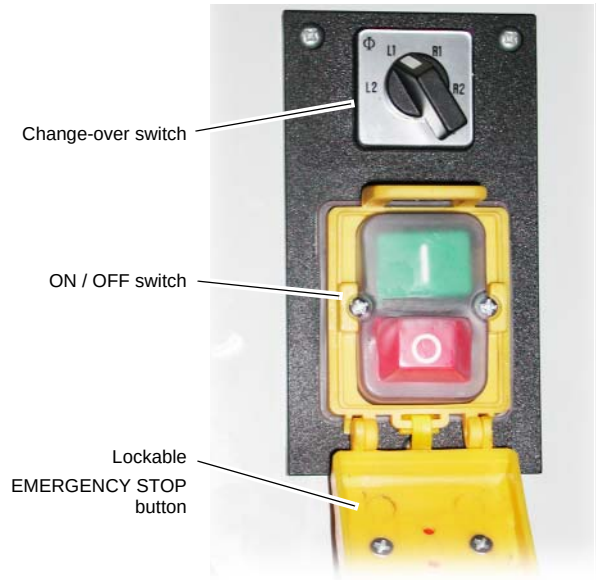
The rotating direction of the geared drill is selected using the change-over switch.

Two speed steps are available for each rotating direction.

- The "R" mark means right-handed rotation (clockwise).
- "L" means left-hand rotation.

EMERGENCY STOP button

- When the EMERGENCY STOP button is activated, the machine is switched off. The button engages in the "OFF" position.



Illustr. 4-2: Operating switches

ATTENTION!

Changing the rotating direction while the drilling spindle is still rotating may damage the machine.

- **Switch the machine off before inverting the rotating direction.**
- **Wait until the drilling spindle has come to a complete halt.**

4.2.2 Gear selector switches

You can change the speed step of the drilling spindle using the gear selectors.

Step of change-over switch	1	2	1	2	1	2	1	2
Upper gear selector	S I		S I		S I		S I	
Lower gear selector	2 1		2 1		2 1		2 1	
Spindle speed [rpm]	100	205	345	690	440	885	1,450	2,900

ATTENTION!

Changing the rotating direction while the drilling spindle is still rotating may damage the machine. Switch the machine off before inverting the rotating direction.

INFORMATION

When choosing the speed, use the speed table on the drill head.

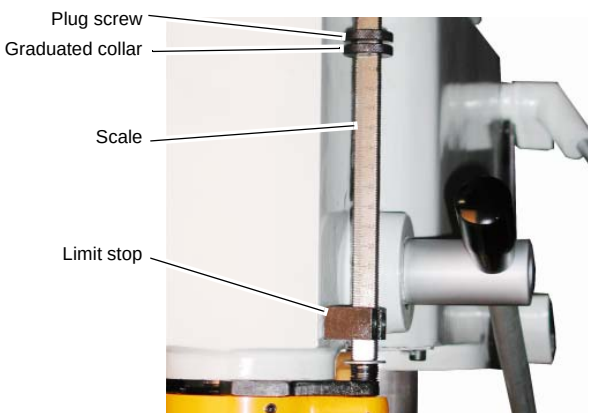
4.2.3 Drill depth stop

When drilling several holes of the same depth you can use the drill depth stop.

➔ Loosen the plug screw and turn the graduated collar until the desired drill depth coincides with the scale.

➔ Tighten the plug screw again.

The spindle can now only be lowered to the adjusted value.



Illustr. 4-3: Scale of drill depth stop

4.2.4 Spindle sleeve feed

The spindle sleeve is moved manually.

Lower the spindle sleeve using the spindle sleeve lever. The spindle sleeve is returned to its initial position by a spring.

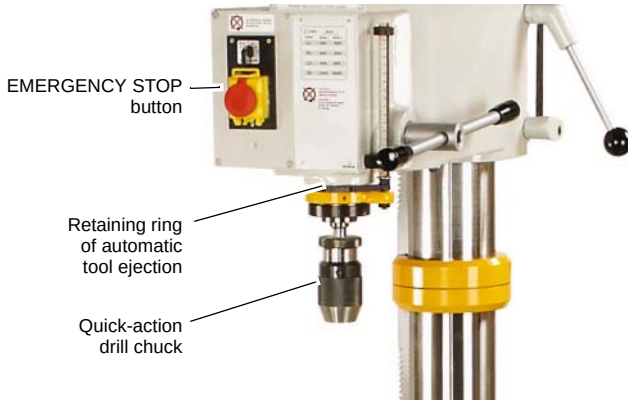
4.3 Drill head

4.3.1 Tool ejection

The geared drill is equipped with an automatic tool ejecting mechanism.

WARNING!

Do not carry out the following work until the geared drill has been switched off and the EMERGENCY STOP button has been secured.



Illustr. 4-4: Tool ejection

4.3.2 Removing the drill chuck

➔ Turn the retaining ring outwards.

➔ Move and press the spindle sleeve upwards.

The tool or the drill chuck together with the Morse taper is ejected.

4.3.3 Inserting the drill chuck

The drill chuck is secured through a form-fit union (dog) against twisting in the drilling 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.

➔ Make sure that the retaining ring is turned inwards and fits closely with the drilling spindle sleeve.

➔ Press the taper mandrel into the drilling spindle.

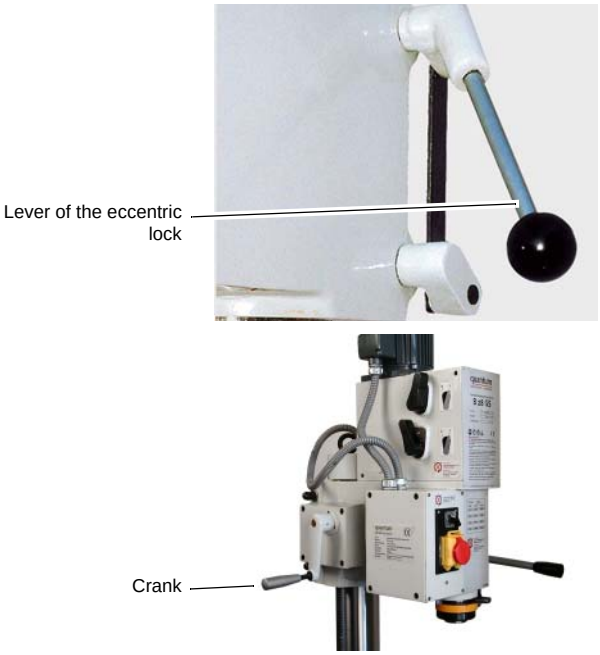
4.3.4 Adjusting the drill head height

The drill head is immobilised with a double eccentric plate.

➔ Loosen the drill head by pressing the lever of the eccentric lock backwards.

➔ Turn the crank to lower o raise the drill head.

➔ Then, lock the drill head by pulling the lever of the eccentric lock forwards.



Illustr. 4-5: Clamping lever and crank at the drill head

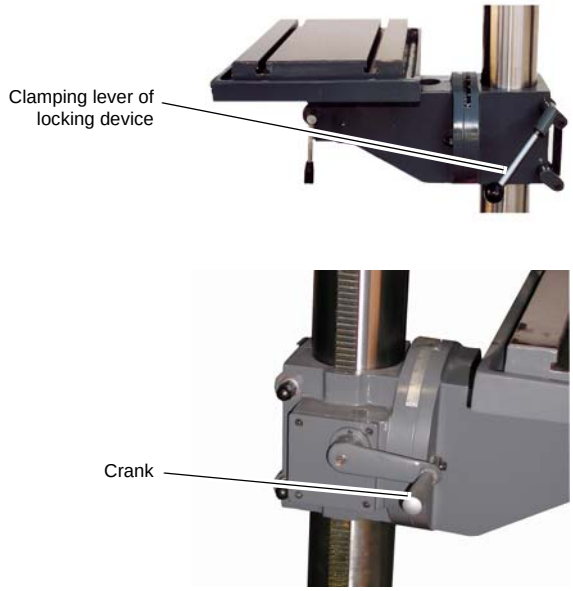
4.4 Working table

4.4.1 Adjusting the height of the working table

➔ Loosen the working table by pressing the clamping lever of the lokking device backwards.

➔ Turn the crank to lower o raise the working table.

➔ Then, lock the working table by pulling the clamping lever of the locking device forwards.



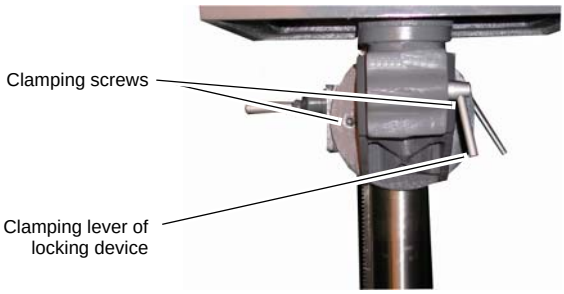
Illustr. 4-6: Table height adjustment B30 GS

4.4.2 Swivelling the working table

➔ Loosen the working table by pressing the clamping lever of the lokking device backwards.

➔ Swivel the working table into the desired position.

➔ Then, lock the working table by pulling the clamping lever of the locking device forwards.



Illustr. 4-7: Working table B30 GS

4.4.3 Pivoting the working table

➔ Loosen the clamping screws on either side.

➔ Pivot the working table support into the desired position. The inclination angle can be seen on the scale.

➔ Tighten the clamping screws again.

4.5 Working with the machine

4.5.1 Preparation

WARNING!

For drilling jobs, it is necessary to clamp the workpiece firmly to prevent the bit catching on the piece.Example of suitable clamping devices include a machine vice or clamping jaws.

Put a wooden or plastic board beneath the workpiece to avoid drilling through to the work table, vice, etc.

Use the drill depth stop when you want to get various bore holes with the same depth.

Use a dust remover unit when working with wood. Sawdust can be a health hazard.

Also use a suitable protective mask for any work that generates dust.

4.5.2 Drilling

WARNING!

Danger of clothing and/or long hair getting caught.

- **Make sure to wear a well-fitting work suit during drilling work.**
- **Do not use gloves.**
- **If necessary, wear a hairnet.**

CAUTION!

Danger of crushing!

Do not place your hand between the drill head and the spindle sleeve.

Danger of blows from the spindle sleeve levers.

The spindle sleeve is returned to its initial position by a return spring.

Do not release the spindle sleeve lever when repositioning the spindle sleeve.

Bit

Choose a suitable bit speed. This will depend on the diameter of the bit being used and the material. ☞ “Application table“ on page 26

Thin bits break easily. In the case of deep drilling, remove the bit from time to time to remove drilling chips from the bore hole.

Spindle sleeve lever

Make sure the feed of the spindle sleeve is constant and not too fast.

Cooling

The friction generated during rotation can cause the edge of the tool to become very hot.

The tool should be cooled during the drilling process. Cooling the tool with a suitable cooling lubricant ensures better working results and a longer edge life of the tools.

CAUTION!

Danger of injury due to brushes getting caught or pulled in.

Use a spray gun or washing bottle for cooling.

INFORMATION

It is best to use a water-soluble, non-pollutant drilling emulsion, available from specialised dealers.

Make sure that the cooling agent is properly collected.

Respect the environment when disposing of any lubricants and cooling agents.

Follow the manufacturer's disposal instructions.

4.6 Application table

Guideline speed values [rpm] :

Bit Ø [mm]	**Grey cast iron**	**Special steel**	**Steel St 37**	**Aluminium**	**Bronze**
3	2,550	1,600	2,230	9,500	8,000
4	1,900	1,200	1,680	7,200	6,000
5	1,530	955	1,340	5,700	4,800
6	1,270	800	1,100	4,800	4,000
7	1,090	680	960	4,100	3,400
8	960	600	840	3,600	3,000
9	850	530	740	3,200	2,650
10	765	480	670	2,860	2,400
11	700	435	610	2,600	2,170
12	640	400	560	2,400	2,000
13	590	370	515	2,200	1,840
14	545	340	480	2,000	1,700
16	480	300	420	1,800	1,500
18	425	265	370	1,600	1,300
20	380	240	335	1,400	1,200
22	350	220	305	1,300	1,100
25	305	190	270	1,150	950

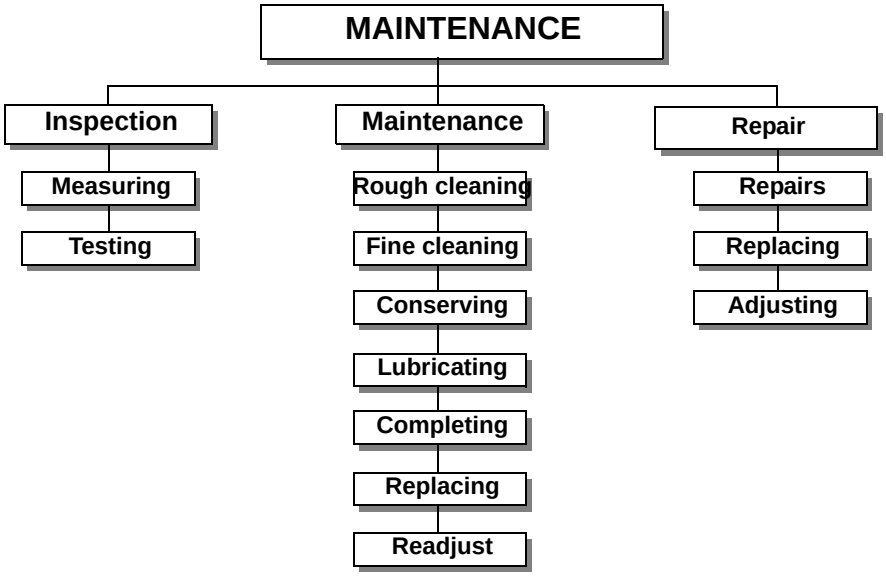
5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the geared drill.

The diagram below shows which of these headings each task falls under.



Illustr. 5-1: Maintenance – Definition according to DIN 31051

ATTENTION !

Properly-performed regular maintenance is an essential prerequisite for

- **safe operation**
- **fault-free operation**
- **long service life of the geared drill and**
- **the quality of the products you manufacture.**

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

ENVIRONMENTAL PROTECTION

During work on the drill head, make sure that

- **collector vessels are used, with sufficient capacity for the amount of liquid to be collected.**
- **liquid and oils are not spilt 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.

Cleaning up spillages

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 vessel to be disposed of.

Disposal

Never dump oil or other pollutant substances in water inlets, rivers or channels.

Used oils must be delivered to a collection centre. Consult your superior if you do not know where the collection centre is.

5.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include very serious injury to personnel working on the machine and damage to the machine itself. Only qualified personnel should carry out maintenance and repair work on the machine.

5.1.1 Preparation

WARNING!

Only carry out work on the geared drill if it has been unplugged from the mains power supply.

☞ “Disconnecting the geared drill and making it safe“ on page 11

Position a warning sign.

5.1.2 Restarting

Before restarting run a safety check.

☞ “Safety check“ on page 10

WARNING!

Before activating the geared drill, double check that this will not

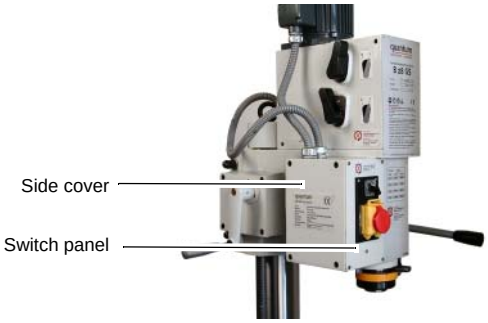
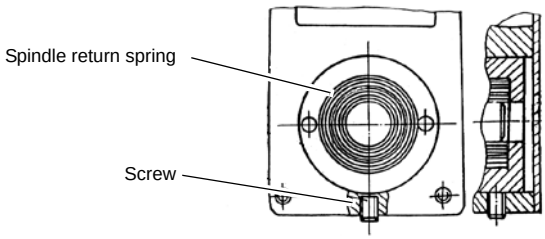
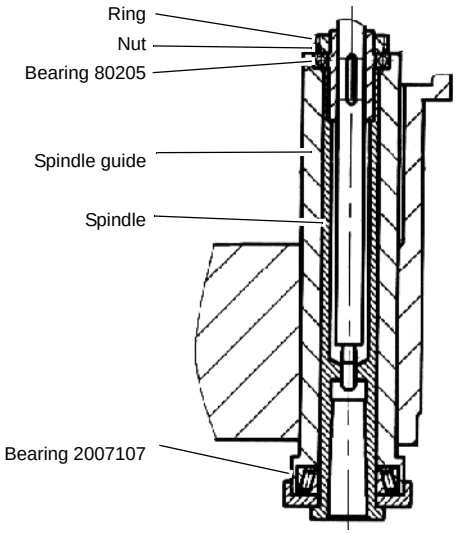
- **endanger other people,**
- **the geared drill is undamaged.**

5.2 Inspection and maintenance

The type and extent of wear depends to a large extent on individual usage and service conditions. For this reason, all the intervals are only valid for the authorised conditions.

Interval	Where?	What?	How?
Start of shift after each maintenance or repair operation	Machine	☞ “Safety check“ on page 10	
every week	Drill head	Spindle gear	➔ Lubricate spindle gear with machine oil or light grease.

Interval	Where?	What?	How?
every month	Rack and upright of drill	Lubricate, grease	➔ Lubricate upright of drill ➔ Lubricate rack with commercial non-corrosive grease (e.g. friction bearing grease).
every six months	Drill head	Lubricating	➔ Lubricate worm shaft and gearwheel of the drillhead height adjustment.
every six months	Working table	Lubricating	➔ Lubricate worm shaft and gearwheel of the working table height adjustment.
as required	Upright of drill and spindle sleeve	Lubricate	➔ Lubricate all bright metallic surfaces.
as required	Working table	Lubricate	➔ Lubricate the clampings of the table height adjustment.
as required	Upright	Fine cleaning	➔ Clean the rack.

Interval	Where?	What?	How?
as required	Spindle sleeve	Stretch return spring	➔ Detach the switch panel and the side cover.  Illustr. 5-2: Drill head ➔ Loosen the screw and turn the spring housing to the right until the spindle return spring is adequately stretched.  Illustr. 5-3: Drawing of spindle return spring
as required	Drill head	Spindle bearing	➔ Detach the gear housing. ➔ Loosen the ring. ➔ Adjust the bearing clearance with the help of the nut.  Illustr. 5-4: Spindle bearing

5.3 Repair

For any repair work, get assistance from an employee of OPTIMUM Maschinen GmbH's technical service or send us the geared drill.

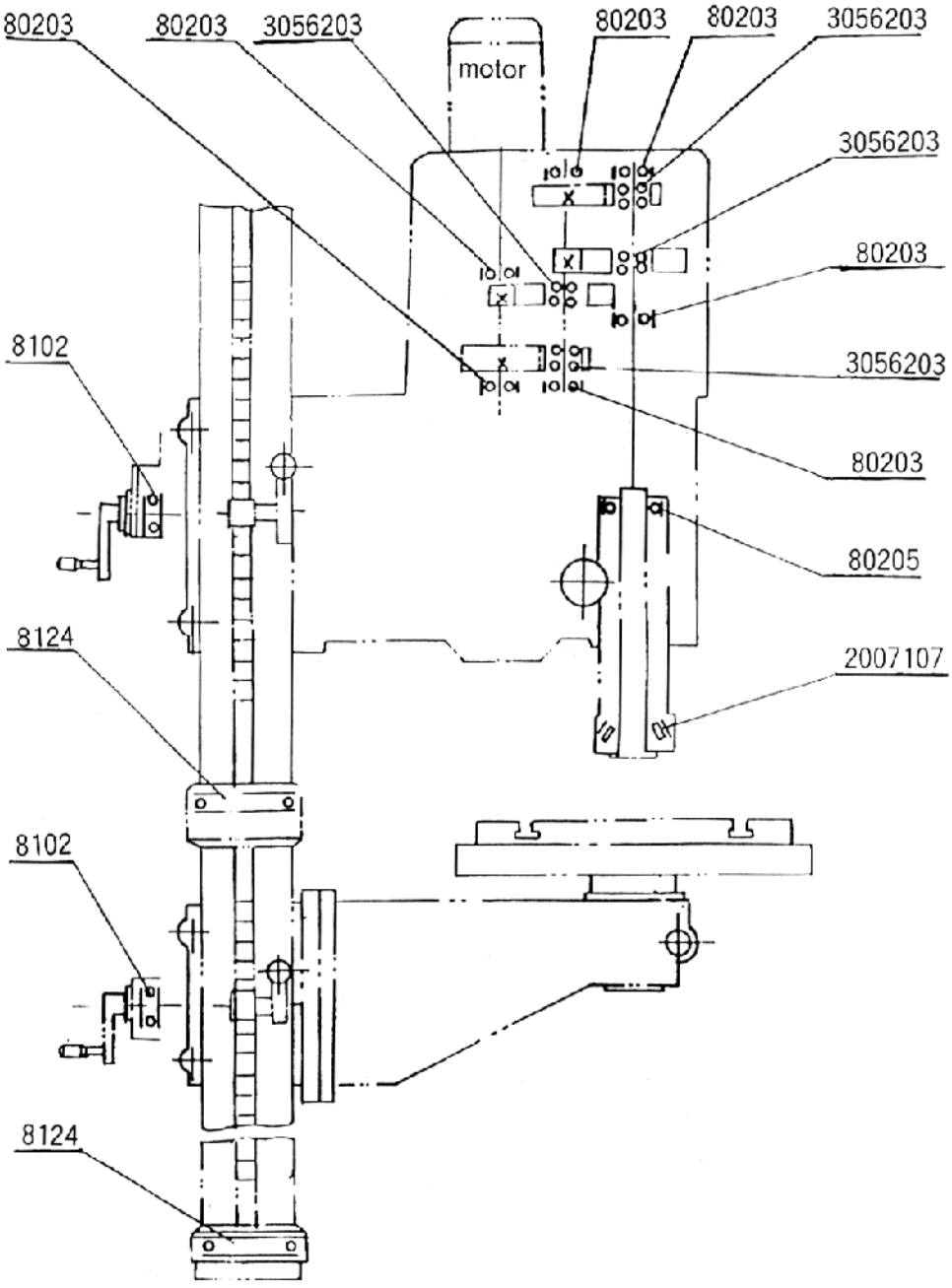
If the repairs are carried out by qualified technical staff, they must follow the indications given in this manual.

OPTIMUM Maschinen GmbH does not take responsibility nor does it guarantee against damage and operating anomalies resulting from failure to observe this operating manual.

For repairs, only use

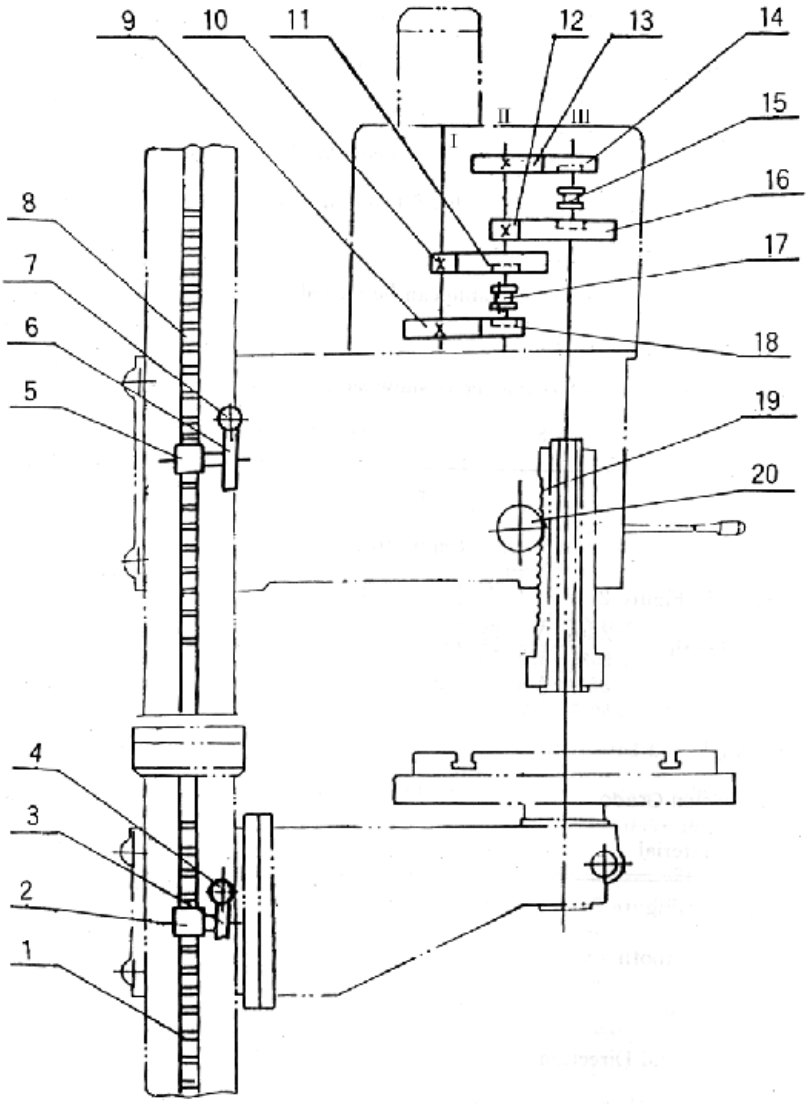
- faultless and suitable tools
- original spare parts or serial parts expressly authorised by OPTIMUM Maschinen GmbH.

5.4 Overview of the bearings



Illustr. 5-5: Overview of bearing arrangement

5.5 Overview of gear



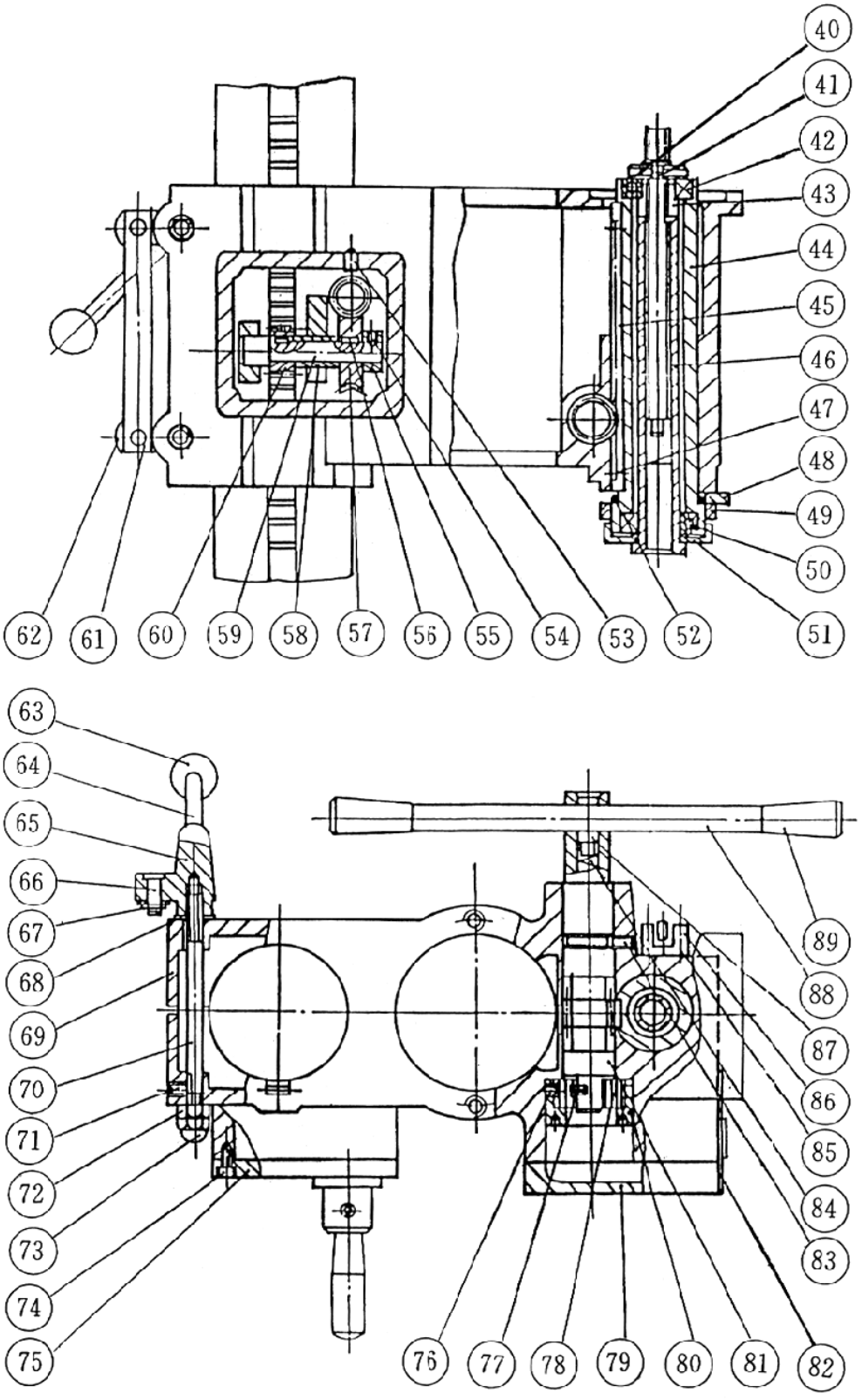
Illustr. 5-6: Gear diagram

No.	Teeth	Module		Precision	Material
1	72	2,5		9-GJ	C45
2	15	2,5		9-FH	C45
3	28	2	5° 6'8''	9-De	C45
4	1	2		9-De	C45
5	17	2,5		9-FH	C45
6	28	2	4° 23'55''	9-De	C45
7	1	2		9-De	C45
8	34	2,5		8-GJ	C45
9	42	1.5		7-GJ	Mc Nylon
10	16	1.5		7-FH	C45
11	68	1.5		7-GJ	Mc Nylon

No.	Teeth	Module		Precision	Material
12	16	2		7-FH	C45
13	34	2		7-FH	Mc Nylon
14	33	2		7-GJ	C45
15					C45
16	51	2		7-GJ	Mc Nylon
17					C45
18	42	1.5		7-FH	C45
19	29	2		8-GJ	C45
20	16	2		8-GJ	C45

6 Ersatzteile - Spare Parts B28GS, B30GS, B30GT

6.1 Ersatzteilzeichnung 1 - Parts drawing 1



6.2 Ersatzteilzeichnung 2 - Parts drawing 2

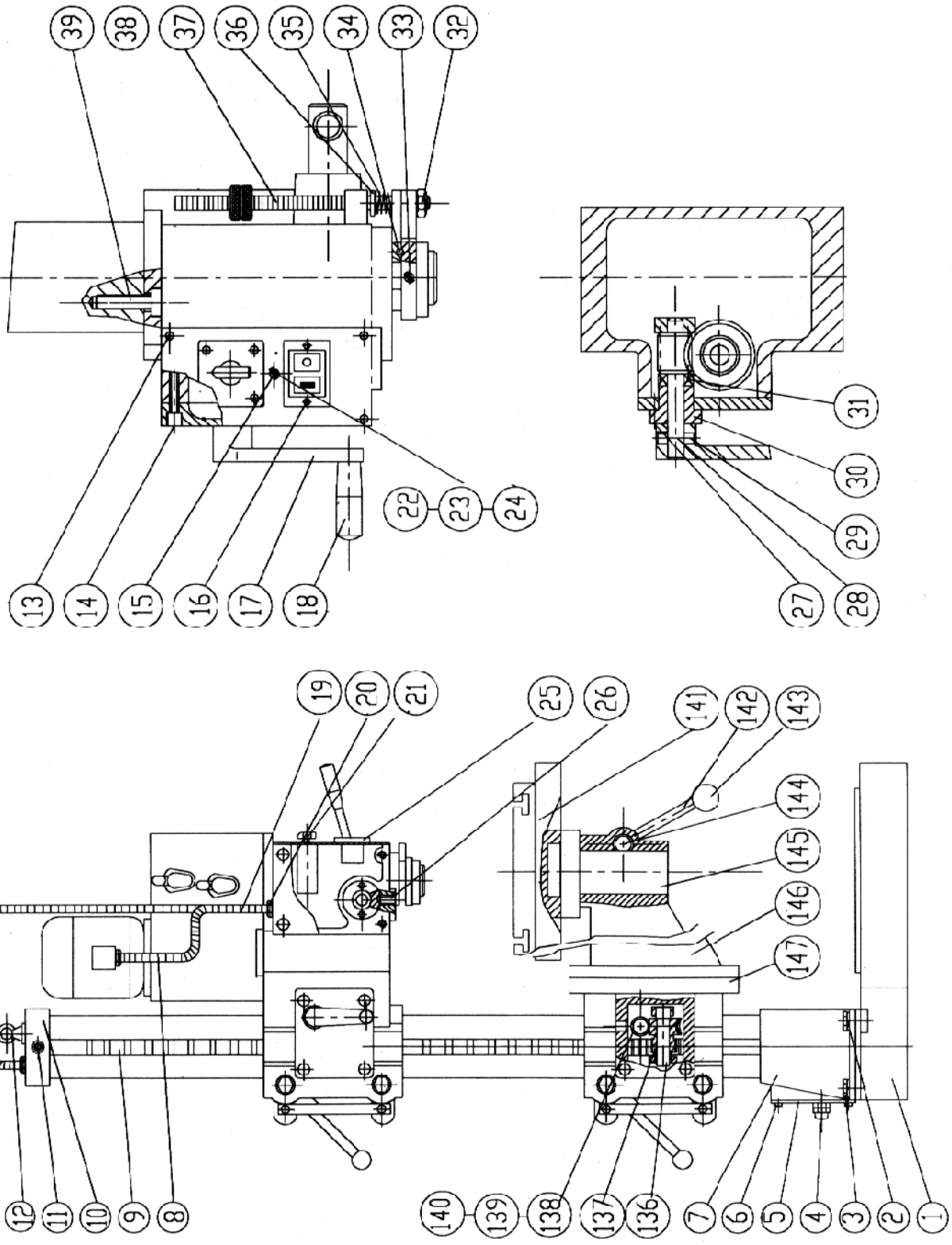


Abb.6-1: Ersatzteilzeichnung 1

6.3 Ersatzteilzeichnung 3 - Parts drawing 3

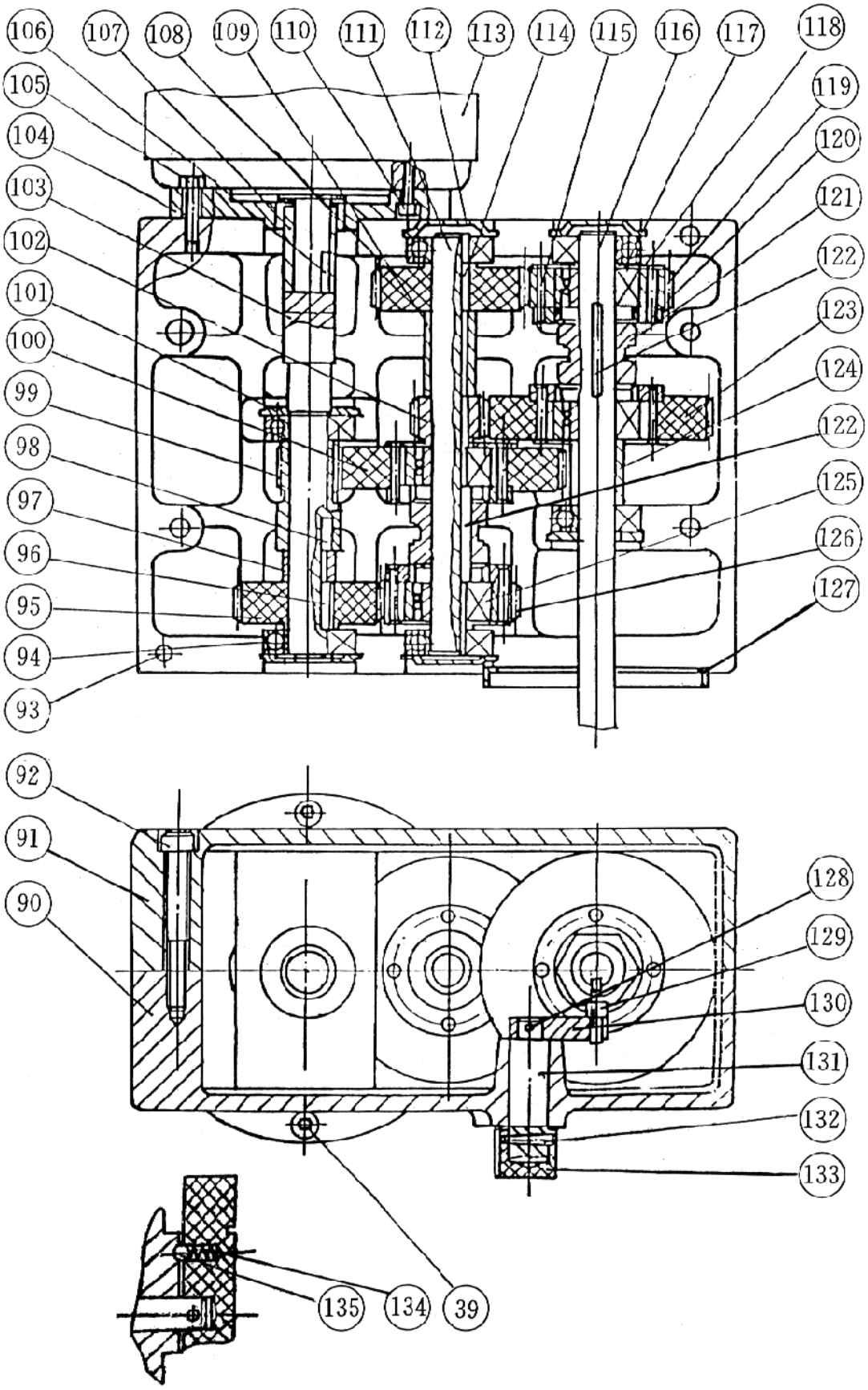


Abb. 6-2: Ersatzteilzeichnung 3

6.4 Ersatzteilzeichnung 4 - Parts drawing 4

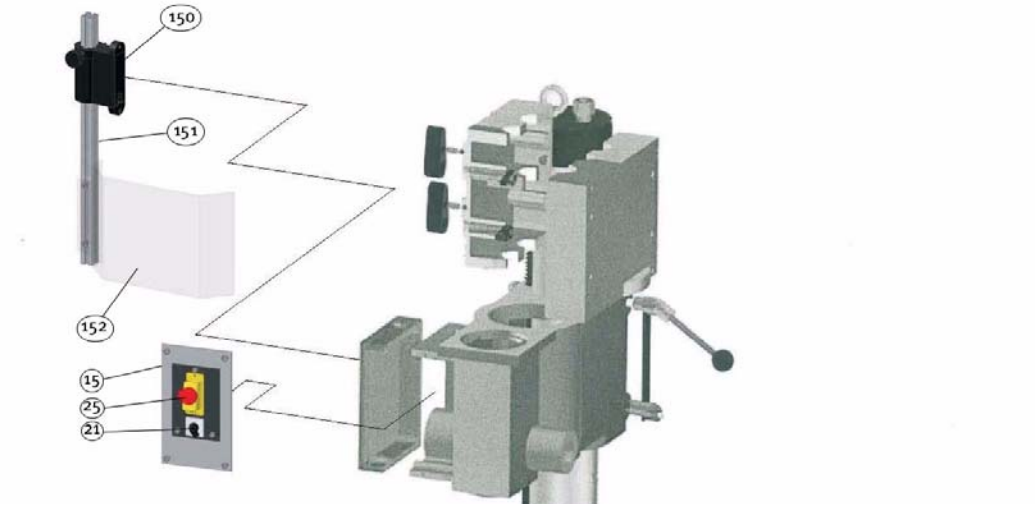


Abb. 6-3: Ersatzteilzeichnung 4

6.5 Ersatzteilliste - Parts list

Pos.	Bezeichnung	Designation	Grösse Size	Artikelnummer Item no.
1	Fußplatte	Base plate	B30GT	0333430301
			B28GS	0333428301
			B30GS	0333431301
2	Unterlegscheibe	Washer		0333430302
3	Sechskantmutter	Hexagon nut		0333430303
4	Kabel-Verbinder	Cable connector		0333430304
5	Deckel	Cover		0333430305
6	Rundkopfschraube	Round screw		0333430306
7	Säule	Column	B30GT	0333430307
			B28GS	0333428307
			B30GS	0333431307
8	Flexibler Metallschlauch	Flexible metal tube		0333431308
9	Zahnstange	Rack	B28GS	0333428309
9	Zahnstange	Rack	B30GS	0333431309
9	Zahnstange	Rack	B30GT	0333430309
10	Säulendeckel	Column cover		0333430310
11	Inbusschraube	Allen screw		0333430311
12	Ringschraube	Ring bolt		0333430312
13	Kreuzkopfschraube	Phillips screw		0333430313
14	Inbusschraube	Allen screw		0333430314
15	Schalterplatte	Switch plate		0333430315
16	Kreuzkopfschraube	Phillips screw		0333430316
17	Kurbel	Crank		0333430317
18	Griff	Grip		0333430318
19	Flexibler Metallschlauch	Flexible metal tube		0333430319
20	Schlauchkupplung	Fitting		0333430320
21	Motorschalter Links/Rechts	Motor switch Left/Right	neu / new type	0333430321
			alt / old type	0373007
22	Unterlegscheibe	Washer		0333430322
23	Beilagscheibe	Washer		0333430323
24	Rundkopfschraube	Round screw		0333430324
25	Schalter	Switch		0333430325
26	Konische Befestigungsschraube	Conical fastening screw		0333430326
27	Rundkopfschraube	Round screw		0333430327
28	Schneckenradwelle	Worm wheel shaft		0333430328
29	Kegelstift	Taper pin		0333430329
30	Buchse	Bushing		0333430330
31	Kugellager	Ball bearing	8102	0333431331
32	Sechskantmutter	Hexagon nut		0333430332
33	Konische Befestigungsschraube	Conical fastening screw		0333430333
34	Stift	Pin		0333430334

Pos.	Bezeichnung	Designation	Grösse Size	Artikelnummer Item no.
35	Feder	Spring		0333430335
36	Unterlegscheibe	Washer		0333430336
37	Skala	Scale		0333430337
38	Rändelmutter	Knurled nut		0333430338
39	Rundkopfschraube	Round screw		0333430339
40	Kreuzlochmutter	Capstan nut		0333430340
41	Sicherungsring	Circlip		0333430341
42	Kugellager	Ball bearing	80205E	03334313142
43	Führungsstift	Guide pin		0333430343
44	Pinole	Pinole		0333430344
45	Zahnstange Pinole	Rack for pinole		0333430345
46	Spindel	Spindle		0333430346
47	Spindelgehäuse	Spindle housing		0333430347
48	Halter	Holder		0333430348
49	Klemmhülse	Clamp bushing		0333430349
50	Kugellager	Ball bearing	7026E	0333430350
51	Lagerdeckel	Bearing cover		0333430351
52	O-Ring	O-ring		0333430352
53	Schmierdeckel	Lubrication cover		0333430353
54	Konische Befestigungsschraube	Conical fastening screw		0333430354
55	Klemmbuchse	Clamping bushing		0333430355
56	Stift	Pin		0333430356
57	Schneckenrad Z28	Worm wheel Z28		0333430357
58	Buchse	Bushing		0333430358
59	Zahnradwelle	Gearwheel shaft		0333430359
60	Zahnrad Z17	Gear Z17		0333430360
61	Verbindungsstange	Connecting rod		0333430361
62	Stütze	Rest		0333430362
63	Knopf	Knob		0333430363
64	Hebel	Lever		0333430364
65	Hebelhalterung	Lever holder		0333430365
66	Stift	Pin		0333430366
67	Federring	Lock washer		0333430367
68	Unterlegscheibe	Washer		0333430368
69	Gehäuse	Housing		0333430369
70	Klemmbolzen	Clamping bolt		0333430370
71	Rundkopfschraube	Round screw		0333430371
72	Sechskantmutter	Hexagon nut		0333430372
73	Hutmutter	Cap nut		0333430373
74	Rundkopfschraube	Round screw		0333430374
75	Deckel	Cover		0333430375
76	Senkschraube	Countersunk screw		0333430376
77	Senkschraube	Countersunk screw		0333430377
78	Rückholfeder	Return Spring		0333430378
79	Deckel	Cover		0333430379
80	Nabe	Hub		0333430380
81	Vorschubwelle Z16	Feed shaft Z16		0333430381
82	Schutzschild	Guard		0333430382
83	Rundkopfschraube	Round screw		0333430383
84	Feder	Spring		0333430384
85	Rundkopfschraube	Round screw		0333430385
86	Halterung	Holder		0333430386
87	Federgehäuse	Spring housing		0333430387
88	Vorschubhebel	Feed lever		0333430388
89	Griff	Grip		0333430389
90	Zahnradgehäuse	Gearwheel housing		0333430390
91	Zahnradgehäuse	Gearwheel housing		0333430391
92	Rundkopfschraube	Round screw		0333430392
93	Kegelstift	Taper pin		0333430393
94	Kugellager	Ball bearing	80205	0333430394
95	Zahnrad Z42	Gear Z42		0333430395
96	Stift	Pin		0333430396
97	Buchse	Bushing		0333430397
98	Stift	Pin		0333430398
99	Zahnrad Z16	Gear Z16		0333430399
100	Zahnrad Z68	Gear Z68		03334303100
101	Deckel	Cover		03334303101

Pos.	Bezeichnung	Designation	Grösse Size	Artikelnummer Item no.
102	Zahnrad Z16	Gear Z16		03334303102
103	Ausgangswelle Motor	Drive shaft		03334303103
104	Motorflansch	Motor flange		03334303104
105	Rundkopfschraube	Round screw		03334303105
106	Stift	Pin		03334303106
107	Buchse	Bushing		03334303107
108	Zahnrad Z34	Gear Z34		03334303108
109	Buchse	Bushing		03334303109
110	Rundkopfschraube	Round screw		03334303110
111	Zwischenwelle	Intermediate shaft		03334303111
112	Deckel	Cover		03334303112
113	Motor	Motor		03334303113
114	Getriebewelle	Shaft		03334303114
115	Niete	Rivet		03334303115
116	Welle	Shaft		03334303116
117	Hülse	Bushing		03334303117
118	Verbindungsplatte	Plate		03334303118
119	Zahnrad Z33	Gear Z33		03334303119
120	Platte	Plate		03334303120
121	Verbindung	Connection		03334303121
122	Stift	Pin		03334303122
123	Zahnrad Z51	Gear Z51		03334303123
124	Buchse	Bushing		03334303124
125	Kugellager	Ball bearing		03334303125
126	Zahnrad Z42	Gear Z42		03334303126
127	Spannring	Clamping ring		03334303127
128	Kegelstift	Taper pin		03334303128
129	Stift	Pin		03334303129
130	Arm	Arm		03334303130
131	Stift	Pin		03334303131
132	Kegelstift	Taper pin		03334303132
133	Hebel	Lever		03334303133
134	Feder	Spring		03334303134
135	Stahlkugel	Steel ball		03334303135
136	Welle	Shaft		03334303136
137	Zahnrad-Schneckenrad	Gearwheel worm wheel		03334303137
138	Schneckenwelle Z51	Worm shaft Z51		03334303138
139	Kugellager	Ball bearing	8102	03334313139
140	Buchse	Bushing		03334303140
141	Bohrtisch	Drilling table	B28GS	03334283141
			B30GS/GT	03334303141
142	Klemmhebel	Clamping lever	B30GS	03334303142
142	Klemmhebel	Clamping lever	B28GS	03334283142
143	Kugelgriff	Ball handle	B30GS	03334303143
143	Kugelgriff	Ball handle	B28GS	03334283143
144	Klemmstück	Clamping piece		03334303144
145	Welle	Shaft	B30GS	03334303145
145	Welle	Shaft	B28GS	03334283145
146	Halter	Bracket		03334303146
147	Schwenkflansch	Swivel flange		03334303147
150	Halterung Bohrfutterschutz	Fixing drill chuck protection		03334303150
150-1	Endlagenschalter Bohrfutterschutz	End position switch drill chuck protection		033343031501
151	Arm Bohrfutterschutz	Arm drill chuck protection	B28GS	03334283151
			B30GS/GT	03334303151
152	Bohrfutterschutz Sichtschutzscheibe	Drill chuck protection view sealing pane	B28GS	03334283152
			B30GS/GT	03334303152
Teile ohne Abbildung - Parts without illustration				
0	Transformator	Transformer	B28GS	03334283153
			B30GS/GT	03334303153
Komplett-Sätze - Complete sets				
152-1	Bohrfutterschutz komplett	Drill chuck protection complete	B28GS	03334283152CPL
			B30GS/GT	03334303152CPL
	Rückholfeder kplt.	Returning spring cpl.		0333430378CPL
	Pinole kplt.	Pinole cpl.		0333430344CPL
	Welle kplt.	Shaft cpl.		03334303116CPL
	Welle kplt.	Shaft cpl.		03334303111CPL
	Welle kplt.	Shaft cpl.		03334303103CPL

6.6 Schaltplan - Wiring diagram B28GS, B30GS, B30GT

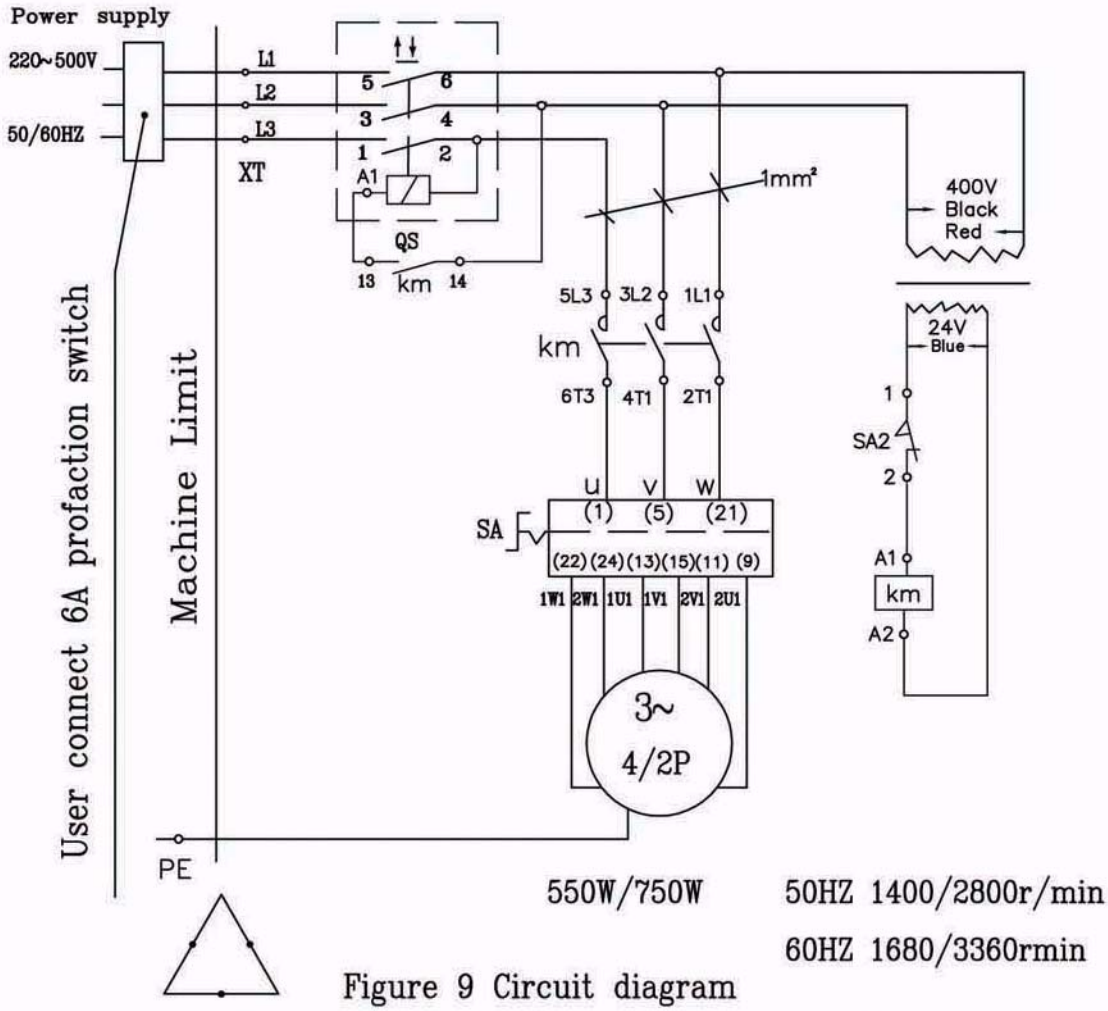


Figure 9 Circuit diagram

SA Connection("+"means connected)

NO:	øCA4D-32F1*05	NO:	CCW			CW	
			L2 H-speed	L1 L-speed		R1 L-speed	R2 H-speed
(1)	U	(2)				+	+
(3)		(4)	+	+			
(5)	V	(6)	+	+			
(7)		(8)				+	+
(9)	2U1	(10)	+				+
(11)	2V1	(12)	+				+
(13)	1U1	(14)		+		+	
(15)	1V1	(16)		+		+	
(17)		(18)	+				+
(19)		(20)	+				+
(21)	W 1W1	(22)		+		+	
(23)	2W1	(24)	+				+

Abb. 6-4: Schaltplan - Wiring diagram B28GS, B30GS, B30GT

7 Anomalies

Problem	Cause / possible effects	Solution
Noise during work	• Spindle turning dry • Tool blunt or incorrectly secured	• Grease spindle • Use new tool and check securing (fixed setting of the bit, drill chuck and Morse taper)
Bit "burnt“	• Incorrect speed • The chips have not been removed from the bore hole. • Bit blunt • Operating without cooling agent	• Select another speed, feed too high • Extract bit more often • Sharpen or replace bit • Use coolant
Bit tip moves, bore is not circular	• Hard fibre in the wood or unequal length of the cutting spiral or unequal angles in the bit • Bit deformed	• Replace bit
Defective bit	• No support used	• Place a wooden board beneath the workpiece and secure the two.
Bit running off-centre or "hopping"	• Bit deformed • Bearings worn down in the drill head • Bit badly secured • Drill chuck defective	• Replace bit • Have the bearings in the drill head replaced • Secure the bit properly • Replace the drill chuck
Impossible to introduce drill chuck or taper mandrel	• Dirt, grease or oil on the inner conical surface of the drill chuck or on the conical surface of the drilling spindle	• Clean surfaces well • Keep surfaces free of grease
Motor does not start	• Motor badly connected • Defective fuse	• Have it checked by authorised personnel
Overheating of the motor and lack of power	• Motor overloaded • Insufficient mains voltage • Motor badly connected	• Reduce feed, disconnect if necessary and have it checked by authorised personnel • Have it checked by authorised personnel
Precision of the work deficient	• Heavy and unbalanced or twisted workpiece • Inexact horizontal position of the workpiece holder	• Balance the workpiece statically and secure it without straining • Adjust workpiece holder
Drilling spindle sleeve does not return to initial position	• Spindle return spring	• ☞ “Inspection and maintenance“ on page 28
Temperature in the spindle bearing too high	• Bearing worn down • Excessive prior tension of the bearing • Working at high rate for a long time	• Replacing • Reduce bearing slack for fixed bearing (taper roller bearing) • Reduce feed

Problem	Cause / possible effects	Solution
Working spindle rattling on rough workpiece surface	• Excessive slack in bearing • Working spindle goes up and down • Chuck loose • Tool blunt • Workpiece loose	• Readjust bearing slack or replace bearing • Readjust bearing slack (fixed bearing) • Check, re-tighten • Sharpen or replace tool • Secure the workpiece properly
Precision of the work deficient	• Heavy and unbalanced or twisted workpiece • Inexact horizontal position of the workpiece holder	• Balance the workpiece statically and secure it without straining • Adjust workpiece holder

8 Appendix

8.1 Copyright

8.2 Terminology/Glossary

Term	Explanation
Drilling spindle sleeve	Fixed hollow shaft in which the drilling spindle turns.
Drilling spindle	Shaft activated by the motor
Quick-action drill chuck	Manually tightenable bit holding fixture
Drill chuck	Device for holding the bit
Drift	Tool for removing the bit or the drill chuck from the drilling spindle
Taper mandrel	Cone of the bit or drill chuck
Tool	Bit, countersinker, etc.
Workpiece	Piece to be turned or machined
Drilling table	Bearing surface, clamping surface
Drill head	Upper part of the geared drill
Spindle sleeve lever	Manual control for advancing the bit

8.3 Warranty

Within the term of warranty, the company Optimum warrants for a perfect quality of its products and will reimburse any cost for overhaul or exchange of defective parts in case of construction error, fault in material and / or defect of fabrication.

The term of warranty for commercial use is 12 months and for use as an amateur it is 24 months. Condition for a warranty claim due to construction errors, faults in material and / or defects of fabrication is:

- Proof of purchase and that the instructions for use had been followed.
  In order to assert the claim of warranty, you have to present a typescript original receipt of purchase. It must comprise the complete address, date of purchase and type designation of the product.
  The instruction for use for the corresponding device as well as the safety information are to be observed. Damages due to operator's mistakes may not be accepted as warranty claims.
- Correct use of the devices.
  The products of the company Optimum had been designed and built for certain purposes. They are listed in the operation manual.
  The warranty claim may not be accepted if the operating manual is not being followed properly or if it is used for a purpose which has not been intended or with improper accessory.
- Maintenance work and cleaning.
  It is absolutely necessary to maintain and clean the machine in regular intervals according to the prescriptions of the instruction for use.
  By intervention of a third party, any warranty claim will expire. Maintenance work and cleaning are usually not part of the claim of warranty.
- Original spare parts
  Make sure to use only original spare parts and original accessory. This can be acquired from authorized distributors of the machine.
  When other than original parts are being used, consequential damages may occur and danger of accidents will increase. Disassembled or partially disassembled devices and devices which are repaired with foreign parts are excluded from warranty claims.
- Wearing parts
  Certain components are subject to wear out by time respectively a standard wear by use on the corresponding machine.
  Among these components are e.g. V-belts, ball bearings, switches, mains cables, gaskets and washers, etc. These wearing parts are not part of the warranty.

8.4 Product follow-up

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

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

- Modified settings
- Experiences with the geared drill, which could be important to other users
- Recurring failures

OPTIMUM Maschinen GmbH
Dr.-Robert-Pfleger-Str. 26

D-96103 Hallstadt

Telefax +49 951 - 96 555 - 99
E-mail: info@optimum-maschinen.de

8.5 EC Declaration of Conformity

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

hereby declares that the following product

Type of machine:	Geared drill
Name of machine:	**B28 GS** **B30 GS** **B30 GT**

Relevant EU directives:

Machinery Directive	98/37/EC, Annex II A
	89/336/EEC
Low Voltage Directive	73/23/EEC

meets the provisions of the aforementioned directive, including any amendments valid at the time of this statement.

In order to ensure conformity, the following harmonised standards in particular have been applied:

EN 12717: 2001 Safety of machine tools - Drilling machines

Thomas Collrep
(Manager)

Kilian Stürmer
(Manager)

Hallstadt, 8.2.08

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