



OPTIMUM

MASCHINEN - GERMANY



Operating manual

Version 1.1.4

Mill Drill

OPTImill®

BF 30V

Item no. 333 1828

Optional Stand, Item No. 335 3004

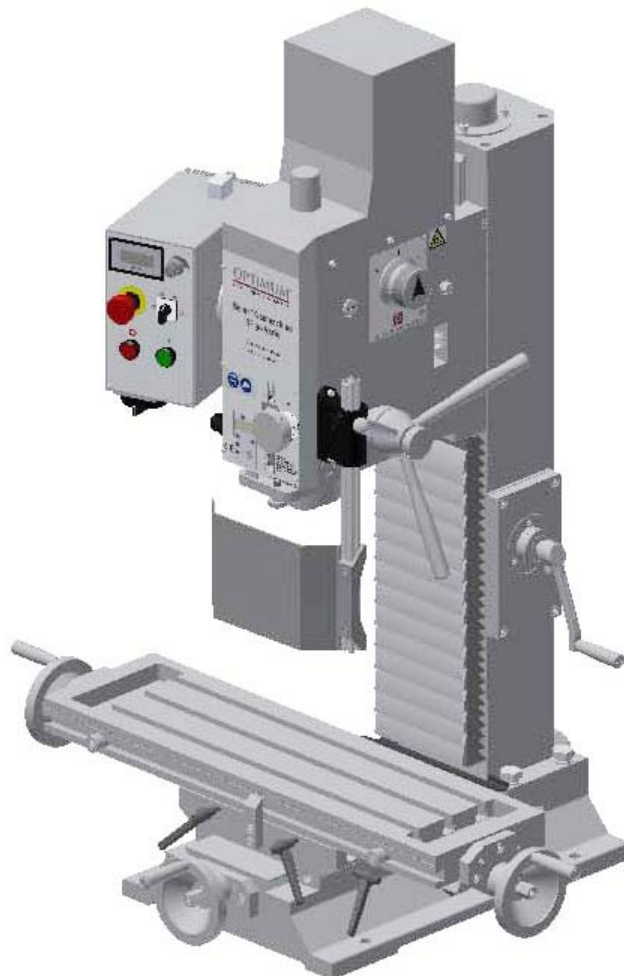




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Preface

Dear customer,

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

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

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

Keep these operating instructions in a safe place nearby the machine.

Information

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

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

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

The illustration and information included in the present manual can possibly deviate from the current state of construction of your machine. Being the manufacturer we are continuously seeking for improvements and renewal of the products. Therefore, changes might be performed without prior notice. The illustrations of the machine may be different from the illustrations in these instructions with regard to a few details. However, this does not have any influence on the operability of the machine.

Therefore, no claims may be derived from the indications and descriptions. Changes and errors are reserved!

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

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

LDS Industries, LLC
930 W. National Ave.
Addison, IL 60101
Tel.: 1-630-785-6437



1 Safety

This part of the operating instructions

- explains the meaning and use of the warning references contained in the operating manual,
- explains how to use the lathe 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 mill drill.

Consult OSHA, state and local regulations in order to determine compliance, danger and risks to the operator.

Always keep this documentation close to the mill drill.

If you would like to order another operating manual for your machine, please indicate the serial number of your machine. Please find the serial number on the type plate.

1.1 Type plate

| | | | |
|---|----------------------|---|----------|
| Milling machine | | LDS Industries, LLC | |
| BF 30 Vario | | 930 W. National Ave. Addison, IL 60101 | |
| NO. | 333 8438 |  | 3100 rpm |
|  | 3 HP 230 V ~60 Hz | SN | J |
|  | 585 lbs | Year | 20 |

INFORMATION

If you are unable to solve a problem using these operating instructions, please contact us for advice:

Exclusive USA Agent

LDS Industries, LLC

930 W. National Ave.

Addison, IL 60101

Tel.: 1-630-785-6437



1.2 Safety instructions (warning notes)

1.2.1 Classification of hazards

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

| Ideogram | Warning alert | Definition / consequence |
|----------|--------------------|--|
| | DANGER! | Threatening danger that will cause serious injury or death to people. |
| | WARNING! | A danger that might cause severe injury to the staff or can lead to death. |
| | CAUTION! | Danger or unsafe procedure that might cause injury to people or damage to property. |
| | ATTENTION! | Situation that could cause damage to the mill drill and products and other types of damage. No risk of injury to people. |
| | INFORMATION | Application 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 by





1.2.2 Other pictograms

| | | | |
|--|---|---|---|
|  <p>WARNING</p> <p>READ and UNDERSTAND instruction manual to avoid serious injury. If a manual is not available, DO NOT use machine. Call 1-800-266-9079</p> |  <p>WARNING!</p> <p>ENTANGLEMENT HAZARD! Tie back long hair, roll up long sleeves, and remove loose clothing, jewelry, or gloves to prevent getting caught in moving parts.</p> |  <p>WARNING</p> <p>Pinch/Entangle Hazard! Keep hands clear of outboard spindle and rotating workpiece to avoid serious injury.</p> |  <p>WARNING!</p> <p>PINCH/ENTANGLEMENT HAZARD Keep spindle guard in place and hands clear of outboard spindle and rotating workpiece to avoid serious injury.</p> |
|--|---|---|---|

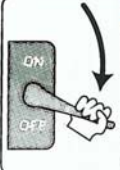
WARNING

Read and Understand instruction manual to avoid serious injury. If a manual is not available do not use machine. Call 1-855-813-1043



Eye injury Hazard!
Always wear safety glasses when using this machine.

WARNING



Disconnect power before adjustments, maintenance, or service.



WARNING

EYE INJURY HAZARD!
Always wear safety glasses when using this machine.



Activation forbidden!



Warning of flammable substances!



Warning of suspended loads!



Warning risk of stumbling!



Warning tilting danger!



Warning of automatic start-up!



Warning of biological hazard!



Read the operating instruction!



Pull the main plug!



Use safety glasses! protection



Use face shield!



Use protective boots!



Use protective suit!



Use ear protection!



Protect the environment!



Contact address



1.3 Proper use

WARNING!

In the event of improper use, the mill drill

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



The mill drill is designed and manufactured to be used for milling and drilling cold metals or other non-flammable materials or that do not constitute a health hazard by using commercial milling and drilling tools.

The mill drill must only be installed and operated in a dry and well-ventilated place.

If the mill drill is used in any way other than described above, or modified without authorization, then the mill drill- is being used improperly.

We do not take liability for damages caused by improper use.

We would like to stress that any modifications to the construction, or technical or technological modifications that have not been authorized will also render the warranty null and void.

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

"Technical data" on page 15

WARNING!

Very serious injury due to improper use.

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



1.4 Possible dangers caused by the mill drill

The mill drill was built using the latest technological advances.

Nonetheless there remains a residual risk, since the mill drill operates with

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

We have used construction resources and safety techniques to minimise the health risk to the staff resulting from these hazards.

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

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

- be duly qualified,
- strictly follow this operating manual.

Disconnect the mill drill from the electrical power whenever cleaning or maintenance work is being carried out.

WARNING!

The mill drill may only be used with the safety devices activated.

Disconnect the mill drill from the electrical power whenever you detect a failure in the safety devices or when they are not fitted!





All additional installations carried out by the operator need to incorporate the prescribed safety devices.

As the machine operator, this will be your responsibility!

 "Safety measures during operation" on page 9

1.5 Qualification of personnel

1.5.1 Target group

This manual is addressed to

- the operator,
- the user,
- the maintenance staff.

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

Always disconnect the mill drill plug from the electrical power. This will prevent it being used by unauthorised staff.

INFORMATION

All personnel involved in assembly, commissioning, operation and maintenance need to

- be duly qualified,
- strictly follow this operating manual.

In the event of improper use

- there may be a risk to the staff,
- there may be a risk to the mill drill and other material property,
- may affect proper operation of the mill drill.



1.6 Safety measures during operation

CAUTION!

Risk due to inhaling health hazardous dusts and mist.

Depending on the material being processed and any additional dusts and mist in the work area, conditions might impair your health.

Make sure that the generated health hazardous dusts and mist are safely removed at the point of origin and are collected and/ or filtered from the working area. Use an appropriate dust collection/ filter unit.



CAUTION!

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

Take additional preventive measures in order to safely avoid health hazards before processing flammable materials (e.g. aluminum, magnesium) or before using flammable additives (e.g. solvents).





1.7 Safety devices

Use the mill drill only with properly functioning safety devices.

Stop the mill drill 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 or has failed, the mill drill must only be used when

- the cause of the failure has been removed,
- it has been verified that there is no resulting danger for the staff 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 mill drill. 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 mill drill includes the following safety devices:

- an EMERGENCY-STOP button,
- a protective cover at the drill-mill head,
- a separating protective equipment on the milling spindle.

WARNING!

The separating protective equipment which is made available and delivered together with the machine is designed to reduce the risk of workpieces or fractions of them from being expelled, but not to remove them completely.



1.7.1 EMERGENCY-STOP button

The EMERGENCY-STOP button switches the mill drill off.

☞ "Starting the mill drill" on page 26



Fig. 1-1: EMERGENCY-STOP button

ATTENTION!

The EMERGENCY-STOP button switches off the mill drill immediately.

Only press the EMERGENCY-STOP button in case of danger! If the emergency stop button is actuated in order to stop the mill drill generally you might damage tools or workpieces.



After actuating the button, turn it to the right, in order to restart the machine.



1.7.2 Lockable main switch

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

When the main switch is switched off, the current supply is interrupted, except for areas marked by the pictogram below.

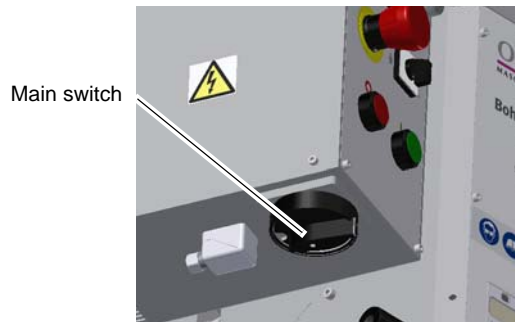


Fig. 1-2: Main switch

WARNING!

Dangerous voltage even if the main switch is switched off. In areas marked by this pictogram, there might be voltage, even if the main switch is switched off.



1.7.3 Protective cover

The drill-mill head is fitted with a protective cover.

WARNING!

Remove the protective cover only after the power plug of the mill drill has been pulled out of the receptacle.

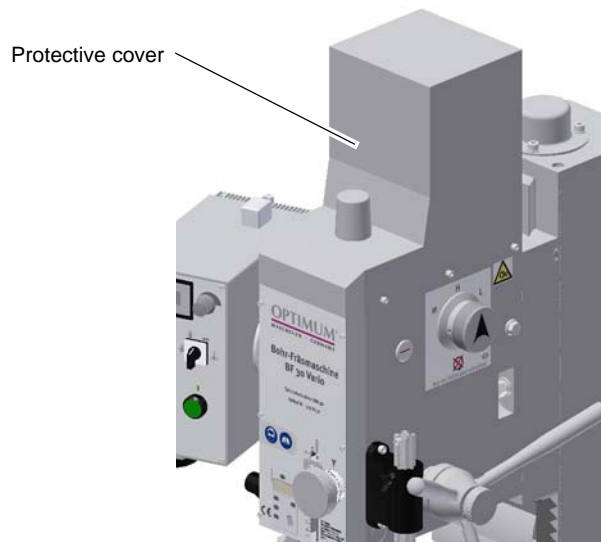


Fig. 1-3: Protective cover



1.7.4 Separating protective equipment

Adjust the protective guard equipment to the correct height before you start working.

To do so, detach the clamping screw, adjust the required height and retighten the clamping screw.

A switch is integrated in the fixture of the spindle protection which monitors that the cover is closed.

INFORMATION

YOU CANNOT START THE MACHINE IF THE PROTECTIVE GUARD IS NOT CLOSED.



Fig.1-4: Separating protective equipment

1.8 Safety check

Check the mill drill regularly.

Check all safety advices

- at the beginning of each shift,
- once a week (with the machine in operation),
- after every maintenance and repair operation.

| General check | | |
|-------------------|---------------------------------------|----|
| Equipment | Check | OK |
| Protective covers | Fitted, firmly bolted and not damaged | |
| Labels, markings | Installed and legible | |

| Run test | | |
|---|---|----|
| Equipment | Check | OK |
| EMERGENCY-STOP button | When the EMERGENCY-STOP button is activated, the mill drill should switch off. A restart will not be possible until the EMERGENCY-STOP button has been unlocked and the ON switch has been activated. | |
| Separating protective equipment around the drilling and milling spindle | Only switch on the mill drill if the protective equipment is closed. | |



1.9 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.



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



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



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



1.10 For your own safety during operation

WARNING!

Before activating the mill drill, double check that this will not endanger other people and cause damage to equipment.



Avoid any unsafe working practises:

Make sure your work does not endanger anyone.

- The instructions in this manual need to be observed during assembly, handling, maintenance and repair.
- Use protective goggles.
- Turn off the mill drill before measuring the workpiece.
- Do not work on the mill drill if your concentration is reduced, for example, because you are taking medication.
- Stay on the mill drill until the working spindle has come to a complete halt.
- Use prescribed protection gear. Make sure to wear a well-fitting work suit, when necessary, a hairnet.
- Do not use protective gloves during drilling or milling work.
- Unplug the shockproof plug from the electrical power before changing the tool.
- Use suitable devices for removing drilling and milling chips.
- Make sure your work does not endanger anyone.
- Clamp the workpiece tightly before activating the mill drill.

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

1.11 Disconnecting the mill drill and making it safe

Unplug the machine from the electrical power before beginning any maintenance or repair work.



1.12 Using lifting equipment

WARNING!

Use of unstable lifting equipment and load-suspension devices that break under load can cause very serious injury 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 OSHA or other inspection authorities.

Hold the loads properly.

Never walk under suspended loads!



Positions of the signs on the mill drill

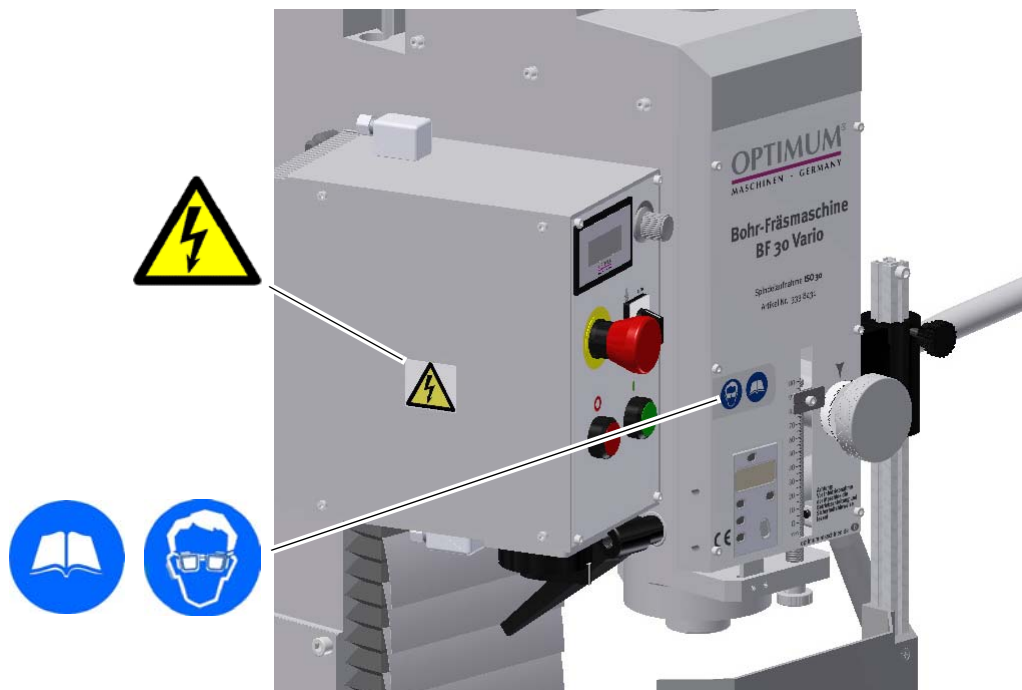


Fig. 1-5: BF30Vario



2 Technical data

The following information are the dimensions and indications of weight and the manufacturer's approved machine data.

| | |
|---|---------------------------------------|
| 2.1 Power Supply | |
| Motor | 3 HP, 230V, 1Ph, 60Hz |
| 2.2 Milling-drilling capacity | |
| Drilling capacity in steel | 24 mm /0.9" max. diam. |
| Drilling capacity cast iron | 28 mm /1.1" max. diam. |
| Milling capacity of end-mill cutter | 30 mm /1.2" max. diam. |
| Milling capacity of inserted tooth cutter | 75 mm /2.9" max. diam. |
| Swing | 440 mm /17.3" |
| 2.3 Spindle holding fixture | |
| Spindle holding fixture | R8 optional (ISO 30) |
| Extraction rod (Draw bar) R8 | 7/16" (R8) optional M12 (ISO 30) |
| Qill travel | 90 mm /3.5" |
| 2.4 Mill drill head | |
| Swivelling | + / - 90° |
| Gearbox stages | 3 |
| Z-axis travel | 470 mm /18.5" |
| 2.5 Cross table | |
| Table length | 750 mm /29.5" |
| Table width | 210 mm /8.3" |
| Y-axis travel | 200 mm /7.9" |
| X-axis travel | 450 mm /17.7" |
| T-slots | 1/2" slots, three |
| 2.6 Work area | |
| Height | 2100 mm /82.7" |
| Depth | 1900 mm /74.8" |
| Width | 2500 mm /98.4" |
| Total Weight | 265 Kg. /584 lbs |
| 2.7 Speeds | |
| Gearbox stage low | 80 - 1100 RPM |
| Gearbox stage middle | 160 - 1700 RPM |
| Gearbox stage rapid | 320 - 3100 RPM |



| 2.8 Environmental conditions | |
|-------------------------------------|---|
| Temperature | 40 - 95 °F (5 - 35 °C) |
| Humidity | 25 - 80% |
| 2.9 Service material | |
| Gearbox | Oil quantity 1-1/4 Qts. (1.2 L) 628 Mobil (Vis. 100/150) |
| Blank steel parts | Mobilux EP 004, acid-free oil, e.g., motor oil |

2.10 Emissions

The emission of the mill drill is below 76 dB(A).

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

INFORMATION

This numerical value was measured on a new machine under proper operating conditions. Depending on the age respectively on the wear of the machine it is possible that the noise behaviour of the machine changes.

Furthermore, the factor of the noise emission is also depending on manufacturing influencing factors, e.g. speed, material and clamping conditions.



INFORMATION

The mentioned numerical value is the emission level and 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 or damping behaviour,
- Other noise sources, e.g. the number of machines,
- Other processes taking place in the 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 shall allow the operator of the machine to more easily evaluate the endangering and risks.



CAUTION!

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

We generally recommend to use a noise protection and a hearing protection.





2.11 Installation plan BF30 Vario

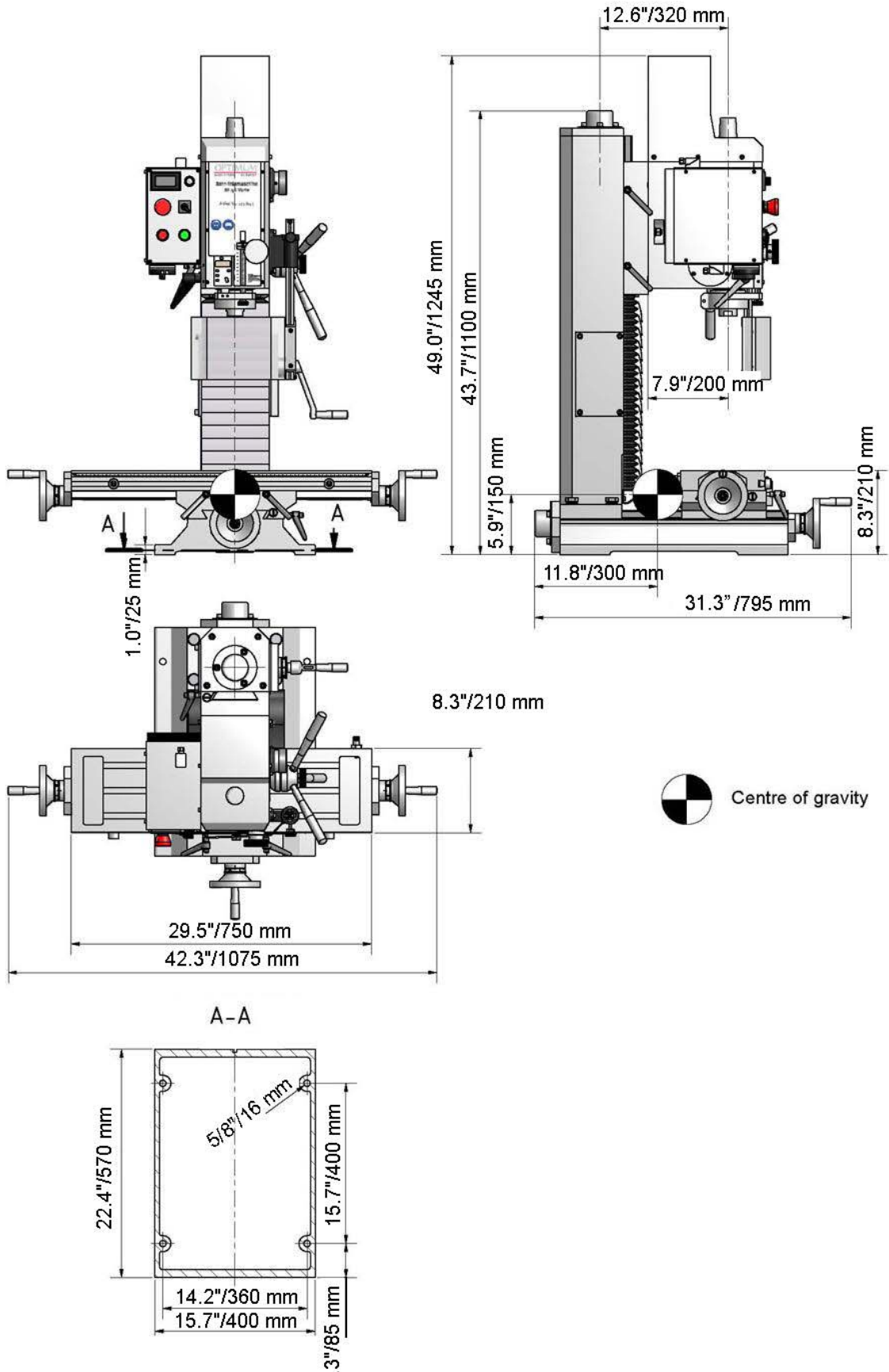


Fig.2-1: Installation plan BF30 Vario



2.12 Installation plan of optional stand



Fig.2-2: Installation plan of optional stand



3 Unpacking and connecting

INFORMATION

The mill drill is pre assembled.



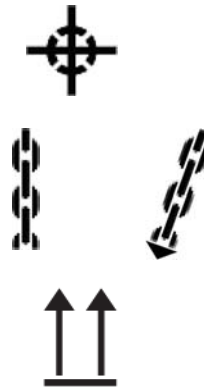
3.1 Scope of delivery

Check immediately upon delivery of the mill drill if there are any transport damages or loosened fastening screws.

Compare the scope of delivery with the packing list.

3.2 Transport

- Centres of gravity
- Load suspension points
(Marking of the positions for the load suspension gear)
- Prescribed transportation position
(Marking of the top surface)
- Means of transport to be used
- Weights



WARNING!

Severe or fatal injuries may occur if 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 case.



WARNING!

The use of unstable lifting and load suspension gear that might break under load can cause severe injuries or even death. Check that the lifting and load suspension gear has sufficient load capacity and that it is in perfect condition.



Observe the accident prevention regulations issued by OSHA or other competent supervisory authority, responsible for your company.

Fasten the loads properly.

Never walk under suspended loads!



3.3 Storage

ATTENTION!

In case of wrong and improper storage electrical and mechanical machine components might get damaged and destroyed.

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

Follow the instructions and information on the transport case.



- Fragile goods
(Goods require careful handling)



- Protect against moisture and humid environment
👉 "Environmental conditions" on page 16.



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



- Maximum stacking height

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



3.4 Installation and assembly

3.4.1 Requirements regarding the installation site

Organize the working area around the mill drill according to the local safety regulations.

INFORMATION

In order to attain good functionality and a high processing accuracy as well as a long durability of the machine the installation site should fulfil certain criteria.



Please observe the following points:

- The device must only be installed and operated in a dry and well-ventilated place.
- Avoid places nearby machines generating chips or dust.
- The installation site must be free from vibrations also at a distance of presses, planing machines, etc.
- The stand must be suitable for the mill drill. Also make sure that the floor has sufficient load bearing capacity and is level.
- The stand must be prepared in a way that possibly used coolant cannot penetrate into the floor.
- Any parts sticking out such as stops, handles, etc. have to be secured by measures taken by the customer if necessary in order to avoid endangerment of persons.
- Provide sufficient space for the staff preparing and operating the machine and transporting the material.



- Also consider that the machine is accessible for setting and maintenance works.
- Provide for sufficient illumination (Minimum value: 47 lumens ft², measured at the tool tip).
At little intensity of illumination an additional illumination has to be ensured e.g. by means of a separate workplace lamp.

INFORMATION

The mains plug of the mill drill must be freely accessible.



3.4.2 Load suspension point

WARNING!

Danger of crushing and overturning. Proceed carefully when lifting, installing and assembling the machine.



- Secure the load-suspension device around the drill-mill head. Use a lifting sling for this purpose.
lifting sling.
- Firmly clamp all clamping levers on the mill drill before lifting the mill drill.
- Make sure that the load attachment does not cause damage to components or paint.

3.4.3 Assembly

- Check if the underground of the mill drill is level using a spirit level.
- Check if the underground is sufficiently stable and rigid.
The total weight amounts to 265 Kg. /584 lbs.

ATTENTION!

Insufficient rigidity of the foundation leads to the superposition of vibrations between the mill drill and the foundation (natural frequency of components). Insufficient rigidity of the entire mill drill assembly also rapidly causes the machine to reach critical speeds, with unpleasant vibrations, leading to bad milling results.



- Position the mill drill on the intended foundation.
- Attach the mill drill using the provided recesses in the machine base.

WARNING!

The quality of the stand and the kind of fixture of the machine stand to the substructure has to assimilate the loads of the machine. The substructure needs to be even. Please check the horizontal alignment of the substructure of the machine with a level. Fix the machine to the substructure at the provided recesses at the stand. Connector cartridges or heavy-duty bolts are strongly recommended.



- ☞ "Installation plan BF30 Vario" on page 17,
- ☞ "Installation plan of optional stand" on page 18



3.5 First commissioning

ATTENTION!

Before commissioning the machine check all screws, fixtures resp. safety devices and tighten up the screws if necessary!



WARNING!

Risk by using improper workpiece clamping materials or by operating the machine with inadmissible speed.



Only use the clamping materials (e.g. drill chuck) which had been delivered together with the machine or as optional equipment.

Use the working clamping materials only in the provided admissible speed range.

Workpiece clamping materials must only be modified according to the recommendations or of the clamping material manufacturer.

WARNING!

Staff and equipment may be endangered if the mill drill is first used by inexperienced staff. We do not take responsibility for damage caused by incorrect commissioning.



☞ "Qualification of personnel" on page 9

3.5.1 Power supply

CAUTION!

Lay the connection cable of the machine so that a stumble of persons is prevented.

- ➔ Connect the electrical supply cable.
- ➔ Check the fusing (fuse) of your electrical supply according to the technical instructions regarding the total connected power of the mill drill.



3.5.2 Cleaning and lubricating

- ➔ Remove the anti-corrosive agents on the mill drill which had been applied for transportation and storage. Therefore, we recommend you to use mineral spirits, with a soft cloth.
- ➔ Do not use any solvents, cellulose thinner or any other cleaning agents which might affect the coating of the mill drill when cleaning the machine. Observe the indications and notes of the manufacturer for cleaning agents.
- ➔ Oil all blank machine parts using an acid-free lubricating oil.
- ➔ Lubricate the mill drill according to the lubricating plan.
☞ "Inspection and maintenance" on page 36
- ➔ Check if all spindles are running smoothly. The spindle nuts are re-adjustable.
- ➔ Disassemble the V-ledges of the cross table and clean the ledges from the anti-corrosive agent. ☞ "V-ledges" on page 40

3.5.3 Filling in gear oil

The mill drill is delivered without oil filling. Fill in gear oil.

☞ "Oil change" on page 37



3.5.4 Warming up the machine

ATTENTION!

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

If the machine is cold such as 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.



3.6 Optional accessories

| Description | Item number |
|--|-------------|
| Machine stand Dimensions (L x W x H): 25.5 x 21.7 x 29.5" 650 x 550 x 750 mm | 3353004 |
| Vice 5" Precision Modular | 3355553 |





4 Operation

4.1 Safety

Commission the mill drill only under the following conditions:

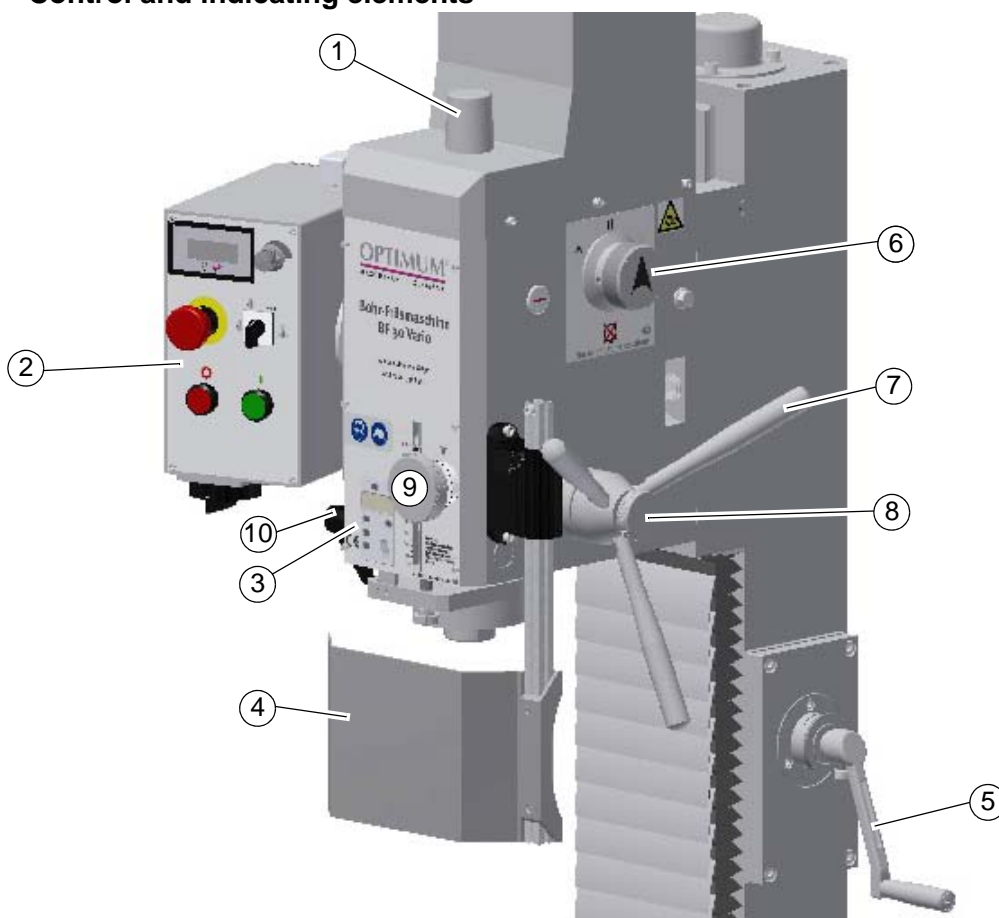
- The mill drill is in proper working order.
- The mill drill is used as intended.
- The operating manual is followed.
- All safety devices are installed and activated.

All problems should be eliminated immediately. Stop the mill drill immediately in the event of any problem in operation and make sure it cannot be started up accidentally or without authorization.



☞ "For your own safety during operation" on page 13

4.2 Control and indicating elements



| Pos. | Designation | Pos. | Designation |
|------|--|------|-------------------------------------|
| 1 | Cover of draw-in rod | 2 | Control panel |
| 3 | Digital display fine feed of spindle | 4 | Spindle protection |
| 5 | Crank for height adjustment of the drill-mill head | 6 | Selector switch for reduction stage |
| 7 | Star grip for spindle quill | 8 | Activation of the fine adjustment |
| 9 | Fine adjustment of spindle | 10 | Clamping lever for spindle quill |



4.2.1 Control panel

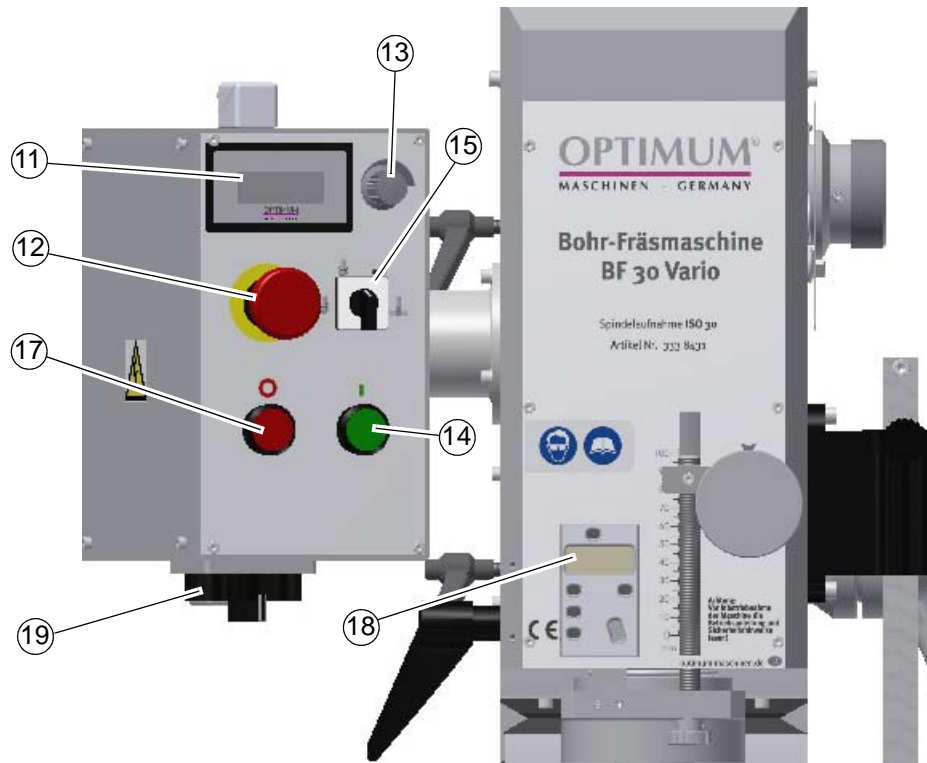


Fig. 4-1: Control panel

| Pos. | Designation | Pos. | Designation |
|------|------------------------------------|------|--|
| 10 | Clamping screw of spindle quill | 11 | Digital display speed |
| 12 | EMERGENCY-STOP | 13 | Speed control |
| 14 | Push button spindle rotation "ON" | 15 | Selection switch operating mode ○ Automatic ○ Threading ○ turning direction |
| 17 | Push button spindle rotation "OFF" | 18 | Digital display fine feed of spindle quill |
| 19 | Main switch | | |

Selection switch for operating mode

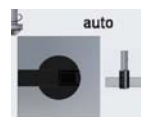
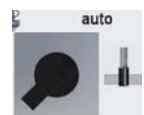
With the selector switch the operating mode „automatic, threading or right-hand respectively left-hand run“ is being selected.

Operation mode automatic

In the automatic mode the motor starts up according to a predefined path over the drilling depth limit of the spindle quill and stop at the end position. This way for, the push button Start and Stop does not have to be actuated for repetitive drilling tasks.

Operation mode thread cutting

In the thread cutting mode the motor 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.





Rotation direction switch

In standard operation, for selection of "right-hand" or "left-hand" rotation. During left-handed rotation, the speed is about 50% less than with right-handed rotation. Select the turning direction before switching on the machine with the push button.



Potentiometer

Speed setting "VARIO"



"ON" push button

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

"OFF" push button

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



Main switch

Interrupts or connects the power supply.



4.3 Switching on the mill drill

- Switch on the main switch.
- Close the protective equipment.
- Select the operating mode.
- Select the gear level.
- Set the potentiometer to the lowest speed.
- Actuate the hand-actuated auxiliary switch Start.
- Set the required speed on the potentiometer.

ATTENTION!

Wait until the mill drill has come to a complete halt before inverting the turning direction using the change-over switch.



INFORMATION

At a cold mill drill it is possible that with switching on the machine an overload of the drive occur.

Therefore, allow the mill drill at low speeds depending on environmental conditions to warm up for 10 to 20 minutes before you go to maximum speed.

Also with a quick on and off, this overload occur. Therefore wait for about 3 seconds before you switch on the mill drill again, the capacitors in the controller must first discharged.



4.4 Switching off the mill drill

- Press the "OFF" push button. For long-term standstill switch the mill drill off with the main switch.



4.5 Inserting a tool

4.5.1 Installation

CAUTION!

When milling operations are performed the cone seat must always be fixed to the draw-in rod. All cone connections with the taper bore of the work spindle without using the draw-in rod are not allowed for milling operations. The cone connection should be released by the lateral pressure. Injuries may be caused by parts flying off.



The mill head is equipped with a draw-in rod 7/16" with R8 spindle seat and 12mm for ISO 30 seat.

- Remove the cover.
- Clean the seat in the spindle / quill.
- Clean the taper of your tool.
- Insert the tool in the spindle / quill.



Fig. 4-2: Drilling and mill head

- Screw the draw-in bar in the tool.
- Tighten the tool with the draw-in rod and hold the spindle on the end support with a key.

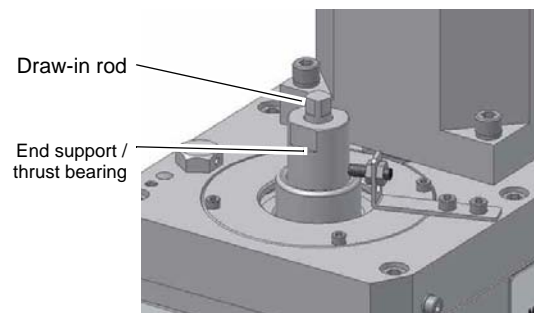


Fig. 4-3: Drilling-mill head without cap

4.5.2 Unfitting

- Hold the spindle thrust bearing with a wrench and loosen the draw-in rod 2-3 turns. Tap top of draw rod with plastic hammer to loosen the tool from the cone. Turn the draw-in rod further, so that the tool is released completely out from the cone.

ATTENTION!

When using an MT spindle.

When installing a cold morse taper into a heated-up machine those MT seats tend to shrink on the Morse taper versus a quick-releaser taper.



4.5.3 Use of collet chucks

When using collet chucks for the reception of milling tools, a higher operation tolerance can be achieved. The exchange of the collet chucks for a smaller or larger end mill cutter is performed simply and rapidly and it is not necessary to disassemble the complete tool. The collet chuck is pressed into the ring of the swivel nut and must rest there by itself. The milling cutter is clamped by fastening the swivel nut on the tool.

Make sure that the correct collet chuck is used for each milling cutter diameter, so that the milling cutter may be fastened securely and firmly.



4.6 Clamping the workpieces

CAUTION!

Injury by flying off parts.

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



4.7 Changing the speed range

ATTENTION!

Wait until the mill drill has come to a complete halt, before performing any changes on the gear switch.



→ Select gear level

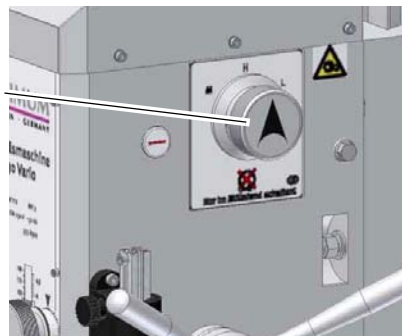
H = rapid

M = middle

L = low

→ Adjust the speed with the potentiometer. The speed and thus the cutting speed depends on the material of the workpiece, the milling cutter diameter and the cutter type.

Selector switch
Gear stage



4.8 Selecting the speed

For milling operations, the essential factor is the selection of the correct speed. The speed determines the cutting speed of the cutting edges which cut the material. By selecting the correct cutting speed, the service life of the tool is increased and the working result is optimised.

The optimum cutting speed mainly depends on the material and on the material of the tool. With tools (milling cutters) made of hard metal or ceramic insert it is possible to work at higher speeds than with tools made of high-alloyed high-speed steel (HSS). You will achieve the correct cutting speed by selecting the correct speed.

In order to determine the correct cutting speed for your tool and for the material to be cut, you may refer to the following standard values or a table reference book (e.g. Machinery's Handbook ISBN 0-8311-2424-5, Insert Pgs. 30a & 30b (attached)).

The required speed is calculated as follows:

$$N = \frac{12V}{\pi \times D} = 3.82 \frac{V}{D}$$



4.8.1 Standard values for cutting speeds

[FPM] with high-speed steel and hard metal in conventional milling

| Tool | Steel | Grey Cast Iron | Age-Hardened Al alloy |
|-------------------------------------|-----------|----------------|-----------------------|
| Peripheral and side milling (FPM) | 33 - 82 | 33 - 72 | 492 - 1,148 |
| Relieved form cutters (FPM) | 49 - 79 | 33 - 66 | 492 - 820 |
| Inserted tooth cutter with SS (FPM) | 49 - 79 | 39 - 82 | 656 - 984 |
| Inserted tooth cutter with HM (FPM) | 328 - 656 | 98 - 328 | 984 - 1,312 |

Given below are standard values for speeds depending on the milling cutter diameter, cutter type and material.

| Tool diameter (in.) Peripheral and side milling cutters | Steel | Grey Cast Iron | Age-Hardened Al alloy |
|--|-------------|----------------|-----------------------|
| | 33 - 82 FPM | 33 - 72 FPM | 492 - 1,148 FPM |
| | Speed (RPM) | | |
| 1.378" | 91 - 227 | 91 - 200 | 1,365 - 3,185 |
| 1.575" | 80 - 199 | 80 - 175 | 1,195 - 2,790 |
| 1.772" | 71 - 177 | 71 - 156 | 1,062 - 2,470 |
| 1.969" | 64 - 159 | 64 - 140 | 955 - 2,230 |
| 2.165" | 58 - 145 | 58 - 127 | 870 - 2,027 |
| 2.362" | 53 - 133 | 53 - 117 | 795 - 1,860 |
| 2.559" | 49 - 122 | 49 - 108 | 735 - 1,715 |

| Tool diameter (in.) Form cutters | Steel | Grey Cast Iron | Age-Hardened Al alloy |
|-------------------------------------|---------------|----------------|-----------------------|
| | 49 - 79 FPM | 33 - 66 FPM | 492 - 820 FPM |
| | Speed (RPM) | | |
| 0.1575" | 1,194 - 1,911 | 796 - 1,592 | 11,900 - 19,000 |
| 0.1969" | 955 - 1,529 | 637 - 1,274 | 9,550 - 15,900 |
| 0.2362" | 796 - 1,274 | 531 - 1,062 | 7,900 - 13,200 |
| 0.3150" | 597 - 955 | 398 - 796 | 5,900 - 9,900 |
| 0.3937" | 478 - 764 | 318 - 637 | 4,700 - 7,900 |
| 0.4724" | 398 - 637 | 265 - 531 | 3,900 - 6,600 |
| 0.5512" | 341 - 546 | 227 - 455 | 3,400 - 5,600 |
| 0.6299" | 299 - 478 | 199 - 398 | 2,900 - 4,900 |



4.8.2 Standard values for speeds with HSS – Eco – twist drilling (U.S. unit)

| Material | | Cutter Diameter (in.) | | | | | | | | | Coolant ₃ |
|--|----------------|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|----------------------|
| | | 0,0787 | 0,1181 | 0,1575 | 0,1969 | 0,2362 | 0,2756 | 0,3150 | 0,3543 | 0,3937 | |
| Steel, unalloyed, up to 87,000 PSI | n ¹ | 5.600 | 3.550 | 2.800 | 2.240 | 2.000 | 1.600 | 1.400 | 1.250 | 1.120 | E |
| | f ² | 0,0016 | 0,0025 | 0,0031 | 0,0039 | 0,0049 | 0,0049 | 0,0063 | 0,0063 | 0,0079 | |
| Structural steel, alloyed, quenched and sub-drawn, up to 130,000 PSI | n | 3.150 | 2.000 | 1.600 | 1.250 | 1.000 | 900 | 800 | 710 | 630 | E/Oil |
| | f | 0,0013 | 0,002 | 0,0025 | 0,0031 | 0,0039 | 0,0039 | 0,0049 | 0,0049 | 0,0063 | |
| Structural steel, alloyed, quenched and sub-drawn, up to 174,000 PSI | n | 2.500 | 1.600 | 1.250 | 1.000 | 800 | 710 | 630 | 560 | 500 | Oil |
| | f | 0,0013 | 0,0016 | 0,0020 | 0,0025 | 0,0031 | 0,0039 | 0,0039 | 0,0049 | 0,0049 | |
| Stainless steels up to 130,000 PSI e.g., X5CrNi18 10 | n | 2.000 | 1.250 | 1.000 | 800 | 630 | 500 | 500 | 400 | 400 | Oil |
| | f | 0,0013 | 0,0020 | 0,0025 | 0,0031 | 0,0039 | 0,0039 | 0,0049 | 0,0049 | 0,0063 | |

1: Speed (n) in RPM

2: Feed Rate (f) in./rev.

3: Coolant: E = Emulsion; Oil = Cutting oil

- The above mentioned indications are standard values. In some cases it may be advantageous to increase or decrease these values.
- When drilling a cooling or lubricating agent should be used.
- For stainless materials (e.g. VA – or NIRO steel sheets) do not center as the material would compact and the drill bit will become rapidly blunt.
- The workpieces need to be tensed in flexibly and stably (vice, screw clamp).

INFORMATION

High temperatures are generated at the tip of the tool by the occurring friction heat. The tool should be cooled during the milling process. Cooling the tool with a suitable cooling lubricant ensures better working results and a longer edge life of the cutting tool.



INFORMATION

Use a water-soluble and non-pollutant emulsion as a cooling agent. This can be acquired from authorised distributors.

Make sure that the cooling agent is properly retrieved. Respect the environment when disposing of any lubricants and coolants. Follow the manufacturer's disposal instructions.



4.9 Manual spindle quill feed with the fine feed

- ➔ Turn the handle screw.
The spindle quill lever moves in direction of the mill head and activates the coupling of the fine feed.
- ➔ Turn the spindle quill fine feed in order to move the spindle quill.

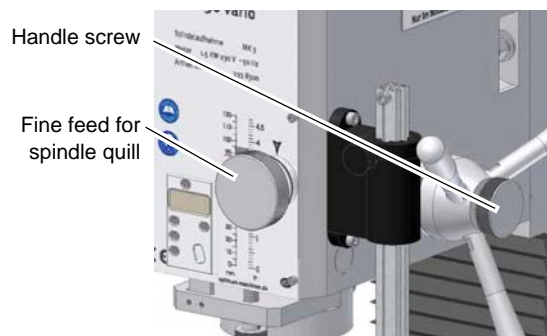


Fig.4-4: Handle screw



4.10 Manual spindle quill feed with the spindle lever

ATTENTION!

The clutch of the fine feed has to be disengaged before the spindle quill lever can be used. Activating the spindle quill lever when the fine feed is engaged may damage the clutch.

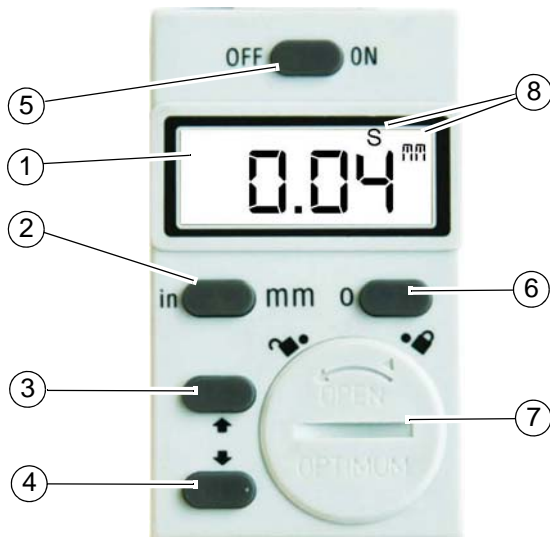


Loosen the handle screw Fig.4-4: "Handle screw" on page 30.

The sleeve lever moves away from the drilling head and deactivates the coupler of the fine feed.

4.11 Digital display for spindle quill travel

| | |
|-------------------|------------------------------------|
| Measuring range | 0 - 999.99mm 0 - 39.371"inch |
| Reading precision | 0.01mm 0.0004"inch |
| Battery | round cell CR2032 , 3 V 20 x 3,2mm |



| Pos. | Description |
|------|---|
| 1 | LCD display |
| 2 | Shifting mm/inch |
| 3 | Performs a value increase in operating mode "S" (Setting) |
| 4 | Performs a value decrease in operating mode "S" (Setting) |
| 5 | ON/OFF switch |
| 6 | Zero position and activation of operation mode "S" |
| 7 | Battery compartment |
| 8 | Display of operation mode "S" and selected unit "mm / inch" |

Operation mode "S"

The operation mode "S" is used to enter and to compensate the mechanical play (backlash) of quill mechanism.

- (1) Display which shows the operating modes "S", "inch" or "mm"



- (2) converts the measuring unit from *millimetres* to *inches* and vice versa.
- (3) ↑ , Value increase in operation mode "S"
- (4) ↓ , Value decrease in operation mode "S"
- (5) Switches the display ON or OFF.
- Resets the display to the set compensation value "S".

Enter the offset value of the quill mechanism

- ➔ Press the button (6) for about 2-3 seconds. The operation mode (8) "S" is activated and displayed.
- ➔ Enter the offset value of a quill mechanism, based on your experience with the keys (3) or (4).
- ➔ Stop the operation mode "S" by pressing the button (6) again.

INFORMATION



Before inserting the new battery, wait about 30 seconds. Please make sure, that the contacts are metallicly bright and free from coverings which result from bleeding or gassing batteries. Grip the new batteries only with plastic forceps, if possible not with the hand due to the formation of oxide and never with metal forceps in order to avoid a short circuit. In most cases the round cell will be inserted into the digital display with the marking upside. After inserting the round cell, the battery compartment has to be closed again.

4.11.1 Troubleshooting

| Problem | Cause / possible effects | Solution |
|-------------------------|---|---|
| Flashing of the display | <ul style="list-style-type: none">• Voltage too low | <ul style="list-style-type: none">• Change battery |
| Screen doesn't refresh | <ul style="list-style-type: none">• Operation mode "S" is active• Disturbance in the circuit | <ul style="list-style-type: none">• Disable the operation mode "S".• Remove the battery, wait 30 seconds and reinsert the battery. |
| No data visible | <ul style="list-style-type: none">• No power supply• Battery voltage less than 3V | <ul style="list-style-type: none">• Clean battery contacts• Replace battery |



4.12 Swivelling the drill-mill head

The drill-mill head may be swivelled 45° to the right and to the left. Four screwings need to be loosened.

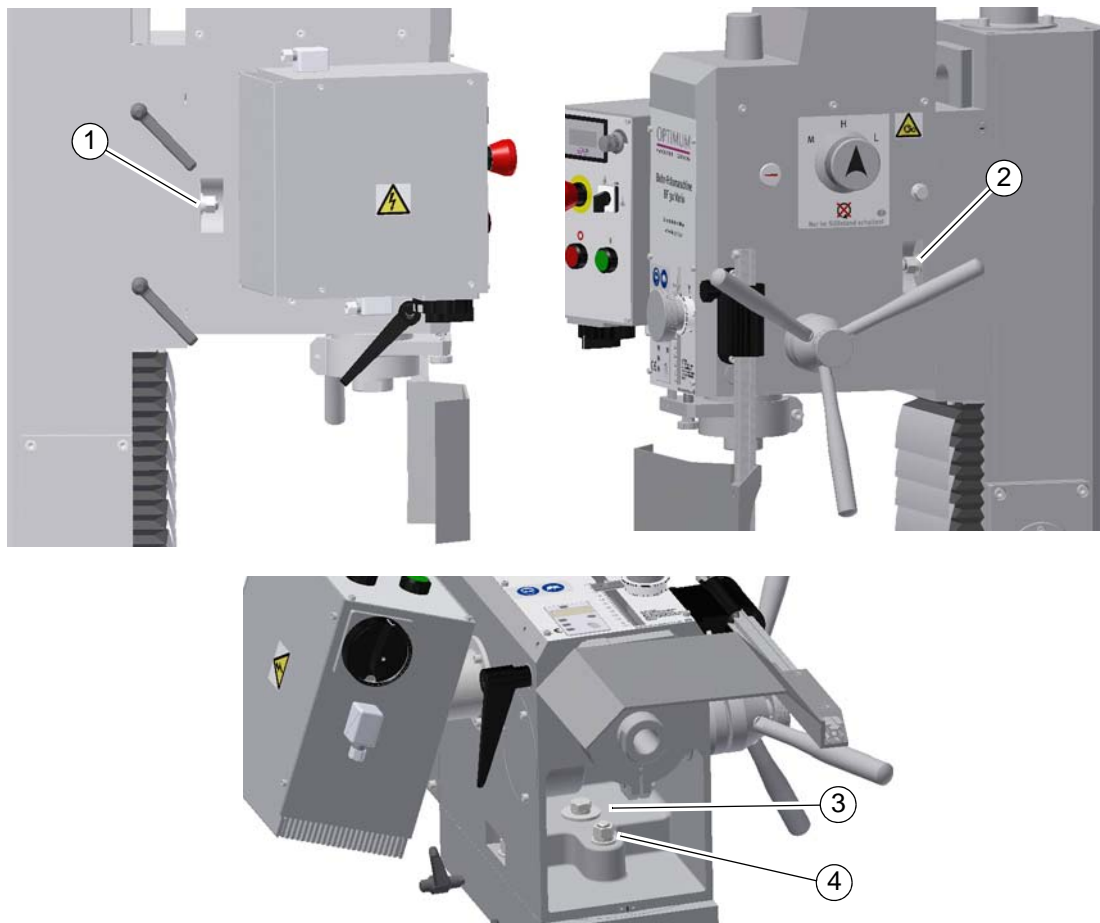


Fig.4-5: Clamping screws

ATTENTION!

The drill-mill head can be rotated much further. When tilting it further on gear oil might escape.



CAUTION!

If the screws are completely unfastened, the mill head might fall down.

When slewing the working head, only unfasten the screws as far as necessary to be able to perform the settings. After having set the tilt angle, retighten the clamping screws.





4.13 Threading

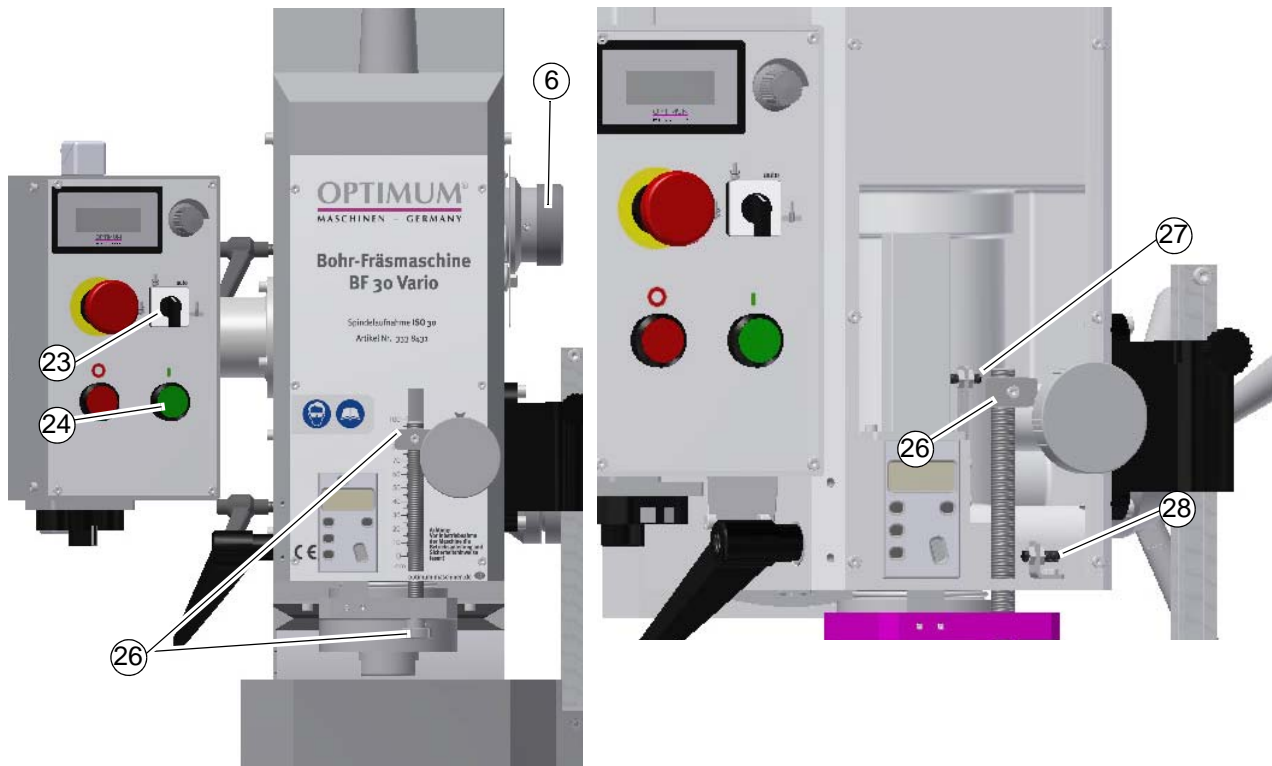


Fig.4-6: Operation mode thread cutting

| Pos. | Designation | Pos. | Designation |
|------|--|------|-----------------------------------|
| 6 | Selector switch for reduction stage | 20 | Speed control |
| 23 | Selection switch operating mode ○ automatic ○ threading ○ turning direction | 24 | "ON" push button spindle rotation |
| 26 | Depth stop | 27 | Adjustable stop cycle end |
| 28 | End position switch turning direction reversal | | |

- ➔ Set the selection switch mode (23) to "threading" or "automatic".
- ➔ Set the depth stop (26) to the desired depth.
- ➔ Select the smallest speed.
- ➔ Close spindle protection system.
- ➔ Start the rotation of spindle (24).
- ➔ Move the sleeve downward with the sleeve lever until the machine tap cams in the work-piece.

The machine tap turns into the workpiece. As soon as the preset depth is attained, the spindle reverses the direction of rotation at the switch point (28). The machine tap turns out of the work-piece. When the spindle quill is completely entered up to the switch point (27) in operation mode "automatic" the rotation of the spindle is stopped. Then it is possible to proceed another threading operation.

ATTENTION!

The spindle quill must be completely retracted in order to trigger the switch point (27).





5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the mill drill.

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

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

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



5.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

- very serious injury to personnel working on the mill drill,
- damage to the mill drill.

Only qualified staff should carry out maintenance and repair work on the mill drill.



5.1.1 Preparation

WARNING!

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

"Disconnecting the mill drill and making it safe" on page 13

Attach a warning sign.



5.1.2 Restarting

Before restarting run a safety check.

"Safety check" on page 12

WARNING!

Before starting the mill drill, you must check that there is no danger for persons and that the mill drill is not damaged.





5.2 Inspection and maintenance

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


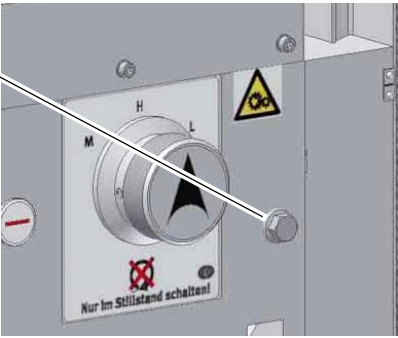
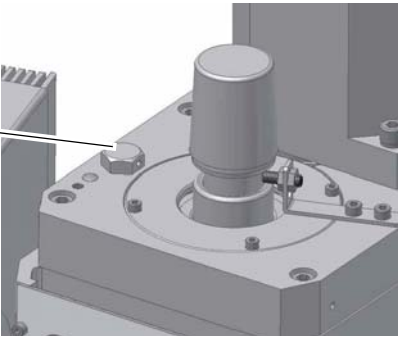
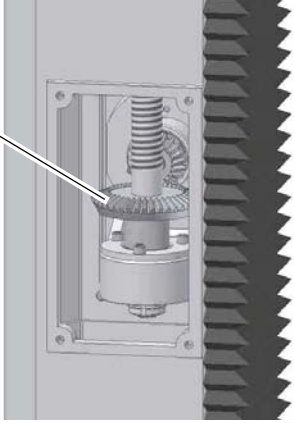

| Interval | Where? | What? | How? |
|--|-------------------|-----------------------------|--|
| Start of work, after every maintenance or repair work | mill drill | → "Safety check" on page 12 | |
| Start of work, after every maintenance or repair work | Dovetail guides | Oiling | → Lubricate all slideways. |
| Every week | Cross table | Oiling | → Oil all bare steel surfaces. Use an acid-free oil, e.g. weapon oil or motor oil. |
| Every week | Gear milling head | Oil level | <p>→ Check the oil level of the gear. The oil level must be in the middle of the view glass.</p>  |

Fig.5-1: Oil sight glass speed gear

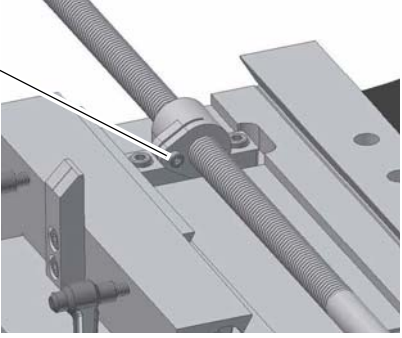
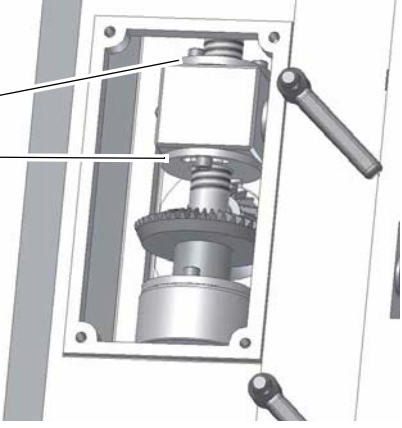


| Interval | Where? | What? | How? |
|---|--------------------------|--------------------|--|
| <p>First after 200 operating hours, then every 2000 operating hours</p> | <p>Gear milling head</p> | <p>Oil change</p> | <ul style="list-style-type: none"> ➔ For oil change use an appropriate collecting tray of sufficient capacity. ➔ Have the mill drill run for a few minutes, the oil will heat up and will slightly penetrate from the opening. ➔ Remove the ventilation screw from the gear. ➔ Remove the oil drain plug. ➔ Refill the oil over the removed ventilation screw. <p>Quantity and type of oil: "Service material" on page 16</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Oil drain plug</p> </div> <div style="text-align: center;">  <p>Ventilation screw of the gear</p> </div> </div> <p style="text-align: right;">Fig.5-2: Milling head</p> |
| <p>Every six months</p> | <p>Adjustment Z axis</p> | <p>Lubricating</p> | <ul style="list-style-type: none"> ➔ Clamp the milling head. ➔ Remove the service cover from the column. ➔ Lubricate the gearwheels. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Toothed wheels feed gear</p> </div> </div> <p style="text-align: right;">Fig.5-3: Adjustment Z axis</p> |

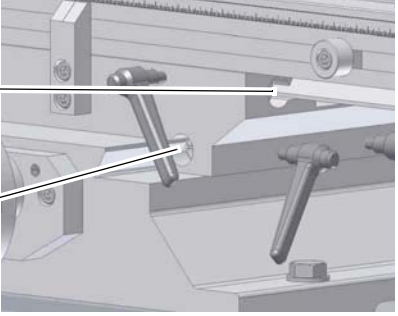

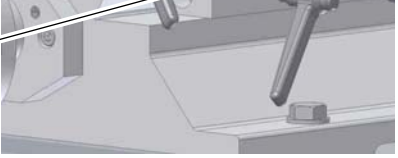
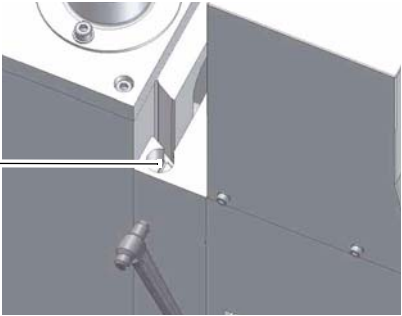
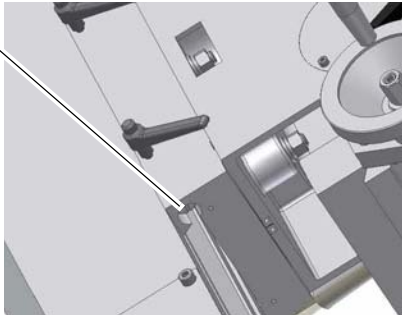


| Interval | Where? | What? | How? |
|------------|------------|--------|---|
| Every week | mill drill | Oiling | <p>→ Lubricate all slideways.</p>  <p>Fig.5-4: Slideways</p> |



| Interval | Where? | What? | How? |
|-------------|--------------------------------|-------------|--|
| As required | Spindle nut cross table | Readjusting | <p>An extended clearance in the spindles of the cross table can be reduced by readjusting the spindle nuts.</p>  <p style="text-align: center;">Spindle nut adjusting screw</p> <p style="text-align: center;">Fig.5-5: Spindle nut X - axis (milling table faded out)</p> <p>The spindle nuts are readjusted by reducing the thread flanks of the spindle nut by means of a regulating screw. Due to the readjustment it is necessary to check if a smooth movement over the whole travel is still given, otherwise the wear is considerably increased due to the friction between the spindle nut and the spindle.</p> <p>The regulating screw of the spindle nut of the Y axis is accessible from the rear side, the regulating screw of the spindle nut of the x axis is accessible from the right or left side of the milling table.</p> |
| As required | Spindle nut Z- axis | Readjusting | <p>An enlarged clearance in the spindle of the Z-axis can be performed by reciprocal turning of the spindle nut.</p>  <p style="text-align: center;">Spindle nut firm at the top Spindle nut turnable at the bottom</p> <p style="text-align: center;">Fig.5-6: Spindle nuts Z-axis</p> <p>Due to the readjustment it is necessary to check if a smooth movement over the whole travel is still given, otherwise the wear is considerably increased due to the friction between the spindle nut and the spindle.</p> <ul style="list-style-type: none"> ➔ Turn the crank of the mill head as low as possible. ➔ Firmly clamp the clamping lever left and right. ➔ Remove the service cover from the column. |



| Interval | Where? | What? | How? |
|-------------|-----------------|-----------------------------|---|
| As required | V-ledges | Readjusting X and Y axis | <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="margin-right: 10px;">Cross table</div>  </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="margin-right: 10px;">Regulating screw V-ledge X axis right side</div>  </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">Regulating screw V-ledge Y axis front</div>  </div> </div> <p style="text-align: center; margin-bottom: 10px;">Fig.5-7: Cross table</p> <ul style="list-style-type: none"> ➔ Turn the adjusting screw of the respective taper gib front and rear, or left and right in the clockwise direction. The taper gib is continued to push in and reduced by it the gap in the guide way. ➔ Check the settings. The respective guide way must be still easily mobile from the adjustment, result in however a stable guidance. |
| As required | V-ledges | Readjusting Z axis: | <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="margin-right: 10px;">Regulating screw V-ledge Z-axis top</div>  </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">Regulating screw V-ledge Z-axis bottom</div>  </div> </div> <p style="text-align: center; margin-bottom: 10px;">Fig.5-8: Column and mill head</p> <ul style="list-style-type: none"> ➔ Proceed as described under "Readjusting X and Y axis". |

INFORMATION

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





5.2.1 Repair

Repairs must be carried out only by qualified technical staff; and must follow the instructions and guidelines given in this manual. Should technical assistance be required, contact LDS Industries at (630) 785-6437.

Optimum Maschinen - Germany and LDS Industries are not liable for, nor do they guarantee against, damage or operating malfunctions resulting from alteration, abuse, lack of maintenance or this product's use for other than its intended purpose. Failure to read and follow this operating manual is not covered.

For repairs only use

- Proper and suitable tools,
- Parts purchased from Optimum, or its authorized agent.

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6 Spare parts - BF30 Vario

6.1 Column

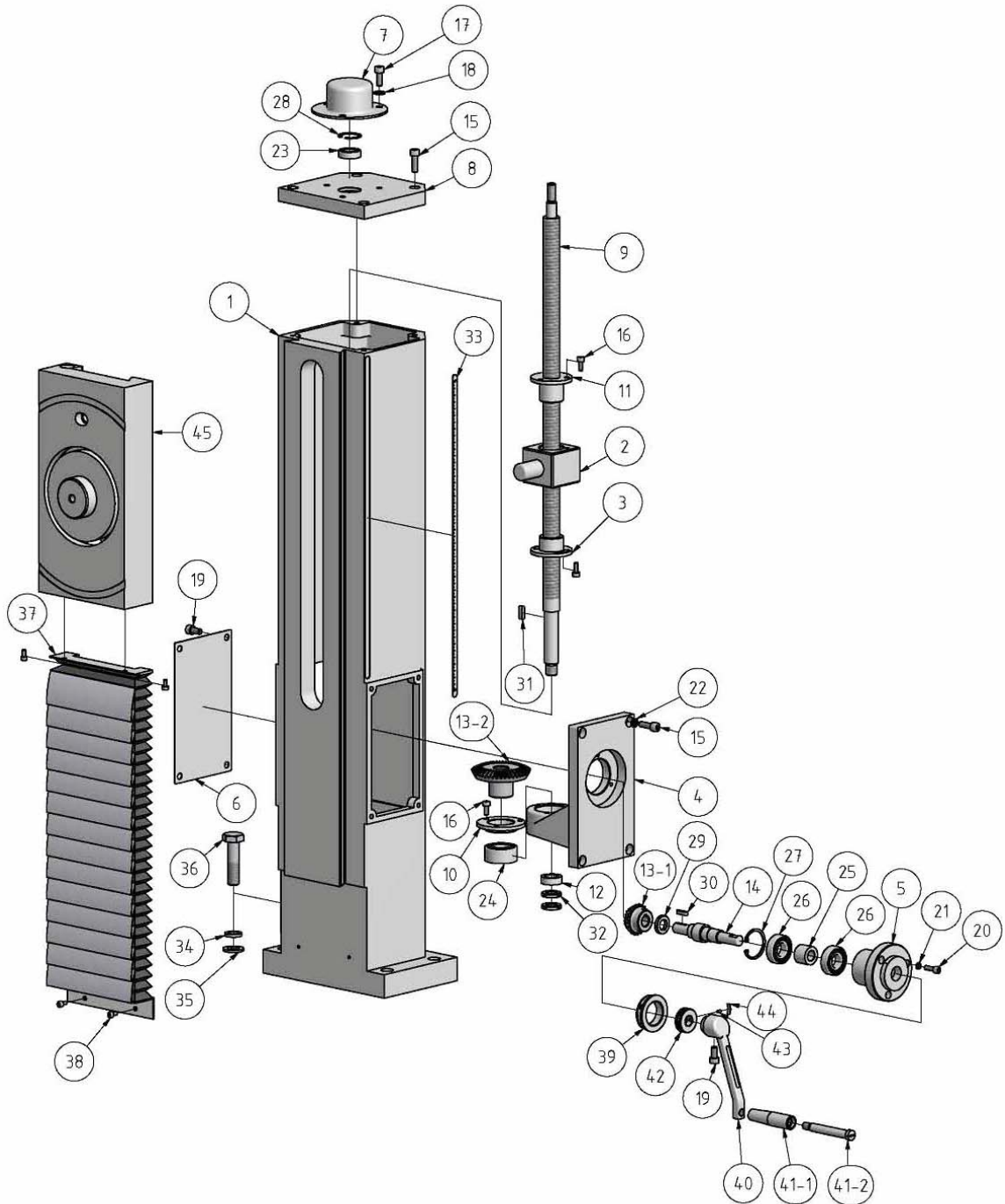


Fig.6-1: Column



6.3 Cross table 2 of 2

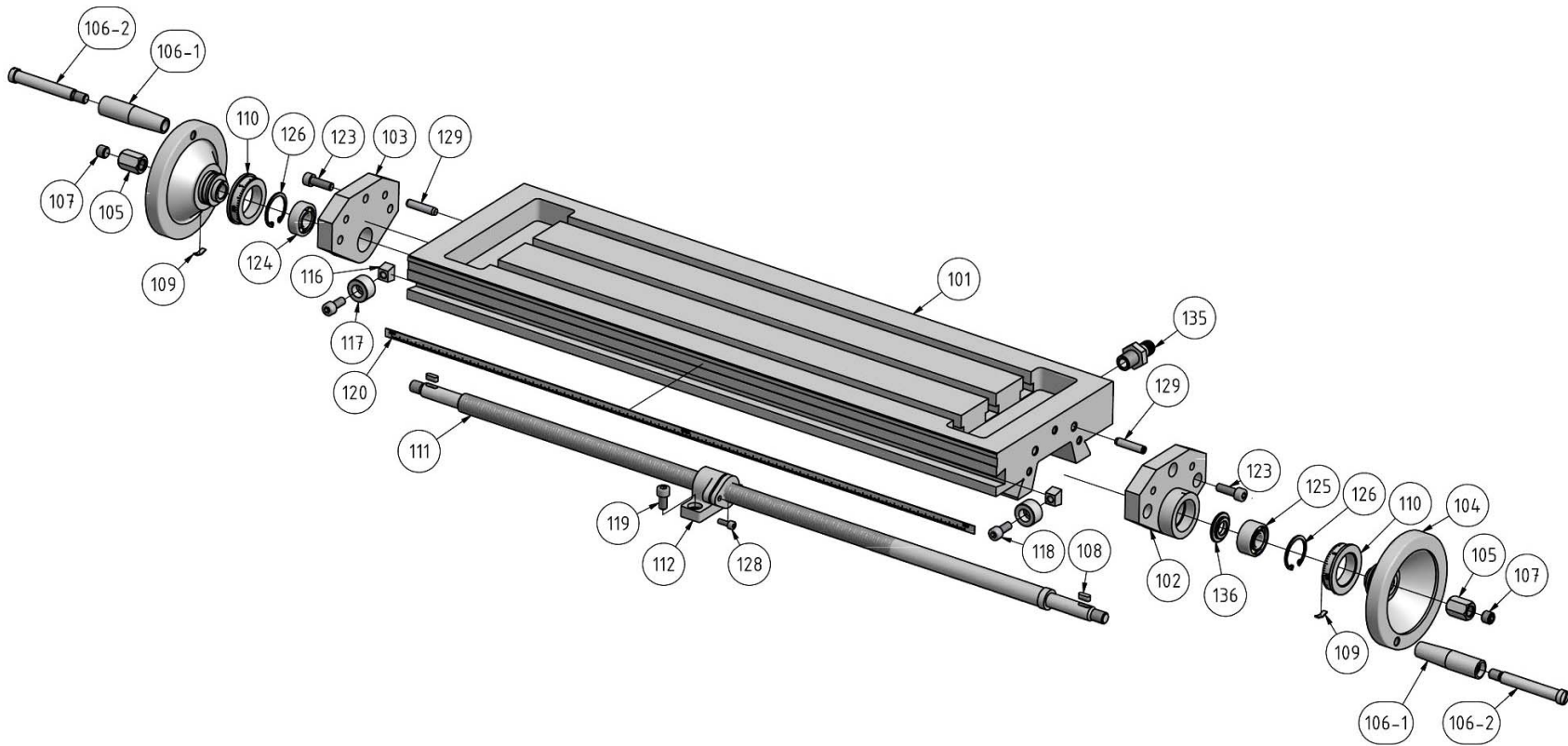


Fig.6-3: Cross table 2 of 2



6.4 Protection device

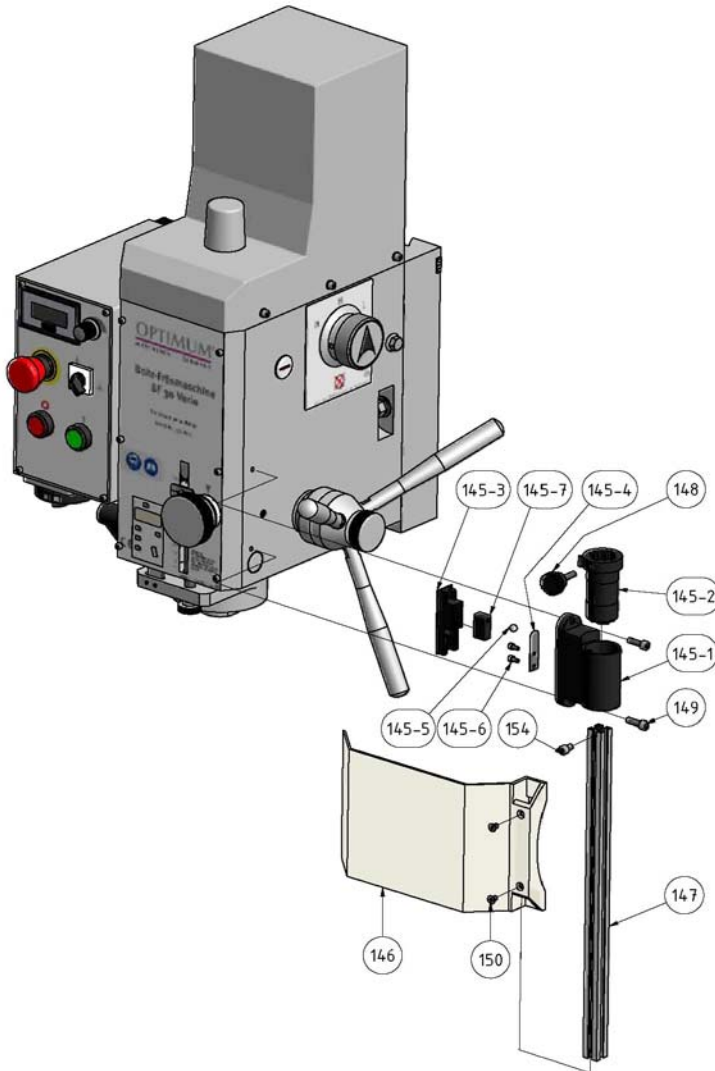


Fig.6-4: Protection device



6.5 Milling head 1 of 3

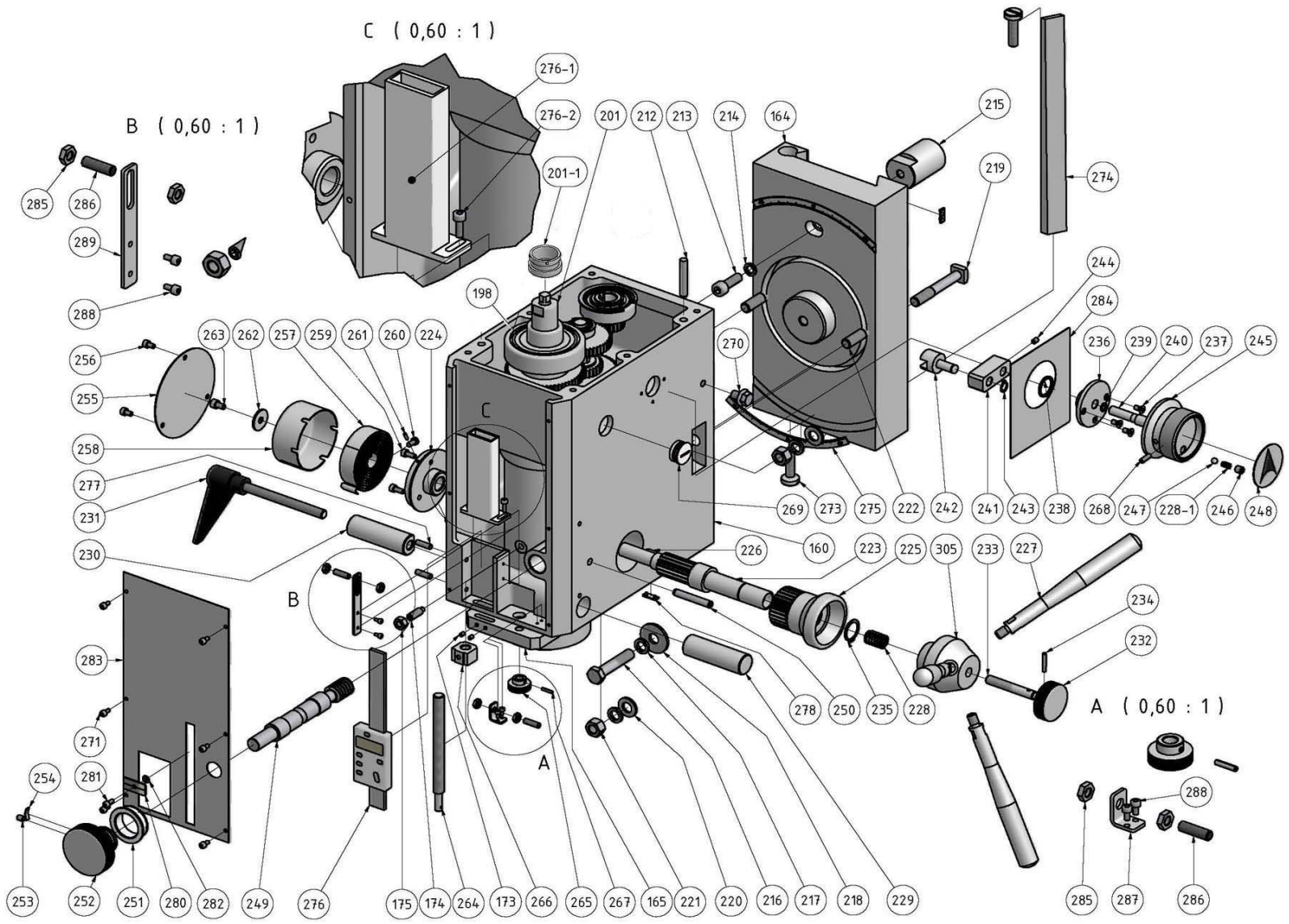


Fig.6-5: Milling head 1 of 3



6.6 Milling head 2 of 3

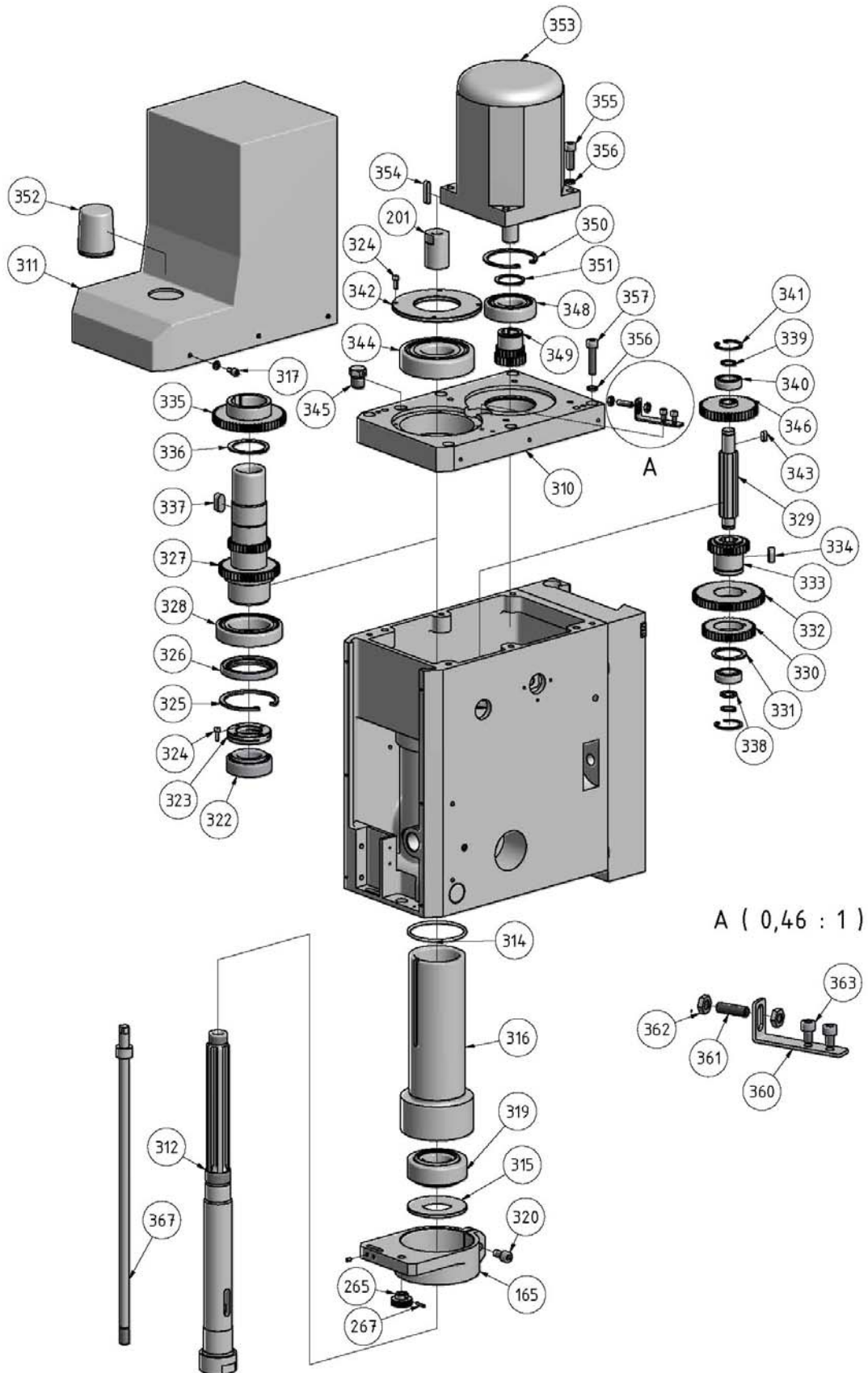


Fig. 6-6: Milling head 2 of 3



6.7 Milling head 3 of 3

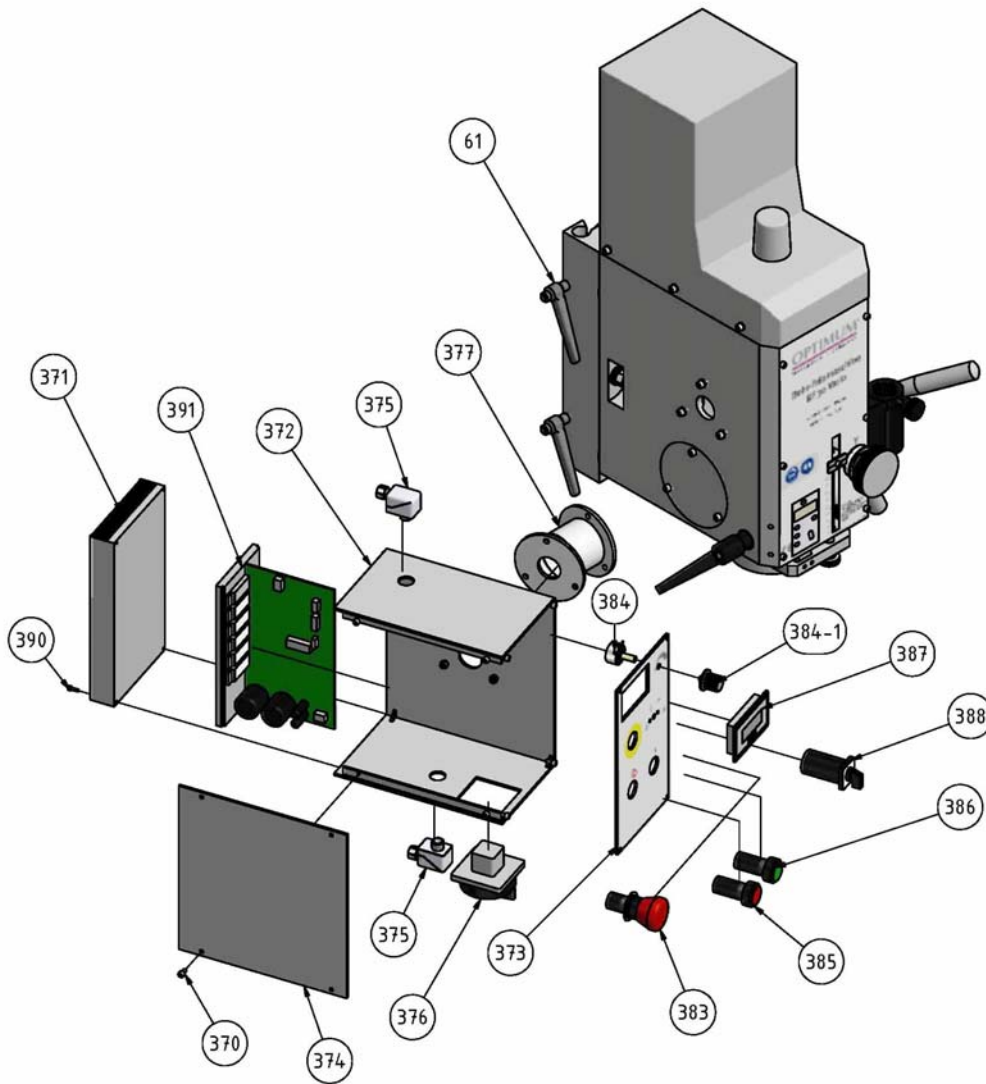


Fig.6-7: Milling head 3 of 3



6.8 Machine stand (optional)

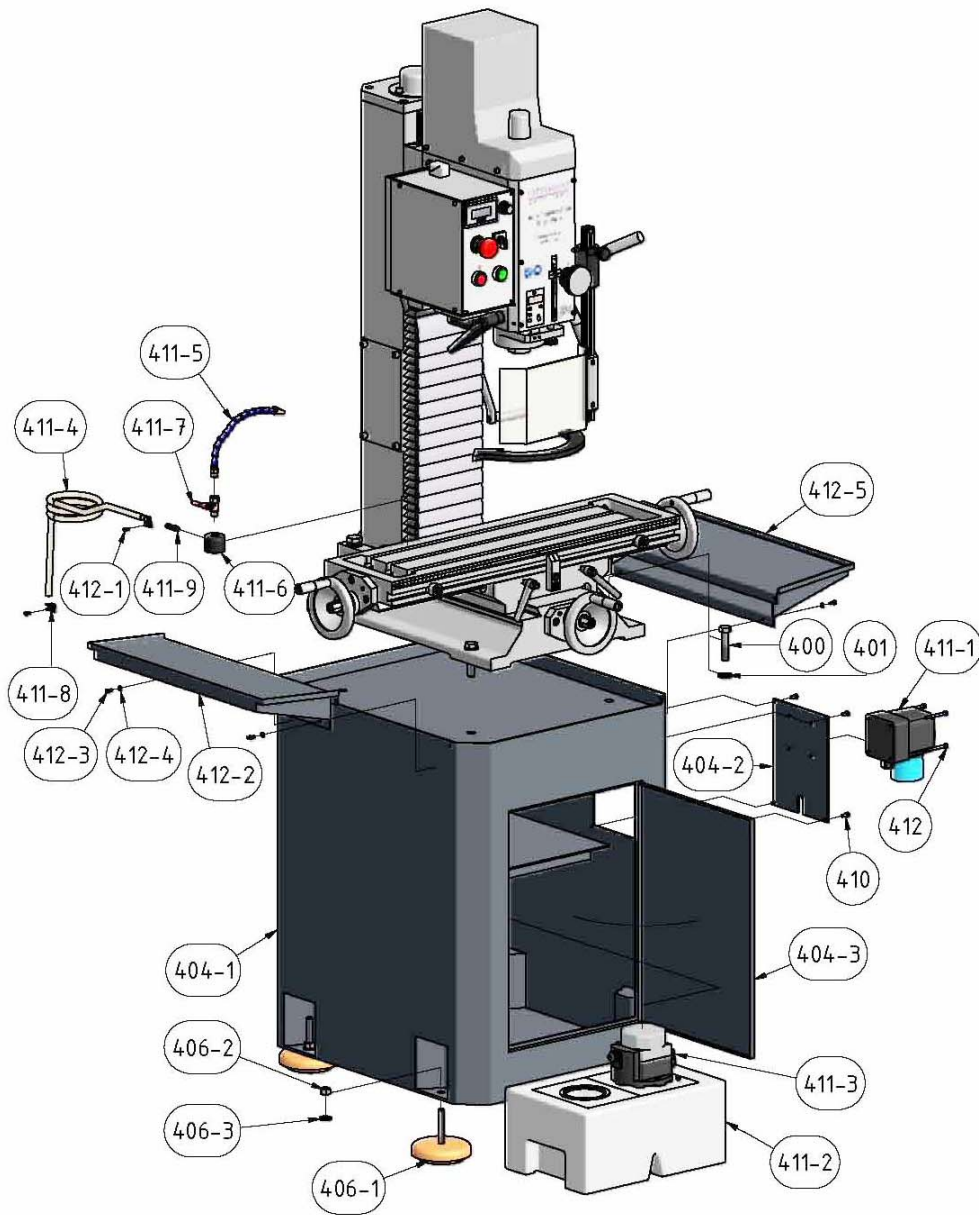


Fig.6-8: Machine stand (optional)



6.9 Parts list

| Pos. | Description | Qty. | Size | Item no. |
|------|---|------|-----------------------|-------------|
| | | | | |
| 1 | Column | 1 | | 033384301 |
| 2 | Support spindle nut z axis | 1 | | 033384302 |
| 3 | Spindle nut two-piece, z axis lower part | 1 | | 033384303y |
| 4 | Clevis mounting vertical adjustment z axis | 1 | | 033384304 |
| 5 | Flange, shaft vertical adjustment z axis | 1 | | 033384305 |
| 6 | Cover plate column | 1 | | 033384306 |
| 7 | Spindle cover Y and Z axis | 1 | | 033384307 |
| 8 | Clevis mounting, cover column | 1 | | 033384308 |
| 9 | Spindle z - axis | 1 | | 033384309y |
| 10 | Bearing cover | 1 | | 0333843010 |
| 11 | Spindle nut two-piece, z axis upper section | 1 | | 0333843011y |
| 12 | Disk | 1 | | 0333843012 |
| 13-1 | Taper gear wheel 21 teeth | 1 | 21/42,2 | 03338430131 |
| 13-2 | Taper gear wheel 42 teeth | 1 | 21/42,2 | 03338430132 |
| 14 | Shaft | 1 | | 0333843014 |
| 15 | Socket head screw | 8 | GB 70-85/M8 x 25 | 0333843015 |
| 16 | Socket head screw | 8 | GB 70-85/M6 x 14 | 0333843016 |
| 17 | Socket head screw | 3 | GB 70-85/M8 x 20 | 0333843017 |
| 18 | Disk | 3 | GB 97.1-85/8 | 0333843018 |
| 19 | Socket head screw | 5 | GB 70-85/M8 x 16 | 0333843019 |
| 20 | Socket head screw | 3 | /M6 x 20 | 0333843020 |
| 21 | Lock washer | 3 | GB 93-87/M6 | 0333843021 |
| 22 | Lock washer | 4 | GB 93-87/M8 | 0333843022 |
| 23 | Grooved ball bearing | 1 | 6002-2Z | 0333843023 |
| 24 | Skew-angle roller bearing, double-row | 1 | 3204 A-2ZTN9_MT33 | 0333843024 |
| 25 | Spacer | 1 | | 0333843025 |
| 26 | Grooved ball bearing | 2 | 6004-2Z | 0333843026 |
| 27 | Snap ring | 1 | GB 893.1/42 | 0333843027 |
| 28 | Snap ring | 1 | GB 893.1/32 | 0333843028 |
| 29 | Spacer taper gear wheel | 1 | | 0333843029 |
| 30 | Key | 1 | DIN 6885/A 5 x 5 x 20 | 0333843030 |
| 31 | Key | 1 | DIN 6885/A 6 x 6 x 20 | 0333843031 |
| 32 | Groove nut | 2 | DIN_1804/M16x1,5 | 0333843032 |
| 33 | Scale z axis | 1 | | 0333843033y |
| 34 | Lock washer | 4 | GB 93-87/M16 | 0333843034 |
| 35 | Spacer | 4 | GB 95-85/16 | 0333843035 |
| 36 | Hexagon screw | 4 | /M16x65 | 0333843036 |
| 37 | Bellows | 1 | | 0333843037 |
| 38 | Socket head screw | 4 | GB/T 1228-91/M5 x 10 | 0333843038 |
| 39 | Scale | 1 | | 0333843039y |
| 40 | Crank | 1 | | 0333843040 |
| 41 | Handle complete | 1 | JB-T7270.4-1994 | 0333843041 |
| 41-1 | Case | 1 | JB-T7270.4-1994-1 | 03338430411 |
| 41-2 | Screw | 1 | JB-T7270.4-1994-2 | 03338430412 |
| 42 | Center ring scale | 1 | | 0333843042 |
| 43 | Threaded pin | 1 | GB 77-85/M4 x 6 | 0333843043 |
| 44 | Spring plate | 1 | | 0333843044 |
| 45 | Turning clevis mounting milling head | 1 | | 0333843045 |
| 49 | Handwheel | 1 | | 0333843049 |
| 50 | Clamping nut handwheel | 1 | | 0333843050 |
| 51 | Handle complete | 1 | | 0333843051 |
| 51-1 | Case | 1 | | 03338430511 |
| 51-2 | Screw | 1 | | 03338430512 |
| 53 | Set screw | 1 | GB 77-85/M12 x 10 | 0333843053 |
| 54 | Key | 1 | DIN 6885/A 5 x 5 x | 0333843054 |
| 55 | Spring plate | 1 | | 0333843055 |
| 56 | Scale ring cross table | 1 | | 0333843056 |
| 59 | Cross table guidance | 1 | | 0333843059 |
| 60 | Zero point - linear measurement cross table | 1 | | 0333843060 |
| 61 | Locking lever | 6 | JB-T7270.12-1994 | 0333843061 |
| 65 | Socket head screw | 10 | GB 70-85/M8 x 16 | 0333843065 |
| 67 | Adjusting screw taper gib | 4 | | 0333843067 |
| 68-1 | Taper gib cross table x axis left side | 1 | | 03338430681 |
| 68-2 | Taper gib cross table y axis back | 1 | | 03338430682 |
| 69 | Socket head screw | 11 | GB 70-85 /M8 x 25 | 0333843069 |
| 70 | Lock washer | 2 | GB 93-87/M8 | 0333843070 |
| 71 | Grooved ball bearing | 2 | 6002-2Z | 0333843071 |
| 72 | Snap ring | 3 | GB 893.1/32 | 0333843072 |
| 73 | Spindle cover Y and Z axis | 1 | | 0333843073 |
| 74 | Socket head screw | 2 | GB 70-85/M5 x 14 | 0333843074 |

OPTIMUM

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| Pos. | Description | Qty. | Size | Item no. |
|-------|---|------|-----------------------|--------------|
| | | | | |
| 75 | Cylindrical pin | 6 | GB 120-86/8 x 35 | 0333843075 |
| 76 | Machine food | 1 | | 0333843076 |
| 77 | Clevis mounting spindle cross table y axis in front | 1 | | 0333843077 |
| 78 | Spindle cross table y axis | 1 | | 0333843078y |
| 79 | Spindle nut cross table y axis | 1 | | 0333843079y |
| 80 | Clevis mounting spindle cross table y axis in the back | 1 | | 0333843080 |
| 83 | Spacer ring clevis mounting cross table x axis right side | 2 | | 0333843083 |
| 84 | Washer | 3 | GB 97.1-85/8 | 0333843084 |
| 85 | Rubber cover | 1 | | 0333843085 |
| 86 | Strip | 1 | | 0333843086 |
| 87 | Socket head screw | 2 | GB 70-85/M5 x 10 | 0333843087 |
| 88 | Hexagon screw | 4 | GB 5780-86/M14 x 60 | 0333843088 |
| 89 | Washer | 4 | GB 95-85/14 | 0333843089 |
| 90 | Lock washer | 4 | GB 7244-87/14 | 0333843090 |
| 91 | Hexagon nut | 4 | GB 6170-86/M14 | 0333843091 |
| 92 | Grooved ball bearing | 2 | 7202AC/15x32x11 | 0333843092 |
| 101 | Milling table | 1 | | 03338430101 |
| 102 | Clevis mounting spindle cross table x axis right side | 1 | | 03338430102 |
| 103 | Clevis mounting spindle cross table x axis left side | 1 | | 03338430103 |
| 104 | Handwheel | 2 | | 03338430104 |
| 105 | Clamping nut handwheel | 2 | | 03338430105 |
| 106 | Handle complete | 2 | JB-T7270.4-1994 | 03338430106 |
| 106-1 | Case | 2 | JB-T7270.4-1994-1 | 033384301061 |
| 106-2 | Screw | 2 | JB-T7270.4-1994-2 | 033384301062 |
| 107 | Threaded pin | 3 | GB 77-85/M12 x 10 | 03338430107 |
| 108 | Key | 3 | DIN 6885/A 5 x 5 x 14 | 03338430108 |
| 109 | Spring plate | 2 | | 03338430109 |
| 110 | Scale ring cross table | 2 | | 03338430110y |
| 111 | Spindle x axis cross table | 1 | | 03338430111y |
| 112 | Spindle nut cross table y axis | 1 | | 03338430112y |
| 116 | Rectangle nut, slots stone end stop, cross table x axis | 2 | | 03338430116 |
| 117 | Collar end stop, cross table x axis | 2 | | 03338430117 |
| 118 | Socket head screw | 2 | GB 70-85/M8 x 20 | 03338430118 |
| 119 | Socket head screw | 10 | GB 70-85/M8 x 16 | 03338430119 |
| 120 | Skale z axis | 1 | | 03338430120y |
| 123 | Socket head screw | 11 | GB 70-85/M8 x 25 | 03338430123 |
| 124 | Grooved ball bearing | 2 | 6002-2Z | 03338430124 |
| 125 | Grooved ball bearing | 2 | 7202AC/15x32x11 | 03338430125 |
| 126 | Snap ring | 3 | GB 893.1/32 | 03338430126 |
| 128 | Socket head screw | 2 | GB 70-85/M5 x 14 | 03338430128 |
| 129 | Cylindrical pin | 6 | GB 120-86/8 x 35 | 03338430129 |
| 135 | Screwing in connection coolant drainage | 1 | | 03338430135 |
| 136 | Washer | 1 | | 03338430136 |
| 137 | Spacer ring clevis mounting cross table x axis right side | 2 | | 03338430137 |
| 145 | Support protection device complete | 1 | | 03338430145 |
| 145-1 | Housing | 1 | | 033384301451 |
| 145-2 | Aluminium profile admission | 1 | | 033384301452 |
| 145-3 | Cover | 1 | | 033384301453 |
| 145-4 | Spring plate | 1 | | 033384301454 |
| 145-5 | Steel ball | 1 | | 033384301455 |
| 145-6 | Screw | 2 | | 033384301456 |
| 145-7 | Micro switch | 1 | | 033384301457 |
| 146 | Protection | 1 | | 03338430146 |
| 147 | Aluminium profile | 1 | | 03338430147 |
| 148 | Clamping scew | 1 | | 03338430148 |
| 149 | Socket head screw | 2 | GB 70-85/M6 x 20 | 03338430149 |
| 150 | Recessed countersunk flat head screw | 2 | GB 819-85/M5 x 12 | 03338430150 |
| 154 | Socket head screw | 2 | GB 70-85/M6 x 10 | 03338430154 |
| 160 | Housing milling head | 1 | | 03338430160 |
| 164 | Turning clevis mounting milling head | 1 | | 03338430164 |
| 165 | Support | 1 | | 03338430165 |
| 173 | Threaded pin | 2 | GB 77-85/M4 x 6 | 03338430173 |
| 174 | Hexagon socket set screws with half-dog point | 1 | GB 79-85/M8 x 2 | 03338430174 |
| 175 | Hexagon nut | 1 | GB 6170-86/M8 | 03338430175 |
| 198 | Grooved ball bearing | 1 | 6308-2RZ | 03338430198 |



| Pos. | Description | Qty. | Size | Item no. |
|-------|---|------|------------------------|--------------|
| | | | | |
| 201 | Holder | 1 | | 03338430201 |
| 201-1 | Sensor ring | 1 | | 033384302011 |
| 212 | Cylindrical pin | 2 | GB 119-86/A 8 x 50 | 03338430212 |
| 213 | Socket head screw | 1 | GB 70-85/M10 x 30 | 03338430213 |
| 214 | Lock washer | 1 | GB 93-87/M10 | 03338430214 |
| 215 | Guiding piece | 1 | | 03338430215 |
| 216 | Hexagon screw | 1 | GB 5782-86/M12x60 | 03338430216 |
| 217 | Lock washer | 4 | GB 93-87/ M12 | 03338430217 |
| 218 | Washer | 1 | GB 96-85/12 | 03338430218 |
| 219 | Square head bolt | 1 | GB 35-88/M12x80 | 03338430219 |
| 220 | Washer | 3 | GB 97.1-85/12 | 03338430220 |
| 221 | Hexagon nut | 3 | GB 6170-86 /M12 | 03338430221 |
| 222 | Square head bolt | 2 | GB 35-880/M12x50 | 03338430222 |
| 223 | Toothed shaft | 1 | | 03338430223 |
| 224 | Driving disk spiral spring | 1 | | 03338430224 |
| 225 | Taper gear wheel | 1 | | 03338430225 |
| 226 | Key | 1 | DIN 6885 /A 6 x 6 x 16 | 03338430226 |
| 227 | Lever | 3 | | 03338430227 |
| 228 | Compression spring micro feed | 1 | | 03338430228 |
| 228-1 | Compression spring micro feed | 1 | | 033384302281 |
| 229 | Clamping pin spindle quill right side | 1 | | 03338430229 |
| 230 | Clamping pin spindle quill left side | 1 | | 03338430230 |
| 231 | Release handle sleeve | 1 | | 03338430231 |
| 232 | Knurling tool disk clutch micro feed | 1 | | 03338430232 |
| 233 | Threaded rod micro feed | 1 | | 03338430233 |
| 234 | Spring pin, threaded rod - knurling disk clutch | 1 | GB 879-86/ 4 x 24 | 03338430234 |
| 235 | Snap ring | 1 | GB 894.1 - 22/22 | 03338430235 |
| 236 | Support shift fork | 1 | | 03338430236 |
| 237 | Recessed countersunk flat head screw | 3 | GB 819-85/M5x10 | 03338430237 |
| 238 | O-ring | 1 | GB 3452-1/ 20 x 2.65 G | 03338430238 |
| 239 | O-ring | 1 | GB 3452-1/6.9 x 1.8 G | 03338430239 |
| 240 | Shaft shift fork | 1 | | 03338430240 |
| 241 | Arm shift fork | 1 | | 03338430241 |
| 242 | Shift fork | 1 | | 03338430242 |
| 243 | Snap ring | 1 | GB 894.1/10 | 03338430243 |
| 244 | Threaded pin | 1 | GB 80-85/ M5 x 8 | 03338430244 |
| 245 | Choice rotary switch transmission | 1 | | 03338430245 |
| 246 | Threaded pin | 1 | GB 77-85/ M8 x 8 | 03338430246 |
| 247 | Steel ball | 1 | | 03338430247 |
| 248 | Position cover choice rotary switch | 1 | | 03338430248 |
| 249 | Worm shaft | 1 | | 03338430249 |
| 250 | Cylindrical pin | 1 | GB 120-86/8 x 50 | 03338430250 |
| 251 | Scale ring micro feed spindle quill | 1 | | 03338430251y |
| 252 | Knurling tool disk micro feed spindle quill | 1 | | 03338430252 |
| 253 | Threaded pin | 1 | GB 77-85 - M6 x 8 | 03338430253 |
| 254 | Spring plate | 1 | | 03338430254 |
| 255 | Barrier barrel | 1 | | 03338430255 |
| 256 | Socket head screw | 3 | GB 70-85/ M5 x 8 | 03338430256 |
| 257 | Spiral spring - return spring spindle quill | 1 | | 03338430257 |
| 258 | Cover spiral spring | 1 | | 03338430258 |
| 259 | Socket head screw | 3 | GB 70-85/M5 x 12 | 03338430259 |
| 260 | Recessed head raised fillister head screw | 1 | GB 822-88/M5 x 10 | 03338430260 |
| 261 | Threaded pin | 2 | GB879-86/M3x10 | 03338430261 |
| 262 | Washer | 1 | | 03338430262 |
| 263 | Socket head screw | 2 | GB 70-85/M6 x 10 | 03338430263 |
| 264 | Threaded rod drilling depth stop | 1 | | 03338430264 |
| 265 | Knurling tool disk drilling depth stop | 1 | | 03338430265 |
| 266 | Drilling depth stop | 1 | | 03338430266 |
| 267 | Spring pin | 1 | GB 879-86 /3 x 14 | 03338430267 |
| 268 | Threaded pin | 1 | GB 78-85/ M5 x 16 | 03338430268 |
| 269 | Oil sight glas | 1 | | 03338430269 |
| 270 | Hexagon screw | 1 | | 03338430270 |
| 271 | Socket head screw | 14 | GB 70-85/M4 x 8 | 03338430271 |
| 273 | Adjusting screw taper gib | 2 | | 03338430273 |
| 274 | Taper gib milling head | 1 | | 03338430274 |
| 275 | Angle scale | 2 | | 03338430275 |
| 276 | Digital indicator micro feed (drilling depth) | 1 | | 03338430276 |
| 276-1 | Prodective cover | 1 | | 033384302761 |
| 276-2 | Hexagon socket screw | 2 | | 033384302762 |
| 277 | Threaded pin | 2 | GB 77-85/M6 x 20 | 03338430277 |
| 278 | Zero point - scale column | 2 | | 03338430278 |



| Pos. | Description | Qty. | Size | Item no. |
|-------|--|------|------------------------|--------------|
| | | | | |
| 280 | indicator drilling depth stop | 1 | | 03338430280 |
| 281 | Socket head screw | 1 | GB 70-85/ M4 x 10 | 03338430281 |
| 282 | Washer | 1 | GB 955-87/4 | 03338430282 |
| 283 | Screen milling head | 1 | | 03338430283 |
| 284 | Screen gearbox | 1 | | 03338430284 |
| 285 | Hexagon nut | 4 | | 03338430285 |
| 286 | Sensor position switch | 2 | | 03338430286 |
| 287 | Angle plate position switch | 1 | | 03338430287 |
| 288 | Socket head screw | 6 | GB 70-85/M3 x 6 | 03338430288 |
| 289 | Band position switch | 1 | | 03338430289 |
| 305 | Hub star grip spindle quill feed | 1 | | 03338430305 |
| 310 | Milling head housing cover | 1 | | 03338430310 |
| 311 | Motor cover | 1 | | 03338430311 |
| 312 | Spindle | 1 | | 03338431312y |
| 314 | O-ring | 1 | GB 3452-1/65 x 3.55 | 03338430314 |
| 315 | Spacer | 1 | | 03338430315 |
| 316 | Spindle quill MT3 | 1 | | 03338430316 |
| 316-1 | Spindle quill ISO 30 | 1 | | 033384303161 |
| 316-2 | Spindle quill R8 | 1 | | 033384303162 |
| 317 | Socket head screw | 6 | GB 70-85/M5 x 10 | 03338430317 |
| 318 | Washer | 6 | GB 97.1-85/5 | 03338430318 |
| 319 | Taper roller bearing | 1 | 33207_Q | 03338430319 |
| 320 | Socket head screw | 1 | GB 70-85/ M8 x 16 | 03338430320 |
| 322 | Taper roller bearing | 1 | 32006-X | 03338430322 |
| 323 | Clamping nut spindle bearings | 1 | | 03338430323 |
| 324 | Socket head screw | 6 | GB 70-85/M4 x 12 | 03338430324 |
| 325 | Snap ring | 1 | GB 893.168 | 03338430325 |
| 326 | Radial rotary shaft seal | 1 | GB 13871/50 x 68 x 8 | 03338430326 |
| 327 | Toothed drive shaft | 1 | | 03338430327 |
| 328 | Grooved ball bearing | 1 | 6010-2RZ | 03338430328 |
| 329 | Shaft | 1 | | 03338430329 |
| 330 | Gear wheel of 41 teeth, module 1.5, straight teeth | 1 | | 03338430330 |
| 331 | Snap ring | 1 | GB 894.1/35 | 03338430331 |
| 332 | Gear wheel of 56 teeth, module 1.5, straight teeth | 1 | | 03338430332 |
| 333 | Gear wheel of 31 teeth, module 2, straight teeth | 1 | | 03338430333 |
| 334 | Key | 1 | DIN 6885/ A 8 x 7 x 18 | 03338430334 |
| 335 | Gear wheel of 57 teeth, module 2, straight teeth | 1 | | 03338430335 |
| 336 | Snap ring | 1 | GB 894.1/42 | 03338430336 |
| 337 | Key | 1 | DIN 6885/A 10 x 8 x 22 | 03338430337 |
| 338 | Spacer | 1 | | 03338430338 |
| 339 | Snap ring | 2 | GB 894.1/15 | 03338430339 |
| 340 | Grooved ball bearing | 2 | 6002-2Z | 03338430340 |
| 341 | Snap ring | 2 | GB 893.1/32 | 03338430341 |
| 342 | Bearing cover | 1 | | 03338430342 |
| 343 | Key | 1 | DIN 6885/A 5 x 5 x 12 | 03338430343 |
| 344 | Grooved ball bearing | 1 | 6308-2RZ | 03338430344 |
| 345 | Vent screw transmission | 1 | | 03338430345 |
| 346 | Gear wheel of 45 teeth, module 2, straight teeth | 1 | | 03338430346 |
| 348 | Grooved ball bearing | 1 | 6206-2Z | 03338430348 |
| 349 | Gear wheel motor of 23 teeth, module 2, straight teeth | 1 | | 03338430349 |
| 350 | Snap ring | 1 | GB 893.1/62 | 03338430350 |
| 351 | Snap ring | 1 | GB 894.1/30 | 03338430351 |
| 352 | Cover screw rod | 1 | | 03338430352 |
| 353 | Motor | 1 | | 03338430353 |
| 354 | Key | 1 | CNS 169/6 x 6 x 28 | 03338430354 |
| 355 | Socket head screw | 4 | GB 70-85/ M8 x 25 | 03338430355 |
| 356 | Lock washer | 10 | GB 93-87/ M8 | 03338430356 |
| 357 | Socket head screw | 6 | GB 70-85/M8 x 35 | 03338430357 |
| 360 | Angle rotational-speed | 1 | | 03338430360 |
| 361 | Rotational-speed sensor | 1 | | 03338430361 |
| 362 | Hexagon nut | 2 | | 03338430362 |
| 363 | Socket head screw | 2 | GB 70-85/M3 x 6 | 03338430363 |
| 367 | Screw rod | 1 | | 03338431367y |
| 367 | Screw rod ISO 30 spindle | 1 | | 03338431367 |
| 370 | Socket head screw | 14 | GB 70-85/M4 x 8 | 03338430370 |
| 371 | Electric box - cover with heat dissipation | 1 | | 03338430371 |
| 372 | Electric box - housing | 1 | | 03338430372 |



| Pos. | Description | Qty. | Size | Item no. |
|-------|---|------|--------------------|--------------|
| | | | | |
| 373 | Electric box - switch plate | 1 | | 03338430373 |
| 374 | Electric box - cover | 1 | | 03338430374 |
| 375 | Strain relief lead switchbox | 2 | | 03338430375 |
| 376 | Main switch | 1 | | 03338430376 |
| 377 | Holder control panel | 1 | | 03338430377 |
| 378 | Socket head screw | 3 | GB 70-85/M5 x 20 | 03338430378 |
| 380 | Lock washer | 3 | GB 93-87/M5 | 03338430380 |
| 383 | Emergency OFF push button | 1 | | 03338430383 |
| 384 | Potentiometer | 1 | | 03338430384 |
| 385 | Push button off | 1 | | 03338430385 |
| 386 | Push button on | 1 | | 03338430386 |
| 387 | Electronic display | 1 | | 03338430387 |
| 388 | Change over switch | 1 | | 03338430388 |
| 390 | Socket head screw | 4 | GB 70-85/ M3 x 10 | 03338430390 |
| 391 | Control board | 1 | | 03338430391 |
| 400 | Hexagon screw | 4 | GB 5780-86 /M14x60 | 03338430400 |
| 401 | Washer | 4 | GB 95-85/14 | 03338430401 |
| 402 | Hexagon nut | 4 | GB 6170-86/M16 | 03338430402 |
| 403 | Washer | 4 | GB 95-85/16 | 03338430403 |
| 404 | Machine stand complete, option | 1 | | 03338430404 |
| 404-1 | Machine stand | 1 | | 033384304041 |
| 404-2 | Fixing plate coolant pump | 1 | | 033384304042 |
| 404-3 | Door machine stand | 1 | | 033384304043 |
| 406 | Levelling- damping element SE1 complete, option | 1 | | 03381012 |
| | Levelling- damping element SE2 complete, option | 1 | | 03381016 |
| 406-1 | Levelling- damping element SE1 | 1 | | 033810121 |
| | Levelling- damping element SE2 | 1 | | 033810161 |
| 406-2 | Hexagon nut SE1 | 1 | | 033810122 |
| | Hexagon nut SE2 | 1 | GB 6170-86/M12 | 033810162 |
| 406-3 | Washer SE1 | 1 | | 033810123 |
| | Washer SE2 | 1 | GB 95-85/12 | 033810163 |
| 410 | Socket head screw | 4 | GB 70-85/ M5 x 10 | 03338430410 |
| 411 | Universal coolant adjustment 230 V complete, option | 1 | | 03352002 |
| 411-1 | ON/OFF switch combination 230 V | 1 | | 033520021 |
| 411-2 | Coolant reservoir 230 V | 1 | | 033520022 |
| 411-3 | Coolant pump 230 V | 1 | | 033520023 |
| 411-4 | Coolant hose 230 V | 1 | | 033520024 |
| 411-5 | Flexible coolant hose 230 V | 1 | | 033520025 |
| 411-6 | Attachment magnet foot 230 V | 1 | | 033520026 |
| 411-7 | Ball valve 230 V | 1 | | 033520027 |
| 411-8 | Hose binder 230 V | 1 | | 033520028 |
| 411-9 | Hose fitting 230 V | 1 | | 033520029 |
| 412 | Socket head screw | 4 | GB 70-85/M5 x 50 | 03338430412 |
| 412-1 | Socket head screw | 2 | GB 70-85/M4 x 10 | 033384304121 |
| 412-2 | Plate | 1 | | 033384304122 |
| 412-3 | Socket head screw | 4 | GB 70-85/M4 x 10 | 033384304123 |
| 412-4 | Washer | 4 | GB 97.1-85/4 | 033384304124 |
| 412-5 | Plate | 1 | | 033384304125 |



6.11 Wiring diagram 2 of 2

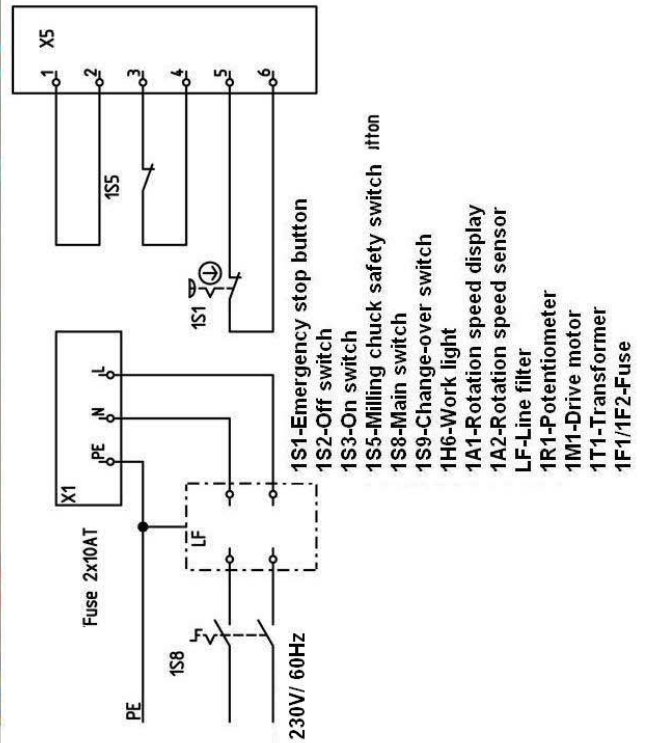
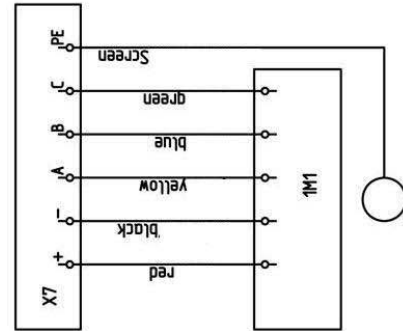
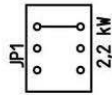
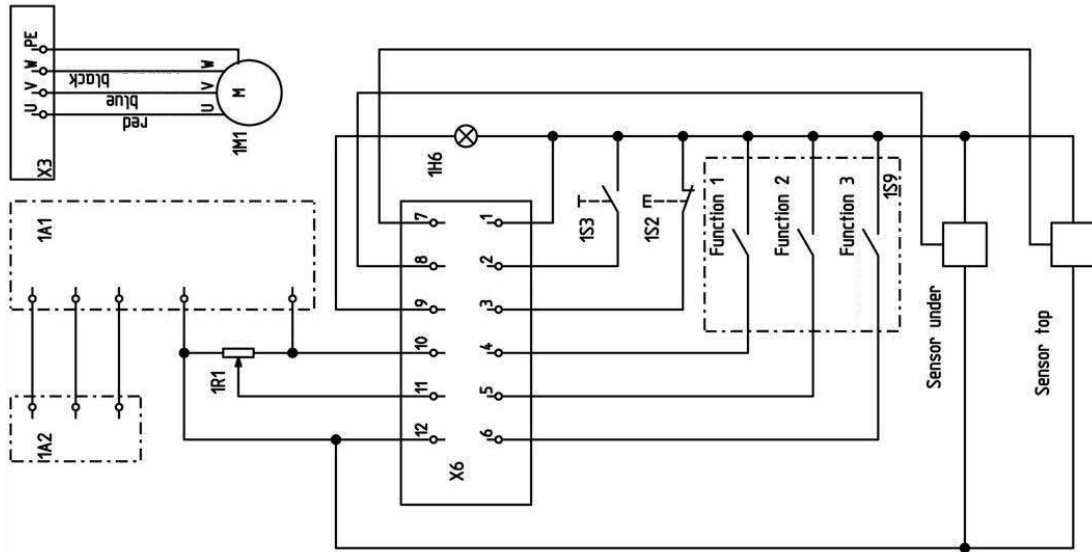


Fig.6-10: Wiring diagram 2 of 2



7 Troubleshooting

7.1 Troubleshooting the mill drill

| Problem | Cause / possible effects | Solution |
|--|---|---|
| The mill drill does not start | <ul style="list-style-type: none"> Power-on sequence ignored. | <ul style="list-style-type: none"> "Switching on the mill drill" on page 26 Have it checked by authorised personnel. |
| Tool "burn". | <ul style="list-style-type: none"> Incorrect speed. Chips do not come out of the bore hole Tool blunt. Operating without cooling agent. | <ul style="list-style-type: none"> Select another rate, feed too high. Pull out tool more often. Sharpen or replace tool. Use cooling agent |
| Impossible to insert grip cone into the spindle. | <ul style="list-style-type: none"> Remove any dirt, grease or oil from the internal conical surface of the spindle sleeve or the grip cone. | <ul style="list-style-type: none"> Clean surfaces well Keep surfaces free of grease. |
| It is not possible to push-out the taper. | <ul style="list-style-type: none"> Optional MT3 taper seat shrunk on the Morse taper. | <ul style="list-style-type: none"> Let the machine run at highest speed for two minutes in order to warm it up and then retry to disassemble the taper. |
| Motor does not start | <ul style="list-style-type: none"> Defective fuse. | <ul style="list-style-type: none"> Have it checked by authorised personnel. |
| Working spindle rattling on rough piece surfaces | <ul style="list-style-type: none"> Climb milling machining not possible under the current operating conditions. Clamping lever of the movement axes not tightened. Loose collet chuck, loose drill chuck, loose draw-in rod. Tool is blunt. The workpiece is not fastened. Excessive slack in bearing. Working spindle goes up and down. | <ul style="list-style-type: none"> Perform conventional milling. Tighten clamping lever Check, re-tighten. Sharpen or replace tool Clamp the workpiece firmly. Readjust bearing slack or replace bearing Readjust bearing slack or replace bearing |
| Fine feed of the spindle does not work | <ul style="list-style-type: none"> Fine feed is not correctly activated. Coupling of the fine feed does not cam-in, is soiled, blurred, worn, defective | <ul style="list-style-type: none"> "Manual spindle quill feed with the fine feed" on page 30 Clean, replace. |



8 Appendix

8.1 Copyright

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Subject to technical changes without notice.

8.2 Terminology/Glossary

| Term | Explanation |
|----------------------------|---|
| Cross table | Bearing surface, clamping surface for the workpiece with X- and Y-axis travel |
| Taper mandrel | Cone of the drill or of the drill chuck |
| Workpiece | Piece to be milled, drilled or machined. |
| Draw-in rod | Threaded rod to fix the taper mandrel in the spindle sleeve. |
| Drill chuck | Drill bit chuck |
| Collet chuck | Holder for end mill |
| Drill-Mill head | Upper part of the mill drill |
| Spindle sleeve | Hollow shaft in which the milling spindle turns. |
| Milling 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 chuck can be fixed by hand. |
| Workpiece | Piece to be drilled or machined. |
| Tool | Milling cutter, drill bit, etc. |



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CE

EC - Declaration of Conformity

Machinery Directive 2006/42/EC Annex II 1.A

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

hereby declares that the following product,

Type of machine: mill drill
Type designation: BF30Vario
Serial number: _ _ _ _ _
Year of manufacture: 20__

Manual geared drill with with frequency converter for speed control for private persons as well as for craft and industrial plants which meets all the relevant provisions of the above mentioned Directive 2006/42/EC as well as the other directives applied (below) including their amendments in force at the time of declaration. The following other EU Directives have been applied: EMC Directive 2014/30/EC, Low Voltage Directive 2014/35/EC

The safety objective meet the requirement of EC Directive 2006/95/EC

The following harmonized standards were applied:

EN 1037:1995+A1:2008 Safety of machinery - Prevention of unexpected start-up
 EN ISO 14119 Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
 EN 61800-5-1 Adjustable speed electrical power drive systems 2008-04 + correction 2
 EN 61800-3:2012-09 Adjustable speed electrical power drive systems + correction 1
 EN 13128:2001+A2:2009/AC:2010 Safety of machine tools - Milling machines (including boring machines)
 EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
 EN 60204-1:2006/AC: 2010 Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005 (modified))
 DIN EN 55011 class A: 2003-08 Industrial, scientific radio-frequency equipment
 EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
 EN ISO 13857:2008 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs

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Kilian Stürmer Hallstadt, 2014-01-19
(CEO, General manager)



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