OPTIMUM®
MASCHINEN - GERMANY

Operating Manual

Version 4.0.3

Milling machine

○ OPTImill® BF 20V Part no. 3338120

○ OPTImill® BF 20L Part no. 3338121

○ OPTImill® BF 20LD Part no. 3338125

Table of contents

BF20V_GBIVZ.fm

Preface

Dear customer,

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

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

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

Information

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

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

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

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

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

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

Optimum Maschinen Germany GmbH
Dr.- Robert - Pfleger - Str. 26
D-96103 Hallstadt, Germany
Fax (+49)0951 / 96555 - 888
Email: info@optimum-maschinen.de
Internet: www.optimum-machines.com

1 Safety

Glossary of symbols

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

This part of the operating instructions

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

In addition to these operation instructions, please observe

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

When installing, operating, maintaining and repairing the milling machine, the relevant standards must be observed.

If European standards have not yet been incorporated in the national legislation of the country in question, the specific applicable regulations of each country must be observed.

If necessary, relevant measures must be taken to comply with national regulations before commissioning the milling machine.

Always keep this documentation close to the milling machine.

If you want to re-order the operating instructions for your machine, please quote the relevant serial number. The serial number can be found on the type plate.

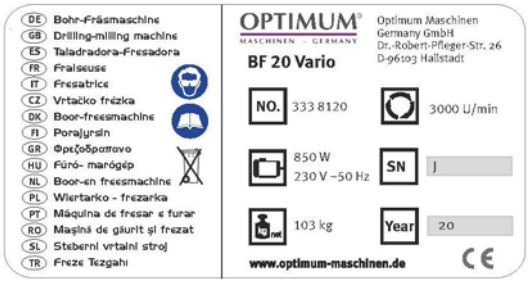
1.1 Machine variants

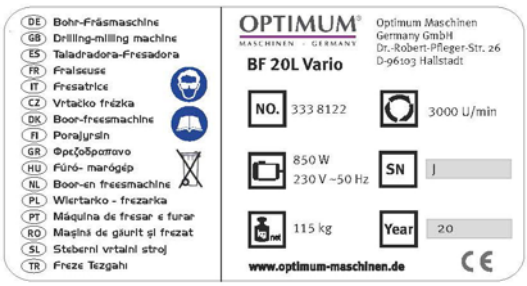
BF20V - Milling machine with standard milling table.

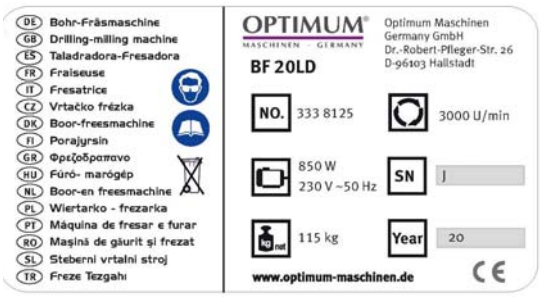
BF20L - Milling machine with extended milling table.

BF20LD - Milling machine with extended milling table and distance measuring system DRO5.

1.2 Rating plate







INFORMATION

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

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

D-96103 Hallstadt, Germany

Email: info@optimum-maschinen.de

1.3 Safety instructions (warning notes)

1.3.1 Classification of hazards

We classify the safety warnings into different categories. The table below gives you an overview of the assignment of symbols (pictograms) and signal words to the specific hazard and the (possible) consequences.

Symbol	Alarm expression	Definition / consequence
	**DANGER!**	Immediate danger that will result in serious personal injury or death.
	WARNING!	Risk: a hazard could result in serious personal injury or death.
	CAUTION!	A danger or unsafe procedure that can cause personal injury or damage to property.
	**ATTENTION!**	Situation that could cause damage to the milling machine and product, as well as other types of damage. No risk of injury to persons.

Symbol	Alarm expression	Definition / consequence
	**INFORMATION**	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram with


general danger


with a warning of


injury to hands,


hazardous electrical voltage,

or


rotating parts.

1.3.2 Other pictograms


Warning: danger of slipping!


Warning: risk of stumbling!


Warning: hot surface!


Warning: biological hazard!


Warning: automatic start-up!


Warning: tilting danger!


Warning: suspended loads!


Caution, danger of explosive substances!


Activation forbidden!


Read the operating instructions before commissioning!


Pull out the mains plug!


Wear protective glasses!


Wear protective gloves!


Wear safety shoes!


Wear a protective suit!


Use ear protection!


Only switch during standstill!


Protect the environment!


Contact address

BF20V_GB_1.fm

1.4 Intended use

WARNING!

If the milling machine is not used as intended,

- **there is a risk to personnel,**
- **will endanger the milling machine and other material property of the operating company,**
- **the functionality of the milling machine may be compromised.**

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

Using this drilling-milling machine it is possible to perform dry processing as well as processing by using cooling lubricants. The limit values of the balances of the tools and tool holders need to be observed.

The milling machine must only be installed and operated in a dry and well-ventilated place.

The milling machine is designed and manufactured to be used in a non-explosive environment.

The defined conditions of use and performance data must not be changed.

The protective equipment used must be available - unless this is not useful for the setup operation or for maintenance - properly installed, and fully functional. Its position must not be changed, bypassed or made ineffective.

Safety components such as limit switches or other control components must not be put out of operation.

The milling machine must not be converted or modified in any way without consulting the manufacturer.

If the milling machine is used in any way other than described above, or modified without the approval of Optimum Maschinen Germany GmbH, then the milling machine is being used improperly.

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

We expressly point out that the guarantee will expire, if any constructive, technical or procedural changes are not performed by the company Optimum Maschinen Germany GmbH. It is also part of the intended use that you

- observe the limits of the milling machine,
- observe the operating instructions,
- and comply with the inspection and maintenance instructions.

☞ Technical data on page 18

WARNING!

Extremely severe injuries due to non-intended use.

Modifications and changes to the operating values of the milling machine are prohibited. They could endanger the personnel and cause damage to the milling machine.

1.5 Reasonably foreseeable misuse

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

Any other use must be discussed with the manufacturer.

The milling machine may only be used to work with metallic, cold and non-flammable materials.

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

Operators must be qualified.

1.5.1 Avoidance of misapplication

➜ Use of suitable cutting tools.

➜ Adapting the speed setting and feed to the material and workpiece.

➜ Clamp workpieces firmly and free of vibration.

➜ Risk of fire and explosion due to the use of flammable materials or cooling lubricants. Before processing inflammable materials (e.g. aluminium, magnesium) or using inflammable auxiliary materials (e.g. spirit), you need to take additional preventive measures in order to avoid health risks.

➜ When processing plastics, the machine operator must ensure that static electricity generated during the machining process can be discharged easily.

➜ When processing carbons, graphite and carbon-fibre-reinforced carbons, the machine is no longer being used as intended. This causes the warranty to be null and void. When processing carbons, graphite and carbon-fibre-reinforced carbons and similar materials, the machine can be damaged extremely quickly, even if the dusts generated are completely sucked out during the work process.

ATTENTION!

The workpiece must always be fastened in a machine vice, jaw chuck or with other suitable clamping tools such as clamping claws.

WARNING!

Risk of injury caused by flying workpieces.

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

❍ Use cooling and lubricating agents to increase the durability of the tool and to improve the surface quality.

❍ Clamp the cutting tools and workpieces on clean clamping surfaces.

❍ Sufficiently lubricate the machine.

❍ Set the bearing clearance and guides correctly.

Recommendations:

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

❍ Clamp end mills (or shank cutters) in a collet chuck using the corresponding collets.

❍ Clamp end face mills using shell end mill arbors.

When drilling, make sure that

❍ the suitable speed is set depending on the diameter of the drill,

❍ the pressure must only be such that the drill can cut without load,

❍ if there is too much pressure, the drill will wear quickly and may even break or jam in the borehole. If the drill gets jammed immediately stop the main motor by pressing the emergency stop button,

❍ use commercial cooling/lubricating agents for hard materials, e.g. steel and

❍ generally always back the spindle out of the workpiece while it is still turning.

CAUTION !

Do not use the drill chuck as a milling tool. Never clamp a milling cutter into a drill chuck. Use a collet chuck and appropriate collets for end mills.

When milling, ensure that

❍ the right cutting speed is selected;

❍ for workpieces with normal strength values, e.g. steel, 18-22 m/min,

❍ for workpieces with high strength values, 10-14 m/min,

❍ the pressure is selected so that the cutting speed remains constant,

- normal trade coolants/lubricants are used for hard materials.

1.6 Dangers that can emanate from the milling machine.

The milling machine is state of the art.

Nevertheless, there is a residual risk, as the milling machine operates with

- high speeds,
- circulating parts and tools and
- electrical voltage and currents.

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

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

INFORMATION

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

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

Always disconnect the milling machine from the electrical power supply when carrying out cleaning or maintenance work.

WARNING!

The milling machine may only be used with fully functional safety devices.

Switch off the milling machine immediately if you notice that a safety device is faulty or has been dismantled!

All additional equipment provided by the operator must be equipped with the prescribed safety devices. This is your responsibility being the operating company or private user!
☞ **Safety devices on page 13**

1.7 Qualification

It is indispensable that the operator is suitably qualified for safe use and secure setting and operation of the machine.

1.7.1 Private Users

The milling machine is used in the private sector. The acumen of people in the private sector with training in metal working was taken into consideration for creating this operation manual. Vocational training or further instruction in a metal working profession is a prerequisite for safe operation of the machine. It is essential that the private user is aware of the dangers involved in operating this machine. We recommend visiting a training course in the operation of milling machines. Your specialist dealer can offer you an appropriate training course. These courses are also offered by adult education centres in Germany.

1.7.2 Obligations of the User

The user must

- have read and understood the operating manual,
- be familiar with all safety devices and regulations,
- be able to operate the milling machine.

1.7.3 Craftsman or industrial use

This manual is addressed to

- the operating companies,

- the operators,
- the maintenance personnel.

The warnings therefore relate to both the operation and maintenance of the milling machine.

WARNING!

Always disconnect the milling machine from the electrical power supply. This will prevent it from being used by unauthorized persons. The qualifications of the personnel for the different tasks are mentioned below:

Operator

The operator has been instructed by the operating company regarding the assigned tasks and possible risks in case of improper behaviour. Any tasks which need to be performed beyond the operation in standard mode must only be performed by the operator, if so indicated in these instructions and if the operator has been expressively commissioned by the operating company.

Qualified electrician

With professional training, knowledge and experience as well as knowledge of respective standards and regulations, qualified electricians are able to perform work on the electrical system and recognise and avoid any possible dangers. Qualified electricians have been specially trained for the working environment, in which they are working and know the relevant standards and regulations.

Qualified personnel

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

Instructed person

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

INFORMATION

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

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

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the milling machine and other material values,
- the functionality of the milling machine may be compromised.

1.7.4 Authorized persons

WARNING!

Inappropriate operation and maintenance of the machine constitutes a danger for personnel, property and the environment.

Only authorized personnel may operate the machine!

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

1.7.5 Operator's obligations

The operator must instruct personnel at least once a year in

- all safety regulations relevant to the machine,
- its operation and
- generally accepted engineering standards.

The operator must also

- check the personnel‘s knowledge level,
- document the training/instruction,
- have attendance at the training/instruction confirmed by signature and
- check whether personnel is working in a manner that shows awareness of safety and risks.
- Define and document the machine inspection deadlines in accordance with section 3 of the Factory Safety Order and perform an operational risk analysis in accordance with section 6 of the Safety at Work Act.

1.7.6 Obligations of the user

The user must

- have read and understood the operating instructions,
- be familiar with all safety devices and regulations,
- be able to operate the machine.

1.7.7 Additional requirements regarding qualification

The following additional requirements apply for work on electrical components or equipment:

- They must only be performed by a qualified electrician or person working under the instructions and supervision of a qualified electrician.

Before starting work on electrical parts or operating agents, the following actions must be taken in the order given:

➜ disconnect all poles,

➜ secure against restarting,

➜ check that there is no voltage.

1.8 User positions

The user position is in front of the milling machine.

1.9 Safety measures during operation

CAUTION!

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

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

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

CAUTION!

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

Before working with flammable materials (e.g. aluminium, magnesium) or using flammable auxiliary materials (e.g. alcohol), you must take additional precautions to prevent a health hazard.

1.10 Safety devices

The milling machine must only be operated with fully functional safety devices.

Stop the milling machine immediately if there is a failure on the safety device or becomes ineffective.

It is your responsibility!

If a safety device has been activated or has failed, and milling machine must only be used if you

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

WARNING!

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

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

WARNING!

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

1.10.1 Emergency stop button

CAUTION!

The emergency stop switch (1) may only be operated in an emergency. Do not use the emergency stop button to stop the machine during normal operation.

CAUTION!

The spindle continues to rotate for a while, depending on the moment of inertia of the spindle and the tool in use.

The emergency stop switch (1) stops the machine.

Turn the knob to the right to unlock the emergency stop switch.

Img.1-1: Emergency-stop

1.10.2 Separation guard

Adjust the guard (2) to the correct height before you start working.
To do so, slacken the clamping screw, set the required height and re-tighten the clamping screw.

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

INFORMATION

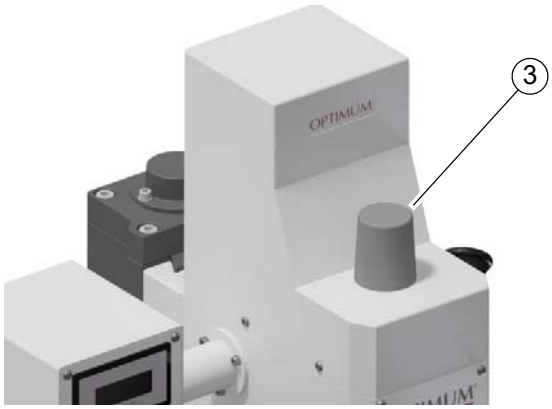
The machine cannot be started, if the spindle protection is not closed.

Img. 1-2: Separation guard

1.10.3 Cover cap for the pull rod

CAUTION!

Refit the cover cap after each tool change.



Img. 1-3: Cover cap

1.10.4 Main switch

WARNING!

Dangerous voltage even when the main switch on the rear of the control panel is switched off.

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

Switch off the milling machine at the main switch. Pull out the mains plug to prevent the appliance from being switched on unattended.

BF20V_GB_1.fm

1.11 Safety check

Check the milling machine regularly.

Check all safety devices

- before starting work,
- once a week (with the machine in operation) and
- after all maintenance and repair work.

General check		
Equipment	**Check**	**OK**
Guards	Mounted, firmly bolted and not damaged	
Signs, Markers	Installed and legible	

Functional check		
Equipment	**Check**	**OK**
Emergency stop button	After actuating the emergency stop switch, the milling machine must switch off. A restart may only be possible once the emergency stop switch has been unlocked and the ON switch has been actuated.	
Separation guard around the drill and milling spindle	The milling machine may switch on only when the guard is closed.	

1.12 Personal protective equipment

For certain work, personal protective equipment is required.

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

Wear protective gloves when handling pieces with sharp edges.

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

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

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

CAUTION!

Dirty or contaminated personnel protective equipment can cause illness. It must be cleaned after each use and at least once a week.

1.13 For your own safety during operation

WARNING!

Before switching the milling machine on, make sure that there is no risk of personal injury or damage to property.

Avoid any unsafe work methods:

Make sure that your operation does not create a safety hazard.

- The rules specified in these operating instructions must be observed during assembly, operation, maintenance and repair.
- Use protective glasses!
- Switch off the milling machine before measuring the workpiece.
- Do not work on the milling machine, if your concentration is reduced, for example, because you are taking medication.
- Stay at the milling machine until the movements have stopped completely.
- Use the specified personal protective equipment. Wear tight-fitting clothes and a hair net if necessary.
- Do not use protective gloves when drilling or milling.
- Turn off the machine before changing the milling tool.
- Use appropriate agents to remove drilling and milling chips.
- Make sure that your operation does not create a safety hazard.
- Clamp the workpiece securely and firmly before switching on the milling machine.

We specifically point out the dangers in the description of work with and on the drilling machine.

1.14 Using lifting equipment

WARNING!

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

Check to ensure that the lifting and load-suspension equipment are of sufficient load-bearing capability and are in perfect condition.

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other competent supervisory authority, responsible for your company.

Fasten the loads carefully. Never walk under suspended loads!

1.15 Symbols on the milling machine

Make sure that the mandatory and warning symbols are legible.

1.16 Electronics

Craftsman or industrial use

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

A second person must be present during work on live components to disconnect the power in the event of an emergency. If there is a fault in the power supply, switch off the milling machine immediately!

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

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

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

The intervals must be set so that foreseeable defects can be detected in a timely manner, when they occur.

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

No check is required before first commissioning, if the manufacturer or installer has confirmed to the operator that the electrical system and operating materials have been procured in accordance with the stipulations of the accident prevention regulations.

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

1.17 Inspection deadlines

Craftsman or industrial use

Specify the inspection intervals for the machine in accordance with § 3 of the Industrial Safety Regulation, document these and carry out an operational hazard analysis in accordance with § 6 of the Industrial Safety and Health Act. The inspection intervals in the maintenance section should be used as reference values.

2 Technical data

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

2.1 Electrical connection	BF20V	BF20L | BF20LD
Motor	230 V / 50Hz / 850 W	
2.2 Drill-mill capacity	**BF20V**	**BF20L | BF20LD**
Drilling capacity [mm]	Ø max. 16	
Milling capacity of end-mill cutter [mm]	Ø max. 20	
Milling capacity of inserted tooth cutter [mm]	Ø max. 63mm	
Throat [mm]	185	
2.3 Spindle seat	**BF20V**	**BF20L | BF20LD**
Spindle seat	MT 2 / M10	
Spindle sleeve stroke [mm]	50 mm	
2.4 Drill-mill head	**BF20V**	**BF20L | BF20LD**
Swivelling	+ / - 90°	
Gear stages	2	
Z axis travel [mm]	280	
2.5 Cross table	**BF20V**	**BF20L | BF20LD**
Table length [mm]	500	700
Table width [mm]	180	
X axis travel [mm]	280	480
Y axis travel [mm]	175	
T - slot size / distance [mm]	12 / 63	
Max. load [kg]	50	40
2.6 Dimensions	**BF20V**	**BF20L | BF20LD**
Height [mm]	935	
Depth [mm]	565	565
Width [mm]	745	950
Total weight [kg]	103	112
2.7 Work area	**BF20V**	**BF20L | BF20LD**
Height [mm]	2000	
Depth [mm]	2200	
Width [mm]	1500	

BF20V_GB_2.fm

2.8 Speeds	BF20V	BF20L | BF20LD
Gear stage slow [min^{-1}]	90 - 1480	
Gear stage rapid [min^{-1}]	150 - 3000	
2.9 Environmental conditions	**BF20V**	**BF20L | BF20LD**
Temperature	5 - 35 °C	
Humidity	25 - 80 %	
2.10 Operating material	**BF20V**	**BF20L | BF20LD**
Gear Bare steel parts	Mobilgrease OGL 007 or, Mobilux EP 004 or Mobil XHP, acid-free oil, e.g. weapon oil, motor oil	

Emission measurement

Measurement in operating conditions in accordance with DIN ISO 8525 with surface areas Measurement methods in accordance with DIN 45635.

The generation of noise emitted is 74 dB(A) on no-load running at 80% of max. spindle speed, measured at a distance of one meter from the machine and at a height of 1.6m.

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

INFORMATION

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

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

INFORMATION

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

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

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

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

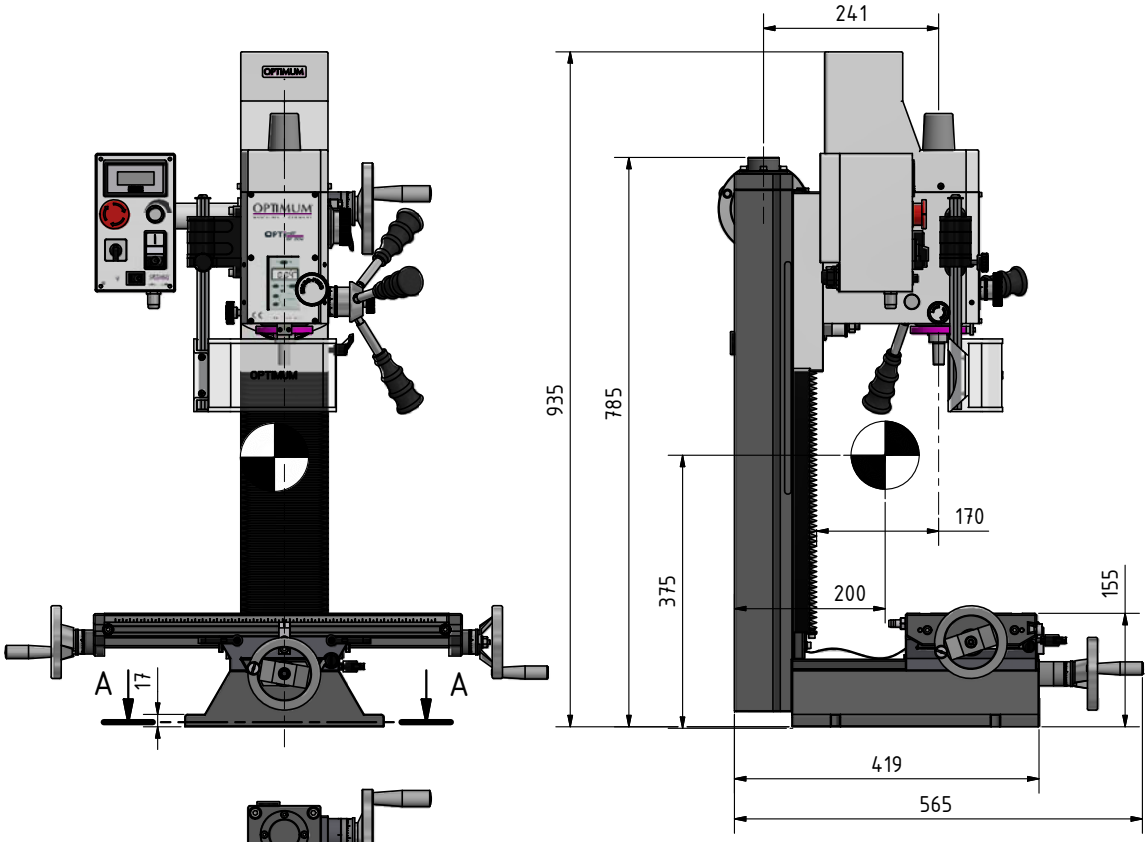
Furthermore, it is possible that the admissible exposure level might be different from country to country due to national regulations.
This information about the noise emission should, however, allow the operator of the machine to more easily evaluate the hazards and risks.

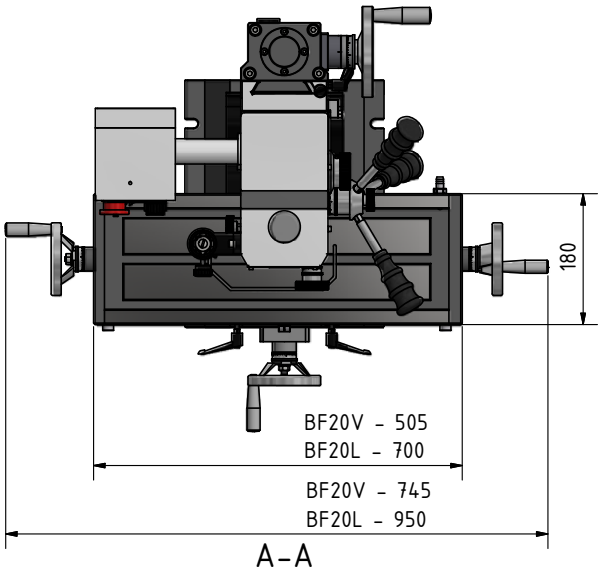
CAUTION!

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

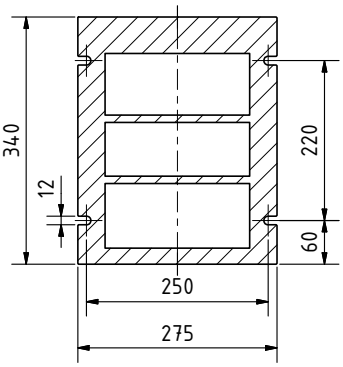
We generally recommend the use of noise and ear protection.

2.11 Dimensions, installation plan





Centre of gravity

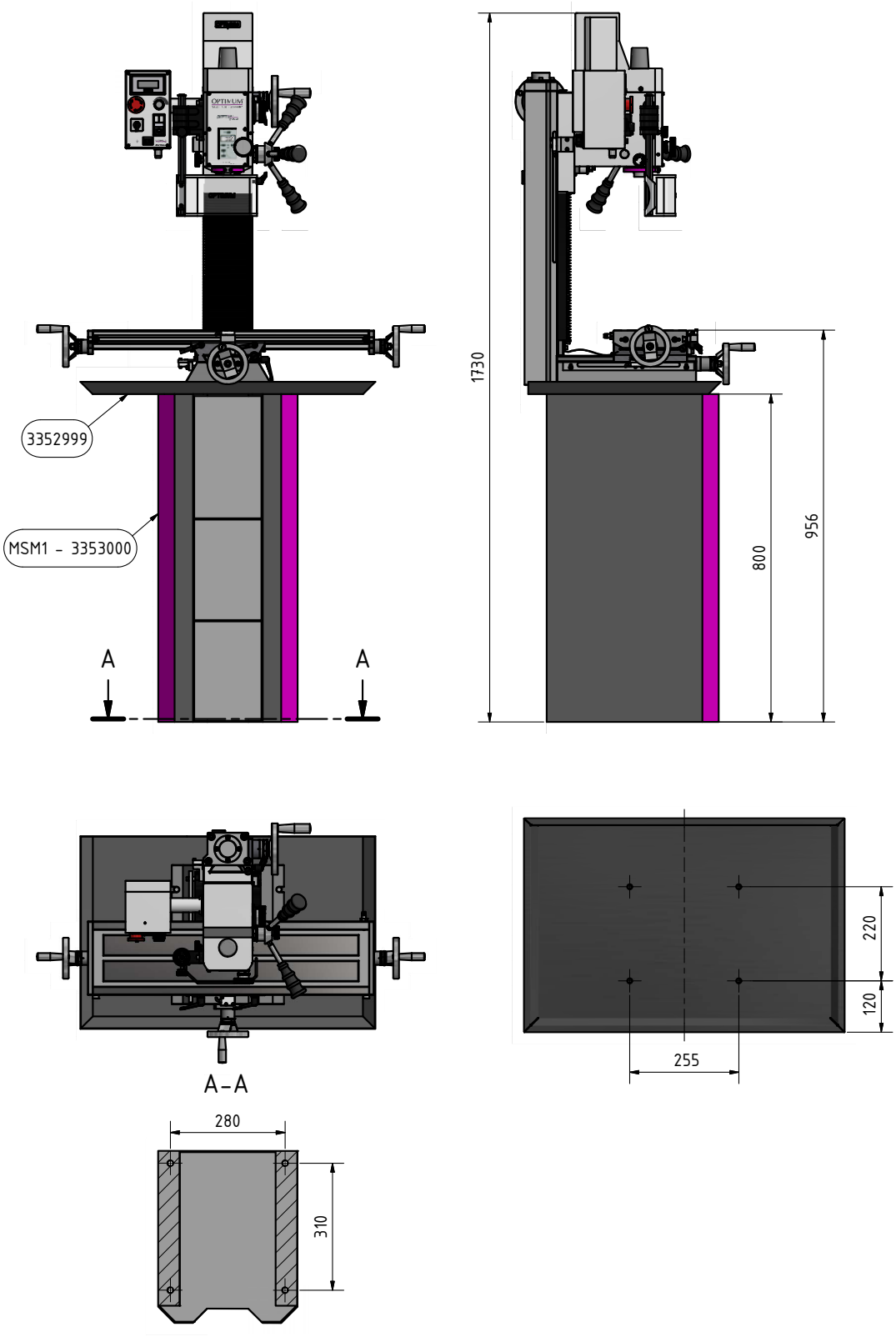


BF20V_GB_2.fm

2.12 Optional machine base

CAUTION!

The optional machine base must be bolted to the floor.



3 Delivery, interdepartmental transport, assembly and commissioning

3.1 Notes on transport, installation, commissioning

Improper transport, installation and commissioning is liable to accidents and can cause damage or malfunctions to the machine for which we do not assume any liability or guarantee.

Transport the scope of delivery secured against shifting or tilting with a sufficiently dimensioned industrial truck or a crane to the installation site.

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 box.

Note the total weight of the machine. The weight of the machine is indicated in the "Technical data" of the machine. When the machine is unpacked, the weight of the machine can also be read on the rating plate.

Only use transport devices and load suspension gear that can hold the total weight of the machine.

WARNING!

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

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other competent supervisory authority, responsible for your company. Fasten the loads properly.

3.1.1 General risks during internal transport

WARNING: TILTING DANGER!

The machine may be lifted unsecured by a maximum of 2 cm.

Employees must be outside the danger zone, i.e. the reach of the load.

Warn employees and advise them of the hazard.

Machines may only be transported by authorized and qualified persons. Act responsibly during transport and always consider the consequences. Refrain from daring and risky actions.

Gradients and descents (e.g. driveways, ramps and the like) are particularly dangerous. If such passages are unavoidable, special caution is required.

Before starting the transport check the transport route for possible danger points, unevenness and faults.

Danger points, unevenness and disturbance points must be inspected before transport. The removal of danger spots, disturbances and unevenness at the time of transport by other employees leads to considerable dangers.

Careful planning of interdepartmental transport is therefore essential.

3.2 Delivery

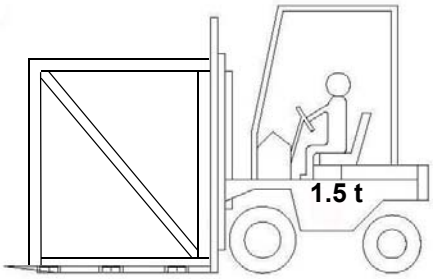
INFORMATION

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

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

Check if all parts are firmly seated.

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



3.3 Unpacking

Put up the machine nearby its definite position before unpacking. If the packaging shows signs of possible transport damage, take the necessary precautions not to damage the machine when unpacking. If damage is discovered, the carrier and/or shipper must be notified immediately so the necessary steps can be taken to register a complaint.

Inspect the machine completely and carefully, making sure that all materials, such as shipping documents, manuals and accessories supplied with the machine have been received.

3.4 Set-up and assembly

3.4.1 Installation site requirements

The power plug of the milling machine must be readily accessible.

The illumination of the workplace must be designed in such a manner that an illumination of 500 Lux is attained at the tool tip.

If this is not guaranteed with the normal installation site lighting, workplace lights must be used.

In order to achieve sufficient safety against falls by slipping, the accessible area in the mechanical machining zone of the machine must be equipped with a slip resistance. The slip resistant mat and/or the slip resistant floor must be at least R11 according to BGR 181.

The used shoes must be suitable for being used in those machining areas. The accessible areas must be cleaned.

3.5 Lifting the machine

WARNING!

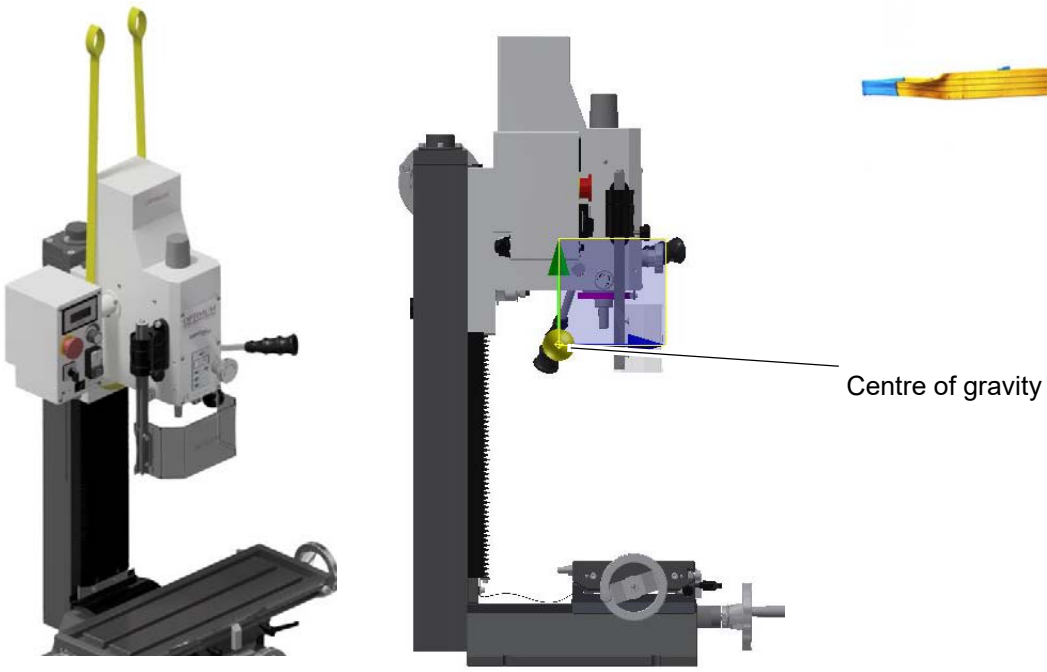
Danger of crushing and overturning. Proceed carefully when lifting, installing and assembling the machine.

➜ Fix the load lifting gear around the drilling-milling head.

➜ Lock all clamping levers on the drilling-milling machine before you lift it.

➜ Make sure that no add-on pieces or varnished parts are damaged due to the load suspension. To prevent the possibility of damage occurring to the cap of the drive and to the milling head, the load step should be selected on the guide of the milling head.

➜ Take care with the centre of gravity of the machine.



3.5.1 Assembly

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

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

➜ Check that the milling machine foundation is horizontal with a spirit level.

➜ Check that the foundation has sufficient load-bearing capacity and rigidity.

ATTENTION!

Inadequate rigidity of the foundation will cause interaction of vibrations between the milling machine and the foundation (resonant frequency of the components). If the rigidity of the overall system is insufficient, critical speeds with annoying vibrations will be reached very quickly and lead to bad milling results.

➜ Fasten the machine substructure to the foundation.

➜ Place the milling machine on the provided foundation.

WARNING!

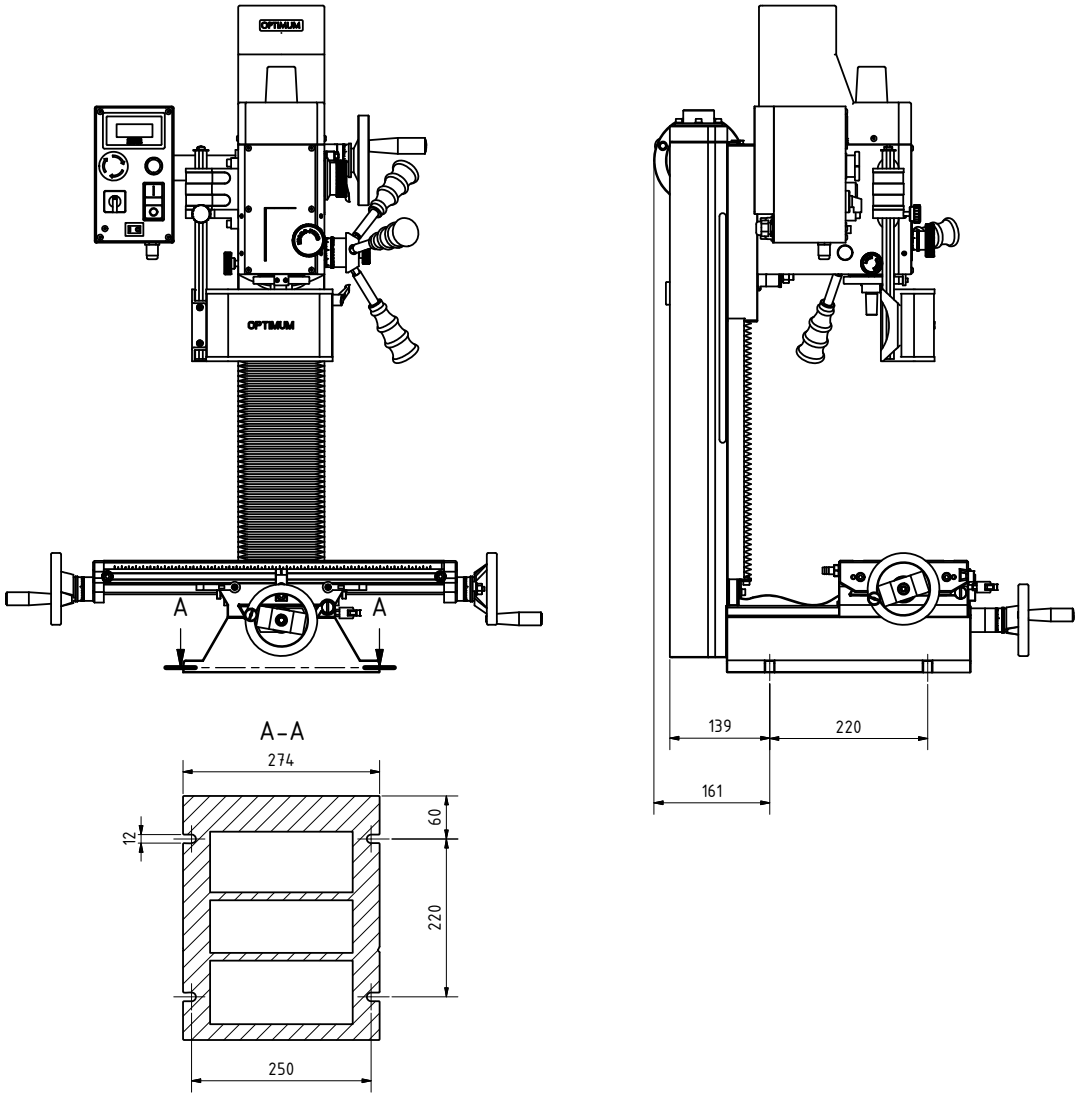
The nature of the foundation and type of fixings used to secure the machine base to the foundation must be capable of absorbing the loads caused by the milling machine. The

foundation must be level. Check that the milling machine foundation is horizontal by using a spirit level.

➜ Fix the milling machine to its foundation at the recesses provided on the machine base for this purpose.

3.6 Attachment to the machine base

3.6.1 Dimensions, recesses for fastening the machine



3.7 First commissioning

☞ Qualification on page 10

WARNING!

First commissioning may only take place after proper installation.

First commissioned of the milling machine by inexperienced personnel or inexperienced users constitute a risk to personnel and equipment. We do not accept any liability for damages caused by incorrectly performed commissioning.

ATTENTION!

Before commissioning the machine, all bolts, fastenings and guards must be checked and re-tightened as necessary!

WARNING!

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

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

Only use tool holders in the intended admissible speed range.

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

3.8 Electrical connection

CAUTION!

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

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

❍ Mains fuse 16A.

3.9 Cleaning and lubrication

➜ Remove the anti-corrosive agents which has been applied to the milling machine for transport and storage. We recommend you use paraffin for this purpose.

➜ To clean the milling machine, do not use any solvents, nitro-cellulose thinner or other cleaning agents that could damage the paintwork. Observe the cleaning agent manufacturer's information and notes.

➜ Grease all exposed machine parts using an acid-free lubricating oil.

➜ Lubricate the milling machine in accordance with the lubrication schedule. ☞ Inspection and maintenance on page 36

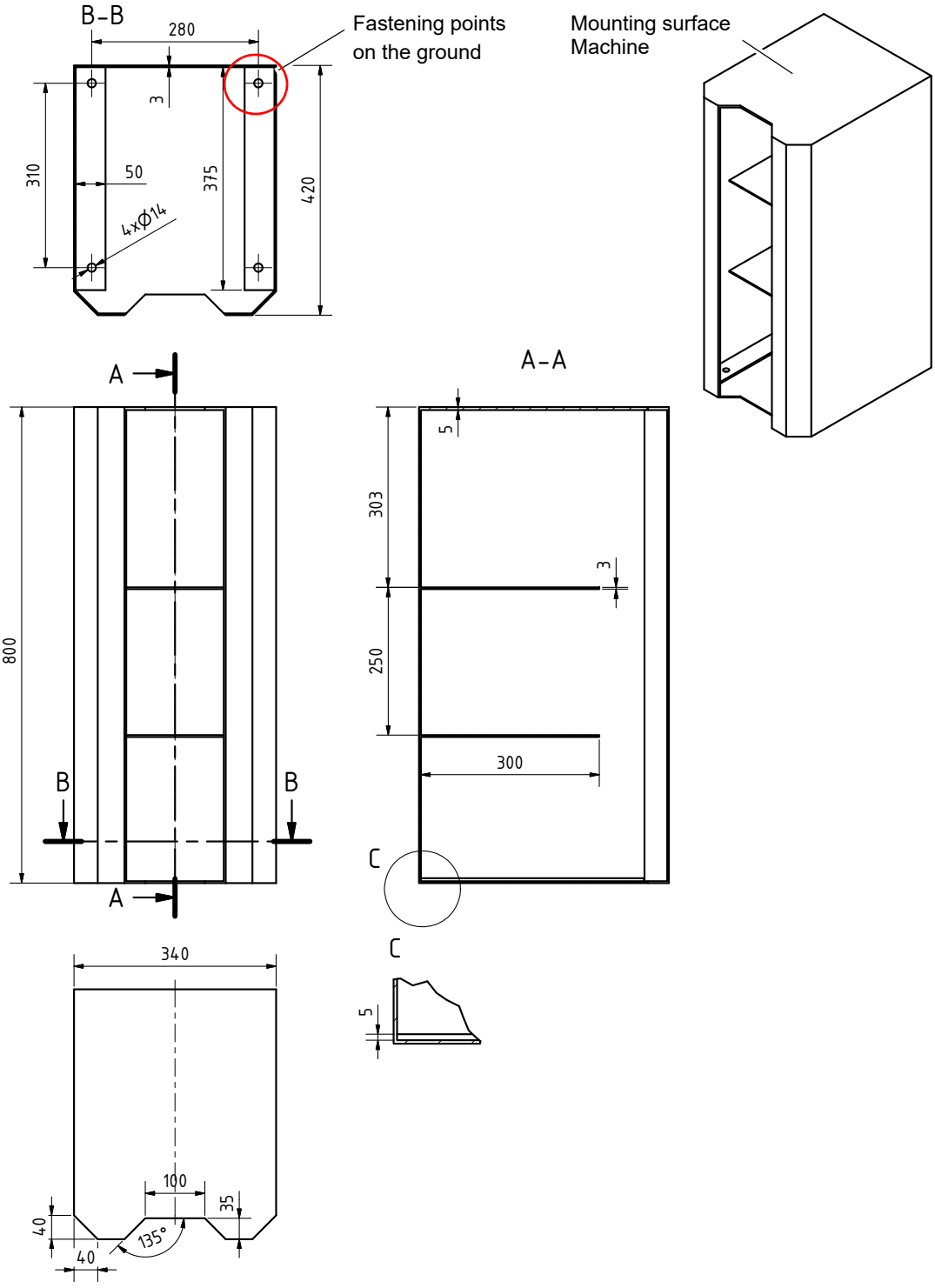
➜ Check that all spindles are running smoothly. All spindle nuts are re-adjustable.

INFORMATION

The milling machine has been painted with varnish. This fact must be taken into account when selecting your cooling lubricant. Optimum Maschinen Germany GmbH does not accept any liability for subsequent damages due to unsuitable cooling lubricants. The flashpoint of the emulsion must be higher than 140°C. When using non-water-miscible cooling lubricants (oil content > 15%) with a flashpoint, ignitable aerosol air mixtures might develop. There is a potential danger of explosion.

3.10 Optional machine base

MSM1 - Part no. 3353000



3.11 Optional digital display DRO5

The magnetic holder supplied with the DRO5 is not strong enough to securely attach the display to the side of the control panel. Attach the DRO5 to the top of the control panel.

3.12 Power grid fluctuations and their destructive effect

A prerequisite for grid stability is that the frequency and voltage are within the specified limits at every location in the power grid and at all times. Excessive deviations in voltage can only be remedied locally, i.e. by nearby plants, while frequency deviations must be reacted to very quickly in particular. These measures to maintain grid stability are called system services of your supplier.

Lightning as a cause of voltage peaks

Thunderstorms, and the associated risk of lightning strikes, are one of the main causes of voltage peaks in electrotechnical installations. About 1.5 to 2 million lightning strikes per year are registered in Germany alone, and the damage is considerable. Destroyed equipment, damaged operating and data technology, failure of installations.

Switching of inductive loads

Switching inductive loads, supply company interference suppression and other problems also often damage data or systems.

Renewable energies

Renewable energies located in a local environment can trigger voltage fluctuations if the electricity grid operator is already operating the grid at the upper limit in order to be able to supply as much electricity as possible.

Detecting voltage peaks

In an electrical system, voltage peaks can be displayed with an oscilloscope or a mains analysis device; voltage peaks are thus made visible during long-term measurements. Measurements can also be made with a pulse counter, which records voltage peaks from a set threshold value using a measuring transformer. However, the significance of such measurements should be treated with caution. It is true that voltage peaks can be detected and can also be used for risk assessment. However, it is not the frequency of the voltage peaks that is decisive, but the destructive energy they contain. And a single impulse is enough to completely destroy a device.

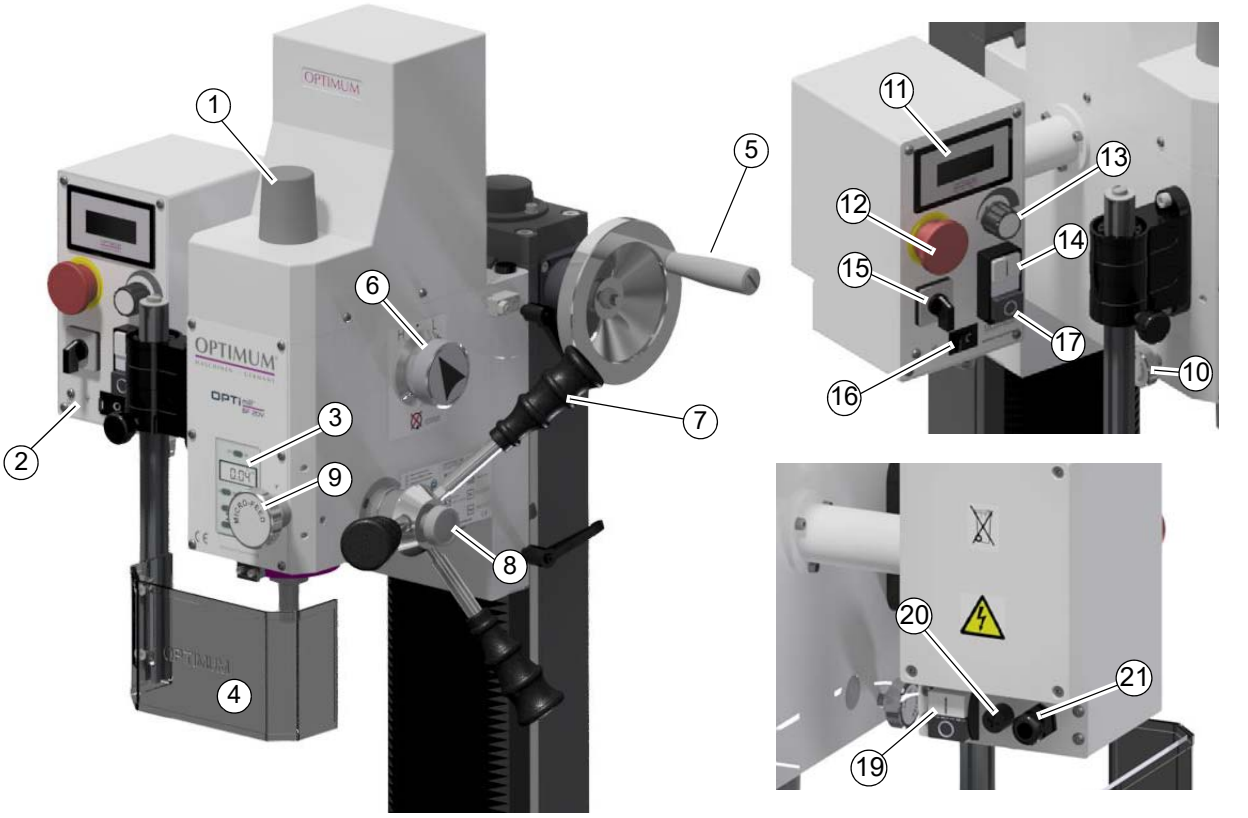
Detect and prevent over voltage

Impending over voltage damage must be recognised by a specialist and prevented by means of protection in the electrical system. Surge protection devices protect against short-term voltage peaks - so-called transients. Special TOV (Temporary Over Voltage) protection devices protect against temporary or permanent over voltages.

Voltage peaks with interference potential occur in every electrical system. Surges due to switching operations occur more frequently than lightning couplings. Voltage peaks can be detected by measurements, but only precautionary measures using a surge protection concept ensure the required high availability of an electrical system.

4 Operation

4.1 Control and indicating elements



Pos.	Designation	Pos.	Designation
1	Draw-in rod cap	2	Control panel
3	Digital display, quill fine feed ☞ Digital spindle sleeve display on page 33	4	Spindle guard
5	Milling head height adjustment hand crank	6	Rotary selector switch gear stage
7	Star grip for spindle sleeve feed	8	Activation of the fine adjustment
9	Fine adjustment of spindle sleeve	10	Quill clamping screw
11	Digital speed display	12	Emergency stop
13	Electronic speed adjustment	14	Start pushbutton
15	Direction of rotation selector switch	16	Machine lamp
17	Stop pushbutton	19	Main switch
20	Fine-wire fuse	21	Power supply connection cable

4.2 Safety

The milling machine must only be operated under the following conditions:

- The milling machine is in proper working order.
- The milling machine is used as intended.
- The operating instructions are followed.
- All safety devices are installed and activated.

Eliminate or have all malfunctions rectified promptly. Stop the milling machine immediately in the event of any abnormality in operation and make sure it cannot be started up accidentally or without authorisation.

☞ For your own safety during operation on page 16

4.3 Switching the milling machine on

➜ Select the gear stage
➜ Close the spindle guard.
➜ Set speed regulator to lowest speed.
➜ Actuate the push button“ON".
➜ Select the direction of rotation.
➜ Set desired speed on the speed regulator.

4.4 Switching off the drilling milling machine

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

➜ Actuate the push button“OFF". For a longer-term standstill, switch it off at the master switch.

4.5 Resetting an emergency stop situation

➜ Unlock the emergency stop switch again.
➜ Switch on the spindle rotation again.

4.6 Power failure, Restoring readiness for operation

➜ Switch on the spindle rotation again.

4.7 Speed setting

4.7.1 Selecting the speed

The correct speed is an important factor for milling. The speed determines the cutting speed by which the cutting edges cut the material. By selecting the correct cutting speed, the service life of the tool is increased and the working result is optimized.

The optimum cutting speed mainly depends on the material and on the material of the tool. Higher speeds are possible with tools (mills) made from hard metal or cutting ceramics than with tools made from high-alloy high speed steel (HSS). You will achieve the ideal cutting speed by selecting the correct rotation speed by hand.

We recommend using a machining technology paperback
ISBN 978-3-8085-1473-3 (example, only in German language available). In these reference table books you will find all the necessary and additional information. Those machining technology paperbacks should bridge the gap between the predominantly theory-oriented textbooks and the with mostly low theoretical foundations written practice books and reference books.

4.7.2 Gear stage

➜ Changing the gear stage may only be at a standstill.

BF20V_GB_4.fm

4.8 Feed

with the hand cranks on the milling table.

Note the different forces acting during synchronous milling and conventional milling on the spindles of the milling table. The cutting forces during synchronous milling tend to be that the tool will move into the material.

Conventional milling is always to be preferred over synchronous milling.

Only with recirculating ball screws can the use of synchronous milling be undertaken sensibly.

This instruction manual assumes that the milling machine has been obtained without recirculating ball screws.

The forces and backlash occurring in the spindle nuts leads to "chatter marks" on the surface of the work piece in synchronous milling.

In conventional milling, the work piece moves with the hand cranks on the milling table opposite to the direction of rotation of the milling machine.

In synchronous milling, the work piece moves with the hand cranks on the milling table in the direction of rotation of the milling machine. A smoother surface is obtained compared with conventional milling. So, machining in synchronous milling should only be used for finishing.

4.9 Tool installation

WARNING!

When milling, the mounting cone must always be secured with the tightening rod. A pure taper connection with the inner taper of the spindle without using the tightening rod is not permitted for milling work. The lateral pressure loosens the cone connection. Injuries due to flying parts are possible.

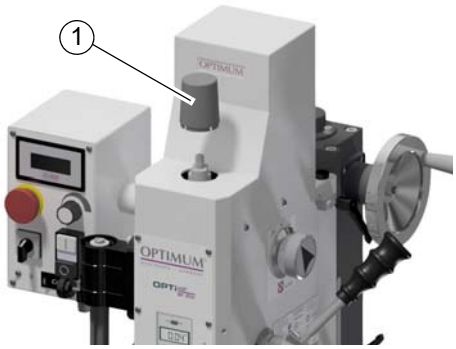
ATTENTION!

Always remove the tool again at the end of the work.

When installing a cold Morse taper in a hot machine, these MT mounts tend to shrink onto the Morse taper compared to steep taper mounts. When the machine has cooled down, or after a longer standstill, problems may arise during removal.

The milling head is equipped with an M10 tightening rod.

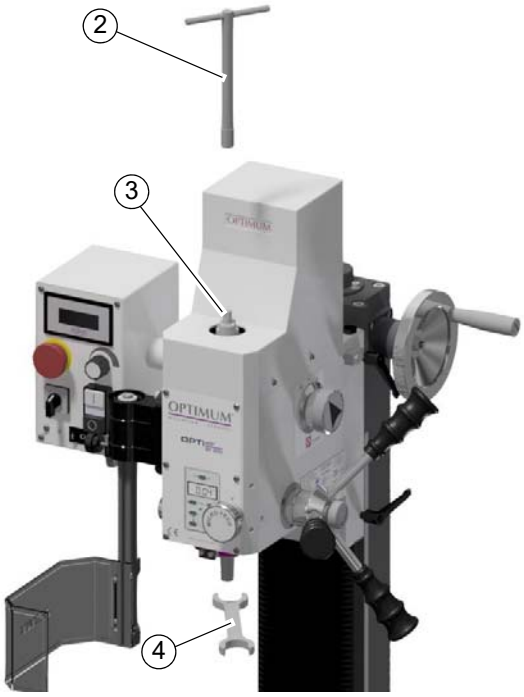
➜ Remove the cover cap (1).
➜ Clean the seat in the spindle / quill.
➜ Clean the cone of your tool.
➜ Insert the tool in the spindle / quill.



Img.4-1: Drill-mill head

➜ Screw (2) the tightening rod (3) into the tool.

➜ Tighten the tool with the tightening rod and hold the spindle on the counter bearing with a spanner (4).



Img.4-2: Drill-mill head

4.10 Removing tool

➜ Hold the spindle on counter bearing with a wrench and loosen the draw bar. Continue turning the tie rod, so that the tool is squeezed out from the conical seat.

4.11 Use of collets

If collets are used to house milling tools, higher machining tolerance can be achieved. The collet may easily and quickly be changed for a smaller or larger end mill with no need to remove the complete tool. The collet is pressed into the ring of the swivel nut and must rest there by itself. By tightening the coupling nut on the tool, the milling cutter is clamped centrally. Make sure that the correct collet is used for each end mill diameter, so that the milling cutter may be fastened securely and firmly.

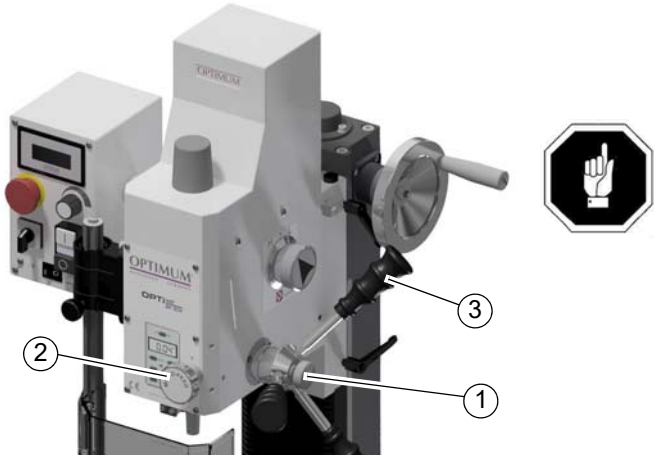
4.12 Manual quill feed with the fine feed

➜ Turn the handle screw (1) to activate the fine feed.

➜ Turn the fine feed (2) to move the quill.

ATTENTION!

Damage to the mechanics. Always deactivate the fine feed when working with the quill lever (3).

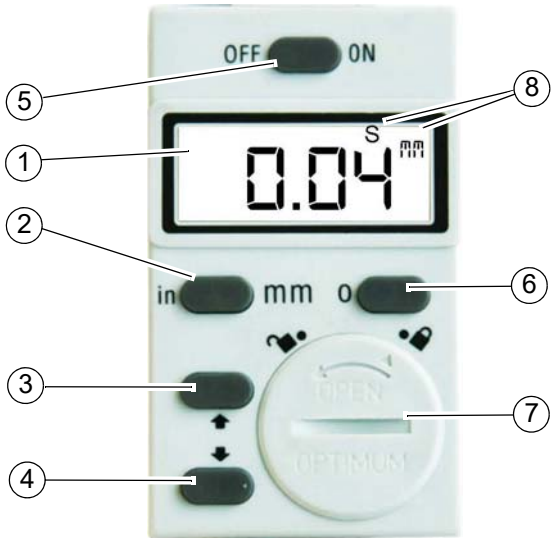


Img.4-3: Fine feed

BF20V_GB_4.fm

4.13 Digital spindle sleeve display

Measuring range	0 - 999.99mm
	0 - 39.371 inch
Display accuracy	0.01 mm
	0.0004 inch
Power supply	Round cell CR2032, 3 V , 20 x 3,2mm



Pos.	Designation
1	LCD Display
2	mm/inch changeover
3	Value increase in operating state < S > (setting)
4	Value reduction in operating state < S > (setting)
5	ON / OFF switch
6	Zero setting and activation of operating state < S >
7	Battery bay
8	Display operating status < S > and selected unit < mm or inch>

Operation status “S“

The operating state < S > is used to enter and compensate for the mechanical play (dead travel) of the quill mechanism.

- (1) Display with indication of the operating states S, inch or mm
- (2) switches the unit of measurement from millimetres to inches and back again.
- (3) ▲, value increase in operating state < S >
- (4) ▼, reduction in value in operating state < S >
- (5) Switches the display ON or OFF.
- (6) 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 metallically 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.

4.13.1 Malfunctions

Malfunction	Cause / possible effects	Solution
Flashing of the display	• Voltage too low	• Change battery
Screen doesn't refresh	• Operation status < S> is active • Disturbance in the circuit	• Deactivate operating status <S>. • Remove the battery and reinsert it after approx. 30 seconds.
No data visible	• No power supply • Battery voltage less than 3V	• Clean battery contacts • Replace battery

4.14 Swivelling the milling head

The milling head can be swivelled to the right and to the left.

➜ Loosen the fastening screw on the milling head.

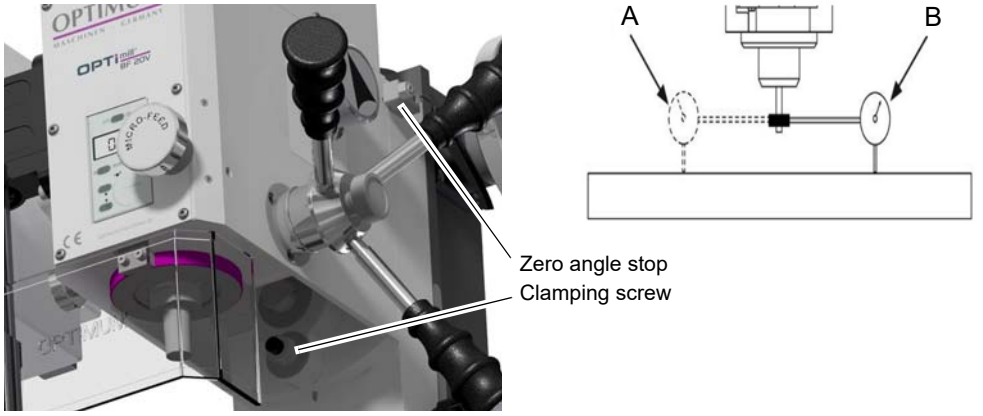
➜ Turn the drill-mill head to the desired position.

➜ Retighten the fastening screw.

INFORMATION

The milling head should be aligned after resetting to the initial position with a dial indicator so that holes can be produced with the spindle sleeve at a right angle.

Set the zero degree angle step using your set-up.



Img.4-4: Swivelling the milling head

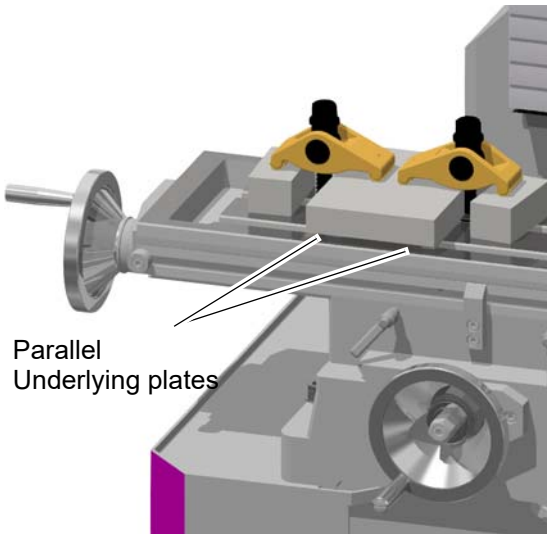
BF20V_GB_4.fm

4.15 Clamping the workpieces

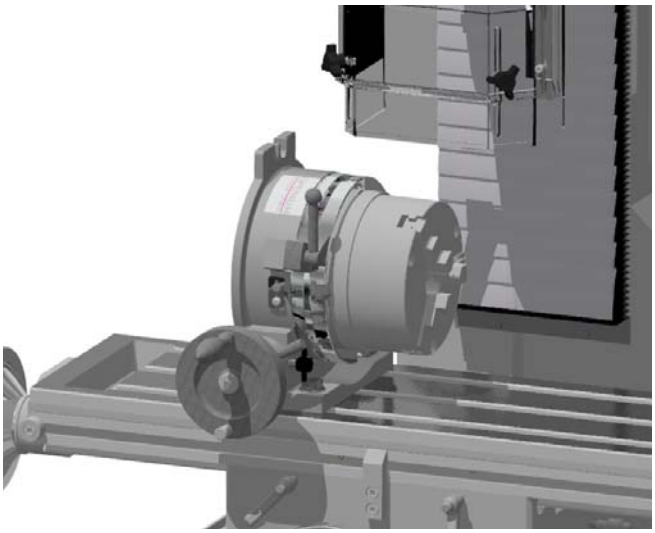
CAUTION!

Injuries can be caused by parts flying off.

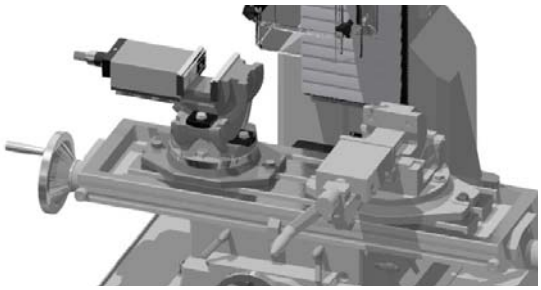
The workpiece must always be secured to the milling table in a machine vice, chuck or with another suitable clamping tool, such as a workholding device (clamping claws).



Workholding device 3352032
+ Parallel underlying plates 3354001



Dividing device 3356200 + Chuck 3356225



Triple axis chuck 3355500
+ Double axis chuck 3354170

4.15.1 Calculation of the Cutting Forces or Necessary Holding Force when Milling

The cutting force Fc arising between the tool and workpiece when milling can be calculated using the Viktor/Kienzle formula:

$$Fc = K \cdot b \cdot h^{(1-m_c)} \cdot k_{c1.1}$$

In this formula, there are 5 factors which are completely unknown without more detailed knowledge. However, these factors can be determined using tables.

The specific cutting force **kc1.1** and the chip thickness exponent **mc** are dependent on the material used. Both parameters are present in tabular reference books and must be investigated for the corresponding material.

Furthermore, for the calculation of the cutting force **Fc** according to the Kienzle equation, the chip width **b**, the chip thickness **h**, and the correction factor **K** are needed.

We recommend using a book of machining technology reference tables.
In such handbooks you will find all the necessary and additional information. Such manuals should bridge the gap between the predominantly theory-oriented textbooks and reference and table books mostly written with the few theoretical principles in practice.

5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the milling machine.

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

- **operational safety,**
- **failure-free operation,**
- **a long working life of the milling machine 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:

- **extremely serious injuries to those working on the milling machine and**
- **damage to the milling machine.**

Maintenance and repair work on the milling machine must be carried out by qualified technical personnel only.

5.1.1 Preparation

WARNING!

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

Attach a warning sign.

5.1.2 Restarting

Before restarting, run a safety check.

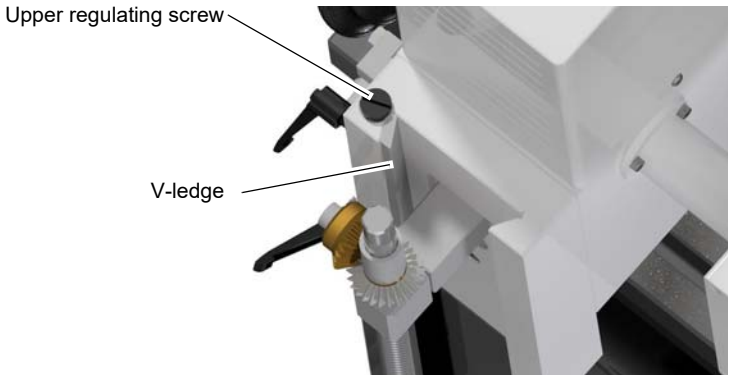
☞ Safety check on page 15

WARNING!

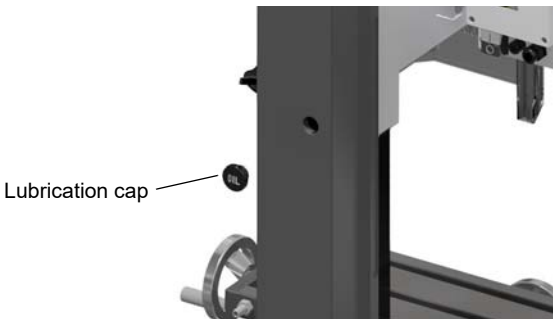
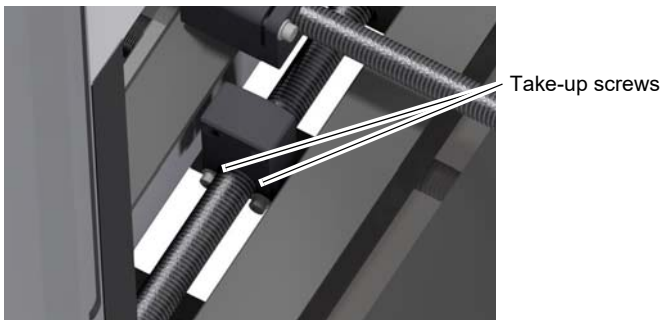
Before starting the milling machine, it is essential that you ensure that this does not constitute a risk to personal safety or damage to the milling machine.

5.2 Inspection and maintenance

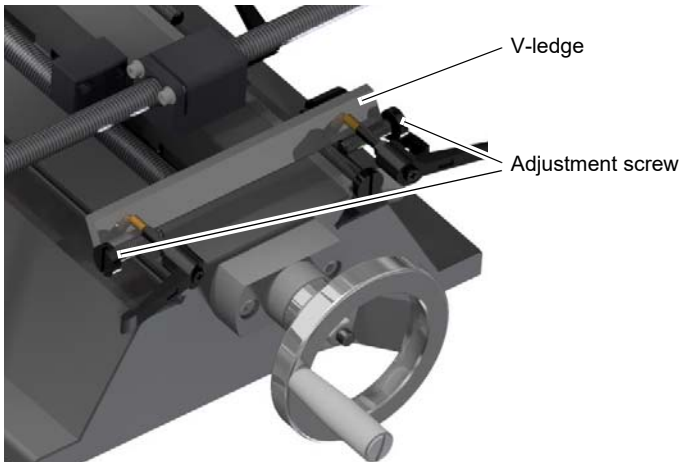
The type and level of wear depends to a large extent on the individual usage and operating conditions. Any indicated intervals therefore are only valid for the corresponding approved conditions.

Interval	Where?	What?	How?
Start of work, after every maintenance or repair work	**Milling machine**	➜ ☞ Safety check on page 15	
Start of work, after every maintenance or repair work	**Dovetail guides**	Oiling	➜ Oil all guide rails.
Every week	**Cross table**	Oiling	➜ Oil all bare steel surfaces. Use acid-free oil.
Monthly	**Clamping bolts Milling head**	firmly tightened	➜ Ensure that the clamping bolt for swivelling the drill head is firmly tightened.
When necessary	**Adjustment gib Milling head**	Readjusting Z axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide rail. ➜ Check the settings. The corresponding guide rail must be more easily movable but ensure stable guidance.  Img.5-1: Adjusting screws Z axis

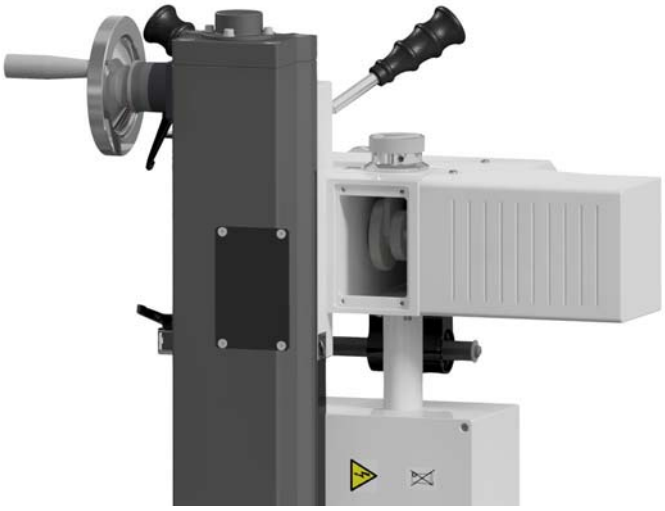
BF20V_GB_5.fm

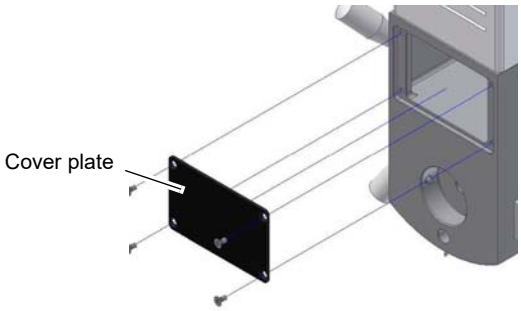
Interval	Where?	What?	How?
Every 6 months	**Z-axis spindle and spindle nut**	Greasing	➜ Open the lubrication cap. ➜ Crank the drilling/milling head to the desired height. ➜ Lubricate or oil the spindle nut and spindle.  Img.5-2: Rear of the column
	Spindle nut Cross table	readjust X axis	Increased play in the milling table spindles can be reduced by resetting the spindle nuts. The spindle nuts are reset by reducing the thread flanks of the spindle nut by means of take-up screws. After the reset, it is necessary to check if there is still smooth movement over the entire path, otherwise wear is considerably increased due to friction between the spindle nut and the spindle.  Img.5-3: Cross table
	Spindle nut Cross table	readjust Y axis	 Img.5-4: Cross table

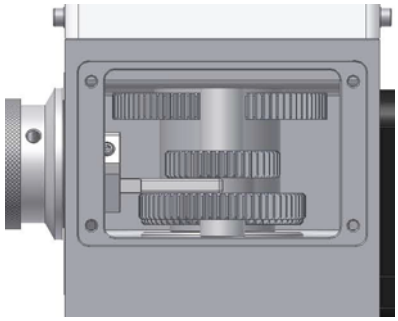
BF20V_GB_5.fm

Interval	Where?	What?	How?
When necessary	**Gibs Cross table**	readjust X axis Y axis	➜ Loosen one screw, turn the other adjustment screw of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide rail. ➜ Check the settings. The corresponding guide rail must be more easily movable but ensure stable guidance.  Img. 5-5: X axis / Y axis adjustment screws

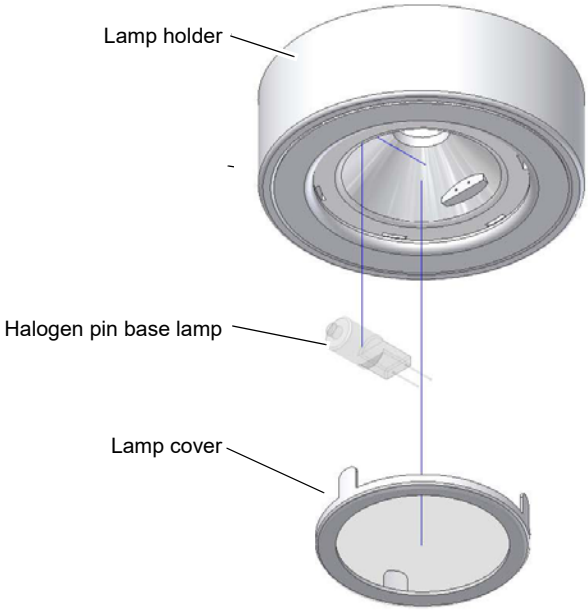
Interval	Where?	What?	How?
Every 6 months	**Drilling-milling head gearbox**	Greasing	➜ Turn the drill/milling head through 90° as described under ☞ Swivelling the milling head on page 34 . ➜ Remove the cover plate on the rear. ➜ Lubricate the gearwheels. ☞ Operating material on page 19







Img.5-6: Rear side

Interval	Where?	What?	How?
When necessary	**Machine illumination**	Replacing the halogen lamp	 Img.5-7: Replacing the halogen lamp ➜ Tilt the mill head a little to the right. This way you can easily remove the lamp cover in order to allow replacing of the halogen lamp. ➜ Plug a small screw driver into the recess between the lamp holder and the lamp cover. ➜ By slightly turning the screw driver you can remove the lamp cover. ➜ Pull the halogen pin base lamp with a cloth and replace the halogen lamp. Type: Halogen pin base lamp, Osram 12V - 10W, base G4
based on operator's historic values in accordance with German DGUV (BGV A3)	**Electronics**	Electrical inspection	☞ Operator's obligations on page 12 ☞ Electronics on page 16

5.3 Repair

5.3.1 Customer service technician

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

Stürmer Maschinen GmbH

Dr.-Robert-Pfleger-Str. 26

D- 96103 Hallstadt, Germany

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

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

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

For repairs, only use

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

6 Ersatzteile - Spare parts

6.1 Ersatzteilbestellung - *Ordering spare parts*

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

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

Die Artikelnummer befindet sich in der Ersatzteilliste. *The article no. is located in the spare parts list.* Die Seriennummer befindet sich am Typschild. *The serial no. is on the rating plate.*

6.2 Hotline Ersatzteile - Spare parts Hotline

+49 (0) 951-96555 -118

ersatzteile@stuermer-maschinen.de

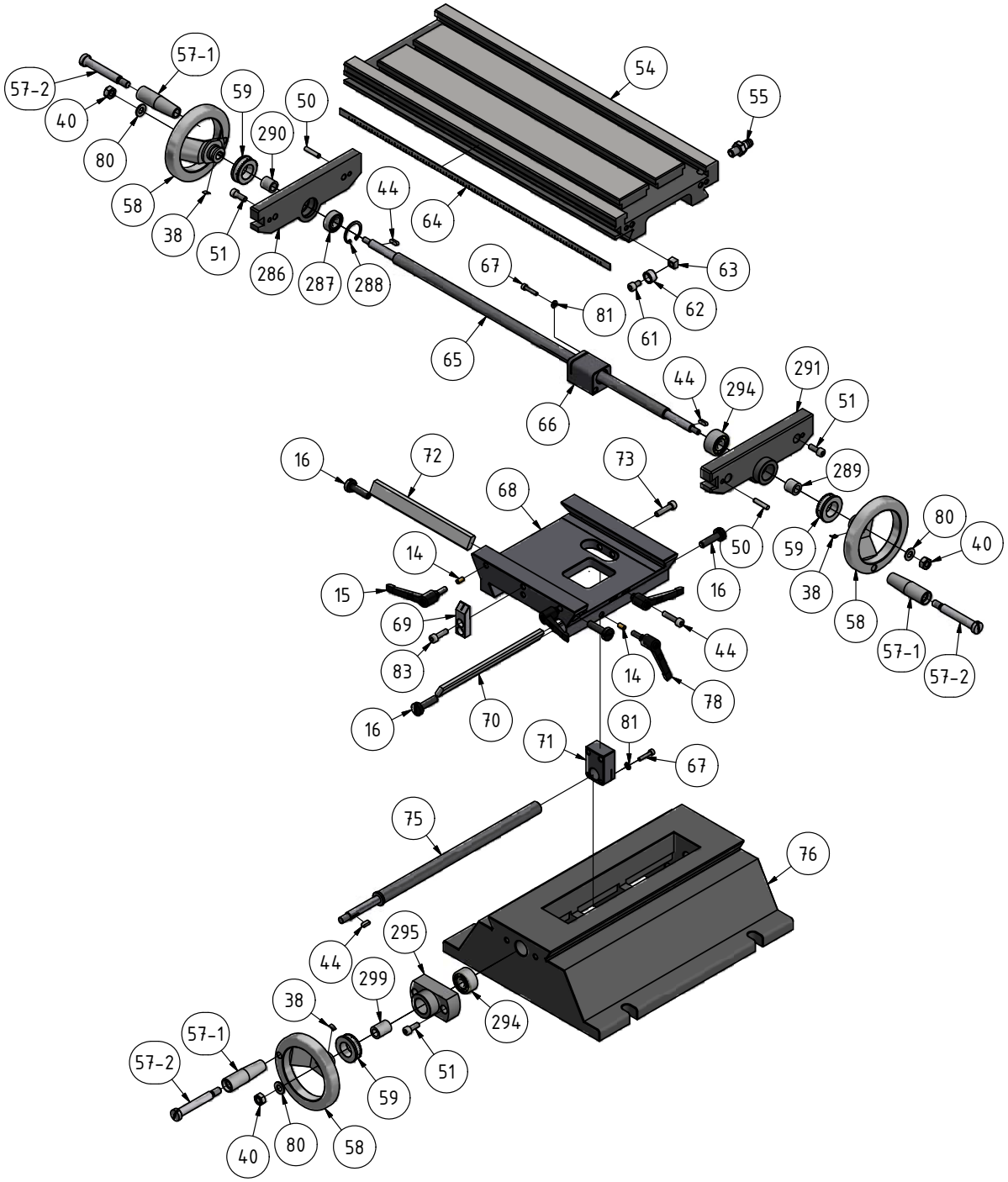
6.3 Service Hotline

+49 (0) 951-96555 -100

service@stuermer-maschinen.de

6.4 Ersatzteilzeichnungen - Spare part drawings

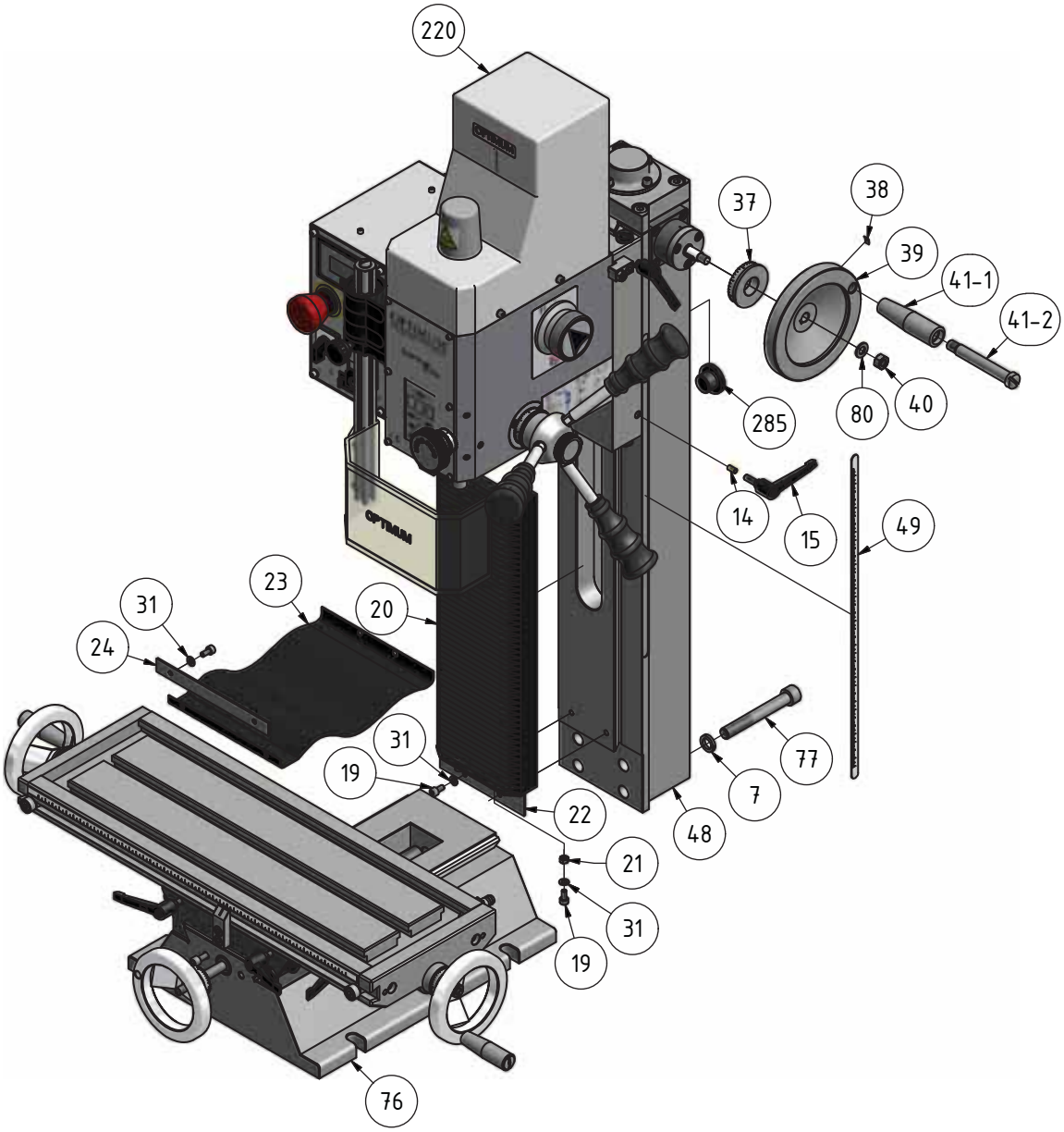
A Kreuztisch - Cross table



6-1: Kreuztisch - Cross table

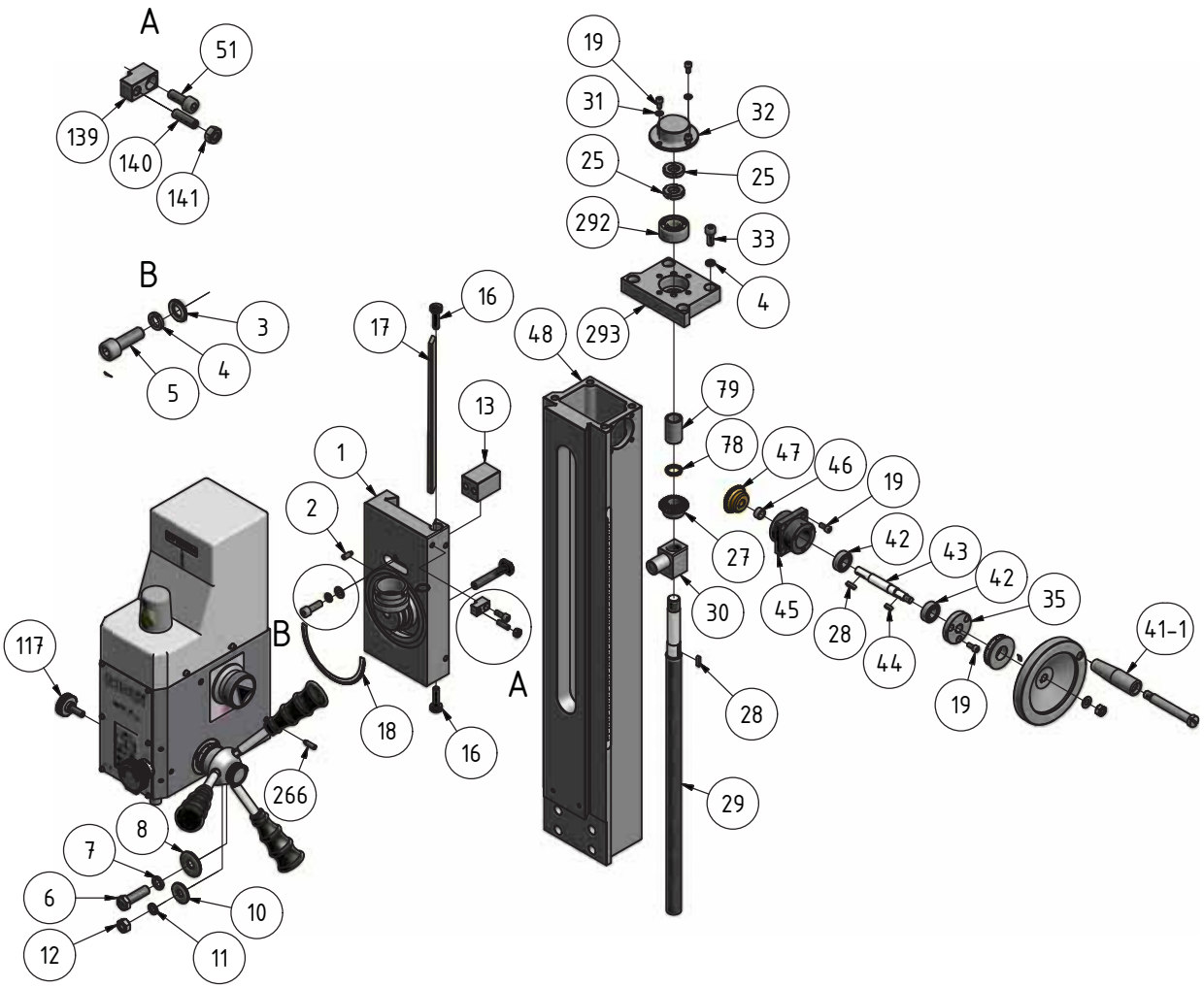
BF20V_parts.fm

B Säule 1 von 2 - Column 1 of 2



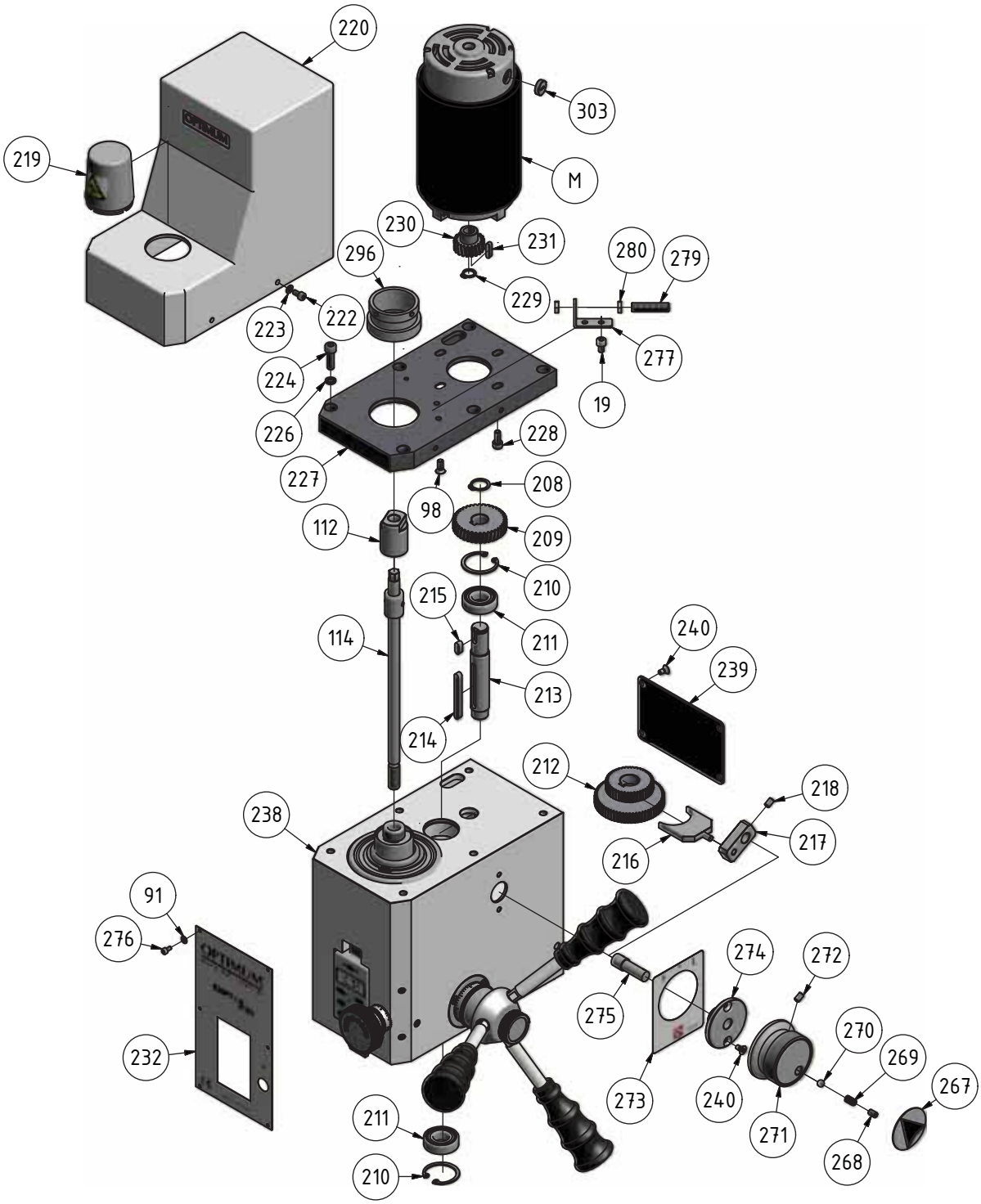
6-2: Säule 1 von 2 - Column 1 of 2

C Säule 2 von 2 - Column 2 of 2



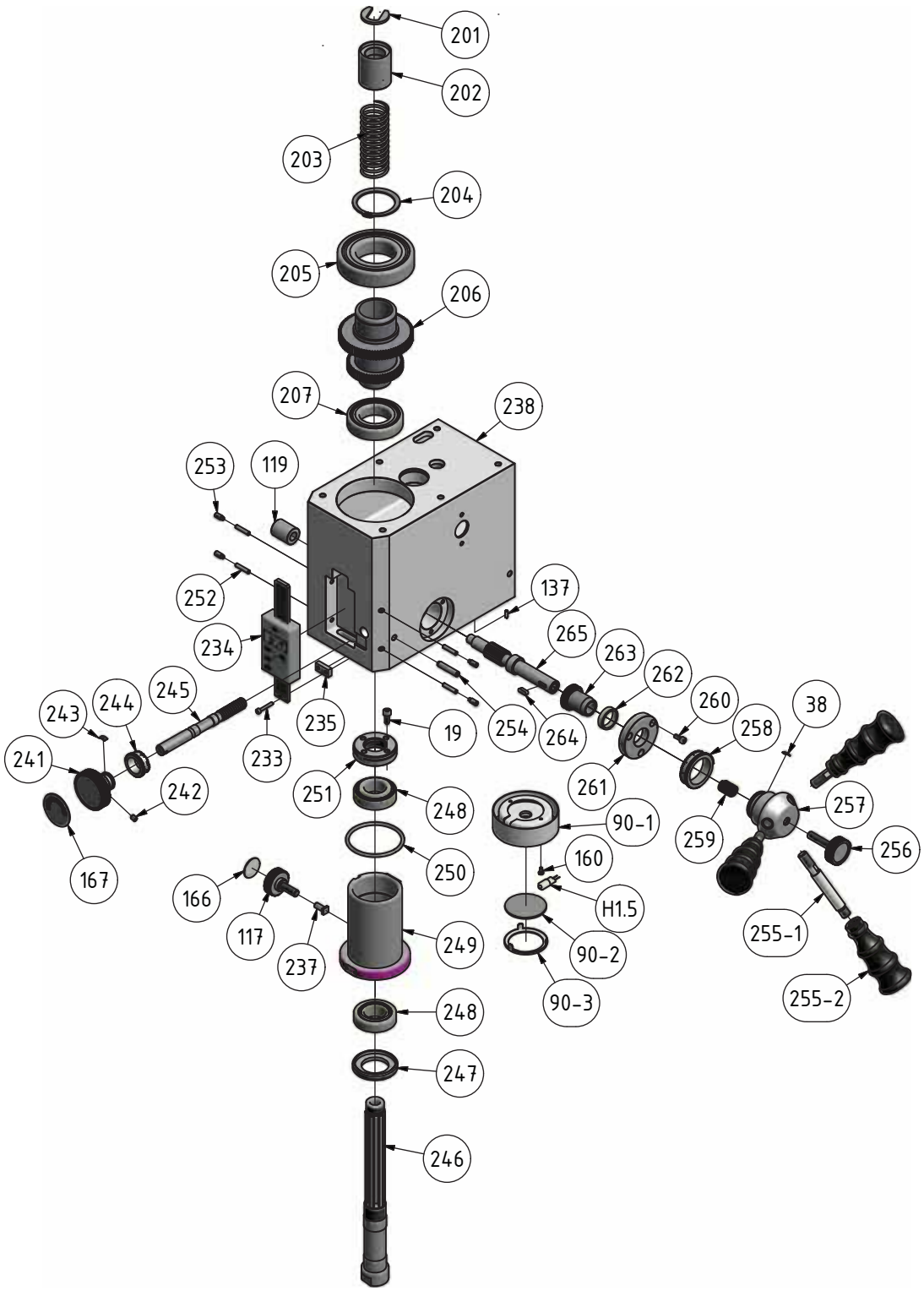
BF20V_parts.fm

D Fräskopf 1 von 2 - Milling head 1 of 2



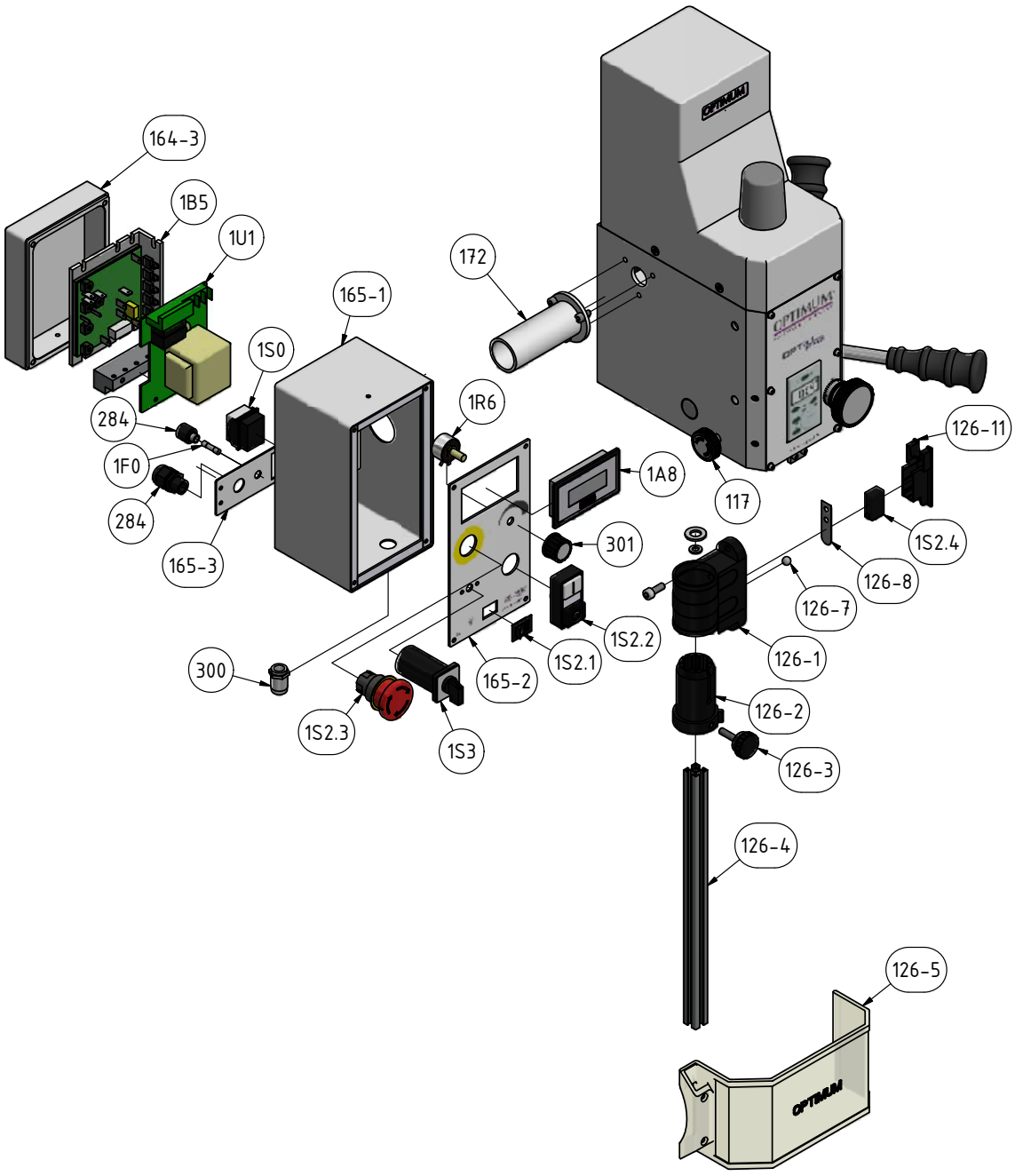
BF20V_parts.fm

E Fräskopf 2 von 2 - Milling head 2 of 2



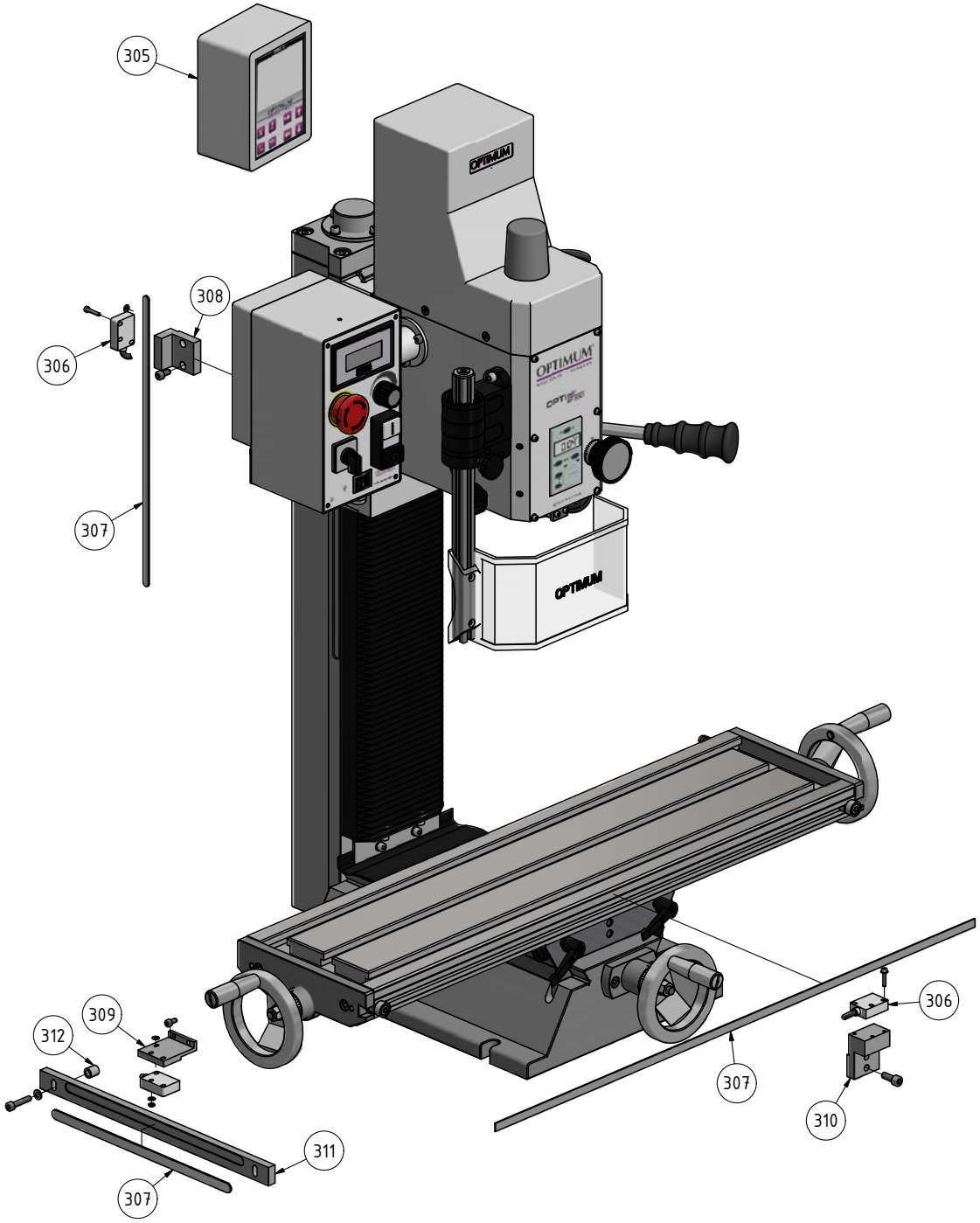
BF20V_parts.fm

F Bedienkonsole und Schutzeinrichtung - Operation panel and protection device



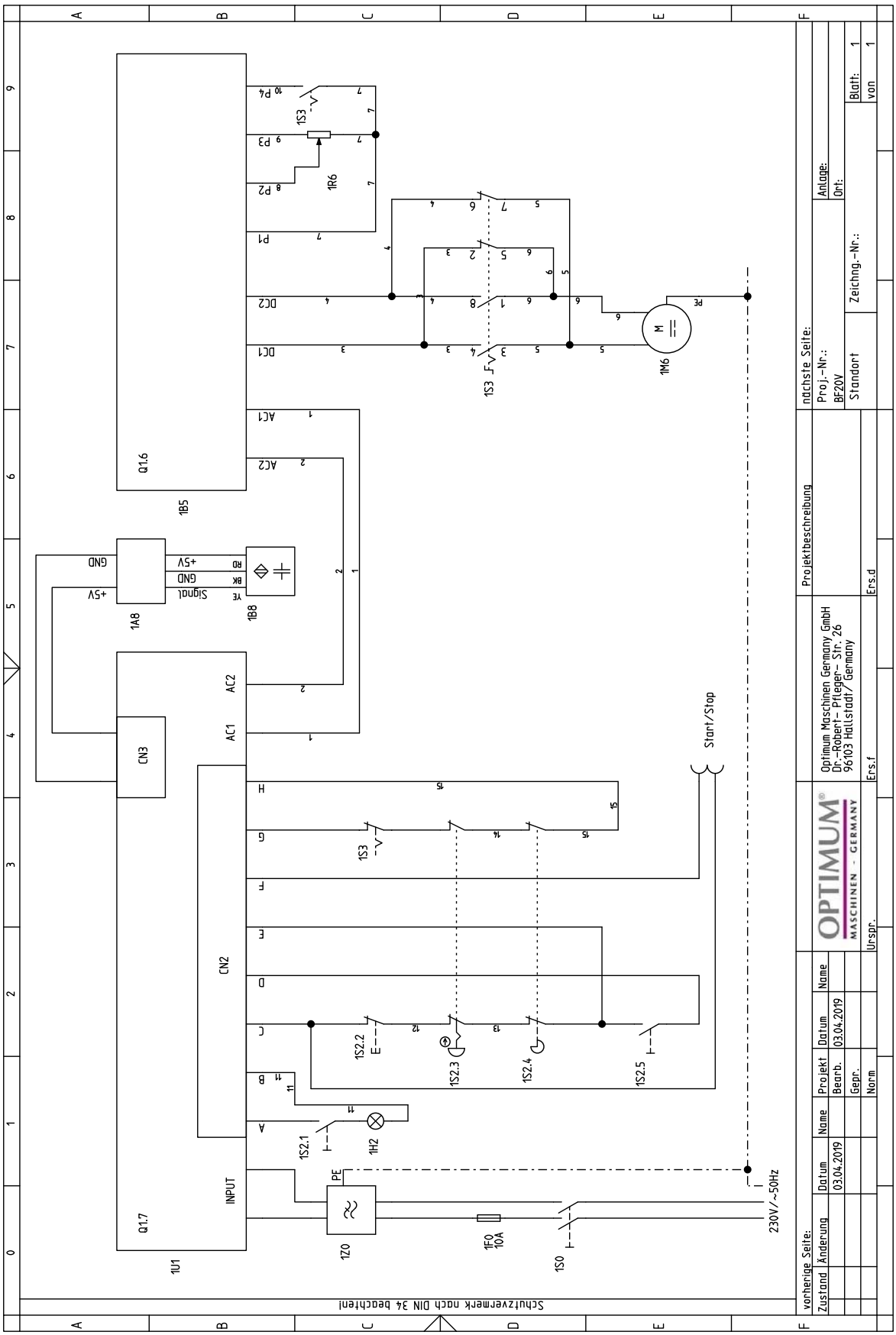
BF20V_parts.fm

G BF20LD



BF20V_parts.fm

6.5 Schaltplan - Wiring diagram - BF20V | BF20L | BF20LD



6-3: Schaltplan-Wiring diagram

BF20V_parts.fm

Ersatzteilliste - Spare part list - BF20V | BF20L | BF20LD						
Pos.	**Bezeichnung**	**Description**	**Menge Qty.**	**Zeichn. Nr. Drawing no.**	**Grösse Size**	**Artikelnummer Item no.**
1	Drehlagerbock Fräskopf	Connect board	1	DM14-01-14		0333812001
2	Gewindestift	Socket head set screw	2	GB 79-85	M6 x 16	
4	Federring	Spring washer	6	GB 93-87	M8	
5	Innensechskantschraube	Hexagon head cap screw	2	ISO 4762	M8 x 25	
6	Sechskantschraube	Hexagon head screw	1	GB 5783-86	M12 x 40	
7	Federring	Spring washer	5	GB 93-87	M12	
8	Unterlegscheibe	Washer	1	DM14-01-39		
9	Schraube	Screw	1			0333812009
10	Unterlegscheibe	Washer	1	DM14-01-40		
11	Federring	Spring washer	1	GB 93-87	M10	
12	Sechskantmutter	Hexagon nut	1	GB 6170-86	M10	
13	Führungsstück	Connect collar	1	DM14-01-13		0333812013
14	Messingstift	Brass pin	6	DM14-00-05		0333812014
15	Klemmhebel	Adjust locating handle	4	JBT 7270.12-1994	DM6 x 16	0333812015
16	Schraube Keilleiste	Gib screw	6	DM14-02-20		0333812016
17	Keilleiste Z-Achse	Taper gib z axis	1	DM14-00-01		0333812017
18	Winkelskala	Angle plate	1	DM14-00-03		0333812018
19	Innensechskantschraube	Hexagon head cap screw	20	GB 70-85	M5 x 10	
20	Faltenbalg	Bellows	1	DM14-00-06		0333812020
21	Mutter	Hexagon nut	2	DIN EN 24 032	M5	
22	Halterung Faltenbalg	Bellows bracket	1	DM14-00-06		
23	Gummi - Späneabdeckung	Rubber splash guard	1	DM14-00-08		0333812023
24	Leiste	Plate	1	DM14-00-09		0333812024
25	Nutmutter	Groove nut	2	GB 810-88	M16x1.5	0333812025
27	Kegelzahnrad	Taper gear	1	DM14-03-06	26 Z ; m 1,5	0333812027
28	Paßfeder	Key	3	DIN 6885	A 4 x 4 x 16	042P4416
29	Spindel Z-Achse	Lift lead screw	1	DM14-03-04		0333812029
30	Spindelmutter Z-Achse	Lift lead screw nut	1	DM14-03-05		0333812030
31	Scheibe	Washer	8	GB 97.1-85	5	
32	Abdeckkappe	Nut collar	1	DM14-03-01		0333812032
33	Innensechskantschraube	Hexagon head cap screw	4	GB 70-85	M8 x 20	
35	Lagerabdeckung	Bearing cover	1	DM14-03-10		0333812035
37	Skalenring Z-Achse	Lift dial z axis	1	DM14-03-11		0333812037
38	Federstück	Spring piece	4			0333811638
39	Handrad Z Achse	Handwheel z axis	1	DM14-03-13		0333812039
40	Sechskantmutter	Hexagon nut	4	ISO 4033	M8	0333812040
41	Griff komplett	Handle complete	1			03020219139
41-1	Griffhülse	Handle sleeve	1	JB7270.5-1994-80	80	
41-2	Schraube	Screw	1	JB7270.5-1994-M10	M10 x 80	
42	Rillenkugellager einreihig	Grooved ball bearing single-row	2	6001-2RZ		0406001R
43	Welle Handrad Z Achse	Lift shaft z axis	1	DM14-03-12		0333812043
44	Paßfeder	Key	5	DIN 6885	A 4 x 4 x 12	042P4412
45	Lagerbock	Lift bearing base	1	DM14-03-09		0333812045
46	Buchse	Collar	1	DM14-03-08		0333812046
47	Kegelzahnrad	Taper gear	1	DM14-03-07		0333812047
48	Säule	Column	1	DM14-03-03		0333812048
48	Säule kpl.	Column cpl	1			0333812048cpl
49	Skala Z-Achse	Lift plate	1	DM14-00-04		0333812049
50	Zylinderstift	Cylindrical pin	4	GB 119-86	A 5 x 24	0333812050
51	Innensechskantschraube	Hexagon head cap screw	11	GB 70-85	M6 x 16	
54	Frästisch	Cross table	1	DM14-02-03	BF20	0333812054
54	Frästisch	Cross table	1	DM14-02-03L	BF20L	0333812254
55	Eiinschraubverschraubung Schlauchanschluss	Screwing in screw connection hose connector	1	DM14-02-18	M10 x 1	
57	Griff komplett	Handle complete	3			0333812057-1
57-1	Griffhülse	Handle sleeve	3	JB7270.5-1994-63	63	
57-2	Schraube	Screw	3	JB7270.5-1994-M8	M8 x 63	
58	Handrad Kreuztisch	Handwheel cross table	3	DM14-02-01		0333812058
59	Skalenring	Dial	3	DM14-02-19		0333812059
61	Innensechskantschraube	Hexagon head cap screw	2	GB 70-85	M6 x 10	
62	Hülse Endlagenanschlag X-Achse	Stopper x axis	2	DM14-02-04		0333812062
63	Rechteckmutter (Nutenstein)	Wedgy nut	2	DM14-02-05		0333812063
64	Skala X-Achse BF20	Table plate x axisBF20	1	DM14-00-02	BF20	0333812064
64	Skala X-Achse BF20 L	Table plate x axisBF20 L	1	DM14-00-02L	BF20L	0333812264

BF20V_parts.fm

Ersatzteilliste - Spare part list - BF20V | BF20L | BF20LD						
Pos.	**Bezeichnung**	**Description**	**Menge Qty.**	**Zeichn. Nr. Drawing no.**	**Grösse Size**	**Artikelnummer Item no.**
65	Spindel X-Achse BF20	Table lead screw x axis BF20	1	DM14-02-11	BF20	0333812065
65	Spindel X-Achse BF20 L	Table lead screw x axis BF20 L	1	DM14-02-11L	BF20L	0333812265
66	Spindelmutter X-Achse	Table lead screw nut x axis	1	DM14-02-09		0333812066
67	Innensechskantschraube	Hexagon head cap screw	4	GB 70-85	M4 x 20	
68	Kreuztischführung	Saddle	1	DM14-02-08	BF20	0333812068
69	Anschlag Endlage X-Achse	Limit plate x axis	1	DM14-02-07		0333812069
70	Keilleiste Y-Achse	Taper gib y axis	1	DM14-02-10		0333812070
71	Spindelmutter Y-Achse	Lead screw nut y axis	1	DM14-02-16		0333812071
72	Keilleiste X-Achse	Taper gib x axis	1	DM14-02-17	BF20	0333812072
73	Innensechskantschraube	Hexagon head cap screw	2	GB 70-85	M6 x 25	
75	Spindel Y-Achse	Lead screw y axis	1	DM14-02-14		0333812075
76	Maschinenfuss	Base	1	DM14-02-15	BF20	0333812076
77	Innensechskantschraube	Hexagon head cap screw	4	GB 70-85	M12 x 90	0333812077
78	Distanzring für Spindel Z-Achse	Spacer ring for spindle z axis	1	DM14-03-15		0333812078
79	Hülse für Z-Achse	Case for z axis	1	DM14-03-14		0333812079
80	Scheibe	Washer	6	GB 97.1-85	8	
81	Scheibe	Washer	2	GB 97.1-85	4	
83	Innensechskantschraube	Hexagon head cap screw	6	GB 70-85	M6 x 12	
90	Maschinenleuchte komplett	Machine lightning complete	1			0333812090-1CPL
90-1	Gehäuse Maschinenleuchte	Housing machine lightning	1			
90-2	Schutzglas	Protection glas	1			
90-3	Deckel Maschinenleuchte	Cover machine lightning	1			
91	Scheibe		6	GB 97.1-85	3	
98	Senkschraube mit Kreuzschlitz	Countersunk screw	1	BS 4183	M5 x 12	
112	Gegenhalter Anzugsstange	Holder screw rod	1	DM14-01-42		03338120112
114	Anzugsstange	Screw rod	1	DM14-20-02		03338120114
117	Klemmschraube Pinole	Clamping screw collar	1	DM14-01-43		03338120117
119	Verschlußstück	Endplate	1	DM14-01-25		03338120119
126	Schutzeinrichtung komplett	Protection device complete	1			03003171125
127	Innensechskant-Gewindestift mit Spitze	Hexagon head cap thread pin screw with point	1	GB 78-85	M5 x 6	
137	Zeiger Winkelskala	Scale-pin	1			
139	Anschlagstück	Stopper	1	DM14-00-10		03338120139
140	Innensechskant-Gewindestift mit flachem Ende	Hexagon head cap thread pin screw with flat end	1	GB 77-85	M6 x 20	
141	Sechskantmutter	Hexagon nut	1	GB 6170-86	M6	
160	Flachkopfschraube mit Kreuzschlitz	Cheese head screw	2	ISO 7045	M3 x 6 - 4.8 - H	
164-3	Gehäuse Steuerung	Housing control boards	1	DM14-10-04		033381201643
165-1	Panel Gehäuse	Panel housing	1			033381201651
165-2	Blende	Cover	1	DM14-10-01A		033381201652
165-3	Blende	Cover	1			
165-12	Innensechskantschraube	Innensechskantschraube	4	GB 70-85	M4 x 30	
166	Label lösen / spannen	Label loose / tighten	1			
167	Label Feinvorschub	Label Micro feed	1			
169	Halterung Panel	Mounting plate panel	1	DM14-10-07		03338120169
170	Halterung Panel	Mounting plate panel	1	DM14-10-08		03338120169
171	Innensechskant-Gewindestift mit Ringschneide	Innensechskant-Gewindestift with cup point	1	GB 80-85	M5 x 12	
172	Haltearm Panel	Holding arm panel	1	DM14-10-06		03338120172
173	Innensechskantschraube	Hexagon head cap screw	4	GB 70-85	M4 x 6	
201	Positionsscheibe	Position washer	1	DM14-01-08		03338120201
202	Buchse	Spring sleeve	1	DM14-01-07		03338120202
203	Druckfeder	Spring	1	GB2089-94	2.5x28x110-3	03338120203
204	Sicherungsring	Retainer ring	1	GB 894.1 - 45		042SR45W
205	Rillenkugellager	Grooved ball bearing	1	6209-2Z	6209-2Z	0406209R
206	Zahnradkombination	Gear combination	1	DM14-01-06	Z 60 / Z 80, m1	03338120206
207	Rillenkugellager	Grooved ball bearing	1	6007-2Z	6007-2Z	0406007R
208	Sicherungsring	Retainer ring	1	DIN 471	15 x 1	042SR15I
209	Zahnrad schrägverzahnt	Gear diagonally-toothed	1	DM14-01-10	Z 37, m 1,25, 9°	03338120209
210	Sicherungsring	Retainer ring	2	DIN 472	32 x 1.2	042SR32I
211	Rillenkugellager	Grooved ball bearing	2	6002-2Z	6002-2Z	0406002R
212	Zahnradkombination	Gear combination	1	DM14-01-05	Z 62 / Z 42, m1	03338120212
213	Zwischenwelle	Intermediate shaft	1	DM14-01-04		03338120213
214	Paßfeder	Key	1	DIN 6885	A 5 x 5 x 50	042P5550
215	Paßfeder	Key	1	DIN 6885	A 5 x 5 x 12	042P5512

Ersatzteilliste - Spare part list - BF20V | BF20L | BF20LD						
Pos.	**Bezeichnung**	**Description**	**Menge Qty.**	**Zeichn. Nr. Drawing no.**	**Grösse Size**	**Artikelnummer Item no.**
216	Schaltgabel	Fork	1	DM14-01-17		03338120216
217	Arm Schaltgabel	Fork arm	1	DM14-01-16		03338120217
219	Abdeckkappe Anzugsstange	Cover	1	DM14-01-09		03338120219
220	Motorhaube	Motor cover	1	DM14-01-35A		03338120220
222	Innensechskantschraube	Hexagon head cap screw	4	GB 70-85	M4 x 8	
223	Scheibe	Washer	8	GB 848-85	4	
224	Innensechskantschraube	Hexagon head cap screw	6	GB 70-85	M6 x 20	
226	Federring	Spring washer	6	GB 93-87	M6	
227	Fräskopf Gehäusedeckel	Fixed cover	1	DM14-01-20		03338120227
229	Sicherungsring	Retainer ring	1	GB 894.1	10	042SR10W
230	Zahnrad schrägverzahnt	Gear diagonally-toothed	1	DM14-01-11	Z 20, m 1,25, 9°	03338116230
231	Passfeder	Key	1		4x4x16	042P4416
233	Innensechskantschraube	Hexagon head cap screw	2	GB 70-85	M3 x 20	
234	Digitalanzeige	Digital slide guage	1	DQ1		03338120234
234-1	Schutzabdeckung	Prodective cover	1			
235	Linealbefestigung Digitalanzeige	Base for ruler digital display	1	DM14-01-31		03338120235
237	Klemm- und Führungsstift	Clamping and guide pin	1	DM14-01-34		03338120237
238	Gehäuse Fräskopf	Housing milling head	1	DM14-01-19		03338120238
238	Fräskopf kpl.	Milling Head cpl.	1			03338120238CPL
239	Abdeckung	Cover	1	DM14-01-12		03338120239
240	Senkschraube mit Kreuzschlitz	Countersunk screw	6	GB 819-85	M4x8	
241	Drehknopf Feinzustellung	Micro feed knob	1	DM14-01-30		03338120241
242	Innensechskant-Gewindestift mit Spitze	Hexagon head cap thread pin screw with point	1	GB 78-85	M5 x 6	
243	Federstück	Spring piece	1			
244	Skalenring Feinzustellung	Micro feed dial	1	DM14-01-28		03338120244
245	Schneckenwelle	Worm shaft	1	DM14-01-27		03338120245
246	Spindel	Spindle	1	DM14-01-03		03338120246
247	Schutzabdeckung	Safety cover	1	DM14-01-01		03338120247
248	Kegelrollenlager einreihig	Taper roller bearing single-row	2	32005 X/Q		04032005
249	Pinole	Sleeve	1	DM14-01-02		03338120249
249	Pinole komplett	Spindle sleeve complete	1			03338120249CPL
250	O-Ring	O-ring	1	GB 3452-1	58x2.65	03338120250
251	Klemmmutter	Clamp nut	1	DM14-01-41		03338120251
252	Zylinderstift	Cylindrical pin	4	GB 119-86	B4x20	
253	Gewindestift geschlitzt mit langem Zapfen	Thread pin slit with long tap	4	GB 79-85	M5 x 12	
254	Zylinderstift	Cylindrical pin	1	GB 120-86-A	6x30	03338120254
255-1	Gewindestange	Threaded rod	3	JB_T7271.6-1994	BM10x80	033381202551
255-2	Griff	Handle	3	JBT7271.5-1994		0300813116
256	Griffschraube	Locking knob	1	DM14-01-21		03338120256
257	Nabe Sterngriff Pinolenvorschub	Feed handle disc	1	DM14-01-22		03338120257
258	Skalenring Sterngriff	Feed dial	1	DM14-01-36		03338120258
259	Feder	Compression spring	1	GB2089-94	1.2x12x25-3	03338120259
260	Innensechskantschraube	Hexagon head cap screw	3	GB 70-85	M4 x 10	
261	Abdeckscheibe	Cover	1	DM14-01-26		03338120261
262	Klemmring	Adjust collar	1	DM14-01-37		03338120262
263	Kupplung mit Verzahnung	Clutch with gear	1	DM14-01-23		03338120263
264	Passfeder	Key	1	DIN 6885 A	4 x 4 x 12	042P4412
265	Verzahnte Welle	Toothed shaft	1	DM14-01-24		03338120265
266	Gewindestift geschlitzt mit langem Zapfen	Thread pin slit with long tap	1	GB 79-85	M6 x 20	
267	Indikator	Plate	1	DM14-BP-03		03338120267
268	Innensechskant-Gewindestift mit flachem Ende	Hexagon head cap thread pin screw with flat end	1	GB 77-85	M8 x 8	
269	Feder	Compression Spring	1	GBT2089-94	0.8x5x25-3	
270	Stahlkugel	Steel ball	1	GBT308-1994	65	042KU65
271	Wahldrehschalter Getriebe	Locating knob	1	DM14-01-33		03338120271
272	Innensechskant-Gewindestift mit Spitze	Hexagon head cap thread pin screw with point	2	GB 78-85	M5 x 8	
273	Drehzahllabel	Shifting plate	1	DM14		03338120273
274	Aufnahmescheibe	Locating base	1	DM14-01-38		03338120274
275	Schaltwelle	Shifting shaft	1	DM14-01-15		03338120275
276	Innensechskantschraube	Hexagon head cap srew	6	GB 70-85	M3 x 6	
277	Winkel Messfuehler	Angle sensor	1			
278	Innensechskantschraube	Hexagon head cap screw	2	GB 70-85	M5 x 8	
279	Drehzahlsensor	Sensor, number of revolutions	1			03338120279

Ersatzteilliste - Spare part list - BF20V | BF20L | BF20LD						
Pos.	**Bezeichnung**	**Description**	**Menge Qty.**	**Zeichn. Nr. Drawing no.**	**Grösse Size**	**Artikelnummer Item no.**
282	Scheibe	Washer	4	GB 848-85	10	
283	Sechskantschraube	Hexagon head screw	4	GB 5783-86	M10 x 30	
284	Zugentlastung Ansclusskabel	Strain relief connection cable	1			
285	Schmierverschluß	Lubrication cap	1			03338120285
286	Lagerbock Kreuztisch links X-Achse	Table dial support x axis left	2	DM14-02-02-A		03338120286
287	Rillenkugellager, einreihig	Grooved ball bearing, single-row	1	6000		0406000R
288	Sicherungsring	Snap ring	1	DIN 472	28 x 1,2	042SR28I
289	Distanzhülse	Distance case	1			03338120289
290	Distanzhülse	Distance case	1			03338120290
291	Lagerbock Kreuztisch rechts X-Achse	Table dial support x axis	1	DM14-02-06-A		03338120291
292	Schrägkugellager, zweireihig	Angular contact ball bearing, double row	1	3203		0403203
293	Abdeckplatte Säule	Column cover	1	DM14-03-02-A		03338120293
294	Schrägkugellager, zweireihig	Skew-angle roller bearing, double-row	2	3200		0403200
295	Lagerbock	Bearing bracket	1	DM14-02-13-A		03338120295
296	Sensorring	Sensor ring	1			03338120296
299	Distanzhülse	Distance sleeve	1			03338120299
302	Kunststoffplatte	Plastic plate	1			03338120302
303	Bürstenabdeckung	Brush cover	2			03338120303
M- 1	Kohlebürste	Carbon brush	2			0340286
304	Batterieabdeckung	Battery cap	1			03338120304
305	Digitalanzeige DRO 5	Digital display DRO 5	1			3383975
306	Sensor	Sensor	3			3384035
307	Magnetband	Magnetic tape	3			3383978
308	Halter Z-Achse	Holder Z-axis	1			03338120308
309	Halter Y-Achse	Holder Y-axis	1			03338120309
310	Halter X-Achse	Holder X-axis	1			033381203010
311	Platte	Plate	1			
312	Buchse	Bushing	2			
1S0	Hauptschalter	Main switch	1			03338120S11
1S2.3	NOT-Halt Schalter	Emergency stop switch	1			0460058
1S2.2 / 1S2.5	Ein - Aus Drucktaster	On- Off push button	1			03338120S13
1S2.1	Ein - Aus Schalter, Halogenlampe	On- Off switch, halogen lamp	1			0460005
1S.3	Drehrichtungsschalter	Direction of rotation switch	1		ZH-A	0460009
1S2.4	Mikroschalter Spindelschutz	Micro switch spindle protection	1			030031712018
1H2	Halogen-Stiftsockellampe 12V , 10 W, Sockel G4	Halogen pin base lamp 12V , 10 W, Sockel G4	1			046423800
1R.6	Potentiometer 4,7 KV	Potentiometer 4,7 KV	1			03338120R15
1A8	Digitale Drehzahlanzeige	Digital speed indicator	1		4 Haltelaschen	03338120P13A
1B8	Drehzahlsensor	Rotation speed sensor	1			03338120279
1U1	Relaiskarte	Relay board	1			03338120Q1.7
1B5	Steuerkarte	Control board	1		DC motor speed control	03338120Q16V2
M	Motor	Motor	1			03338122221
1F0	Feinsicherung	Fine-wire fuse	1		10A	
1Z0	EMV Filter	EMC filter	1			03420251114

7 Malfunctions

7.1 Milling machine malfunctions

Malfunction	Cause/ possible effects	Solution
Tool "burnt".	• Incorrect speed. • Chips are not coming out of the drilled hole. • Blunt tool. • Operating without cooling agent.	• Choose a different speed, excessive feed. • Withdraw the tool more frequently. • Sharpen or replace tool. • Use coolant.
Taper cannot be inserted in quill.	• Remove any dirt, grease or oil from the internal conical surface of the spindle sleeve or the taper.	• Clean surfaces well. Keep surfaces free from grease.
The taper cannot be pushed out.	• MT3 taper is shrinked on the Morse taper.	• Always remove the tool immediately after use. • Allow the machine to warm up for two minutes at maximum speed and then try the removal again. ☞ Tool installation on page 31
Motor does not start.	• Defective fuse. • Spindle guard not closed.	• Check the fine-wire fuse on the rear of the control panel. • Close the spindle guard, check the microswitch in the spindle guard if necessary.
Chattering of the work spindle with rough workpiece surface	• Upcut mill machining not possible under the current operating conditions. • Clamping lever of the movement axes not tightened. • Tool is blunt. • The workpiece is not fastened. • Excessive slack in bearing. • Spindle moves up and down.	• Perform conventional milling. • Tighten the clamping lever. • Sharpen or renew the tool. • Clamp the workpiece firmly. • Readjust the bearing slack or replace the bearing. • Readjust the bearing slack or replace the bearing.
Quill lever cannot be moved.	• Fine feed of the quill is activated	• Deactivate fine feed

8 Appendix

8.1 Copyright

8.2 Terminology/Glossary

Term	Explanation
Cross table	Bearing surface, clamping surface for the workpiece with X- and Y-axis travel
Taper mandrel	Tool housing taper, drill taper, drill chuck taper.
Workpiece	piece to be milled, drilled or machined.
Draw bar	Threaded rod to fix the taper mandrel in the quill.
Tool - quick clamping system	System with collet instead of a drawbar.
Drill chuck	Drill bit adapter
Collet	Holder for end mill
Drill-mill head	Upper part of the milling machine
Quill	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 bit adapter can be fixed by hand.
Workpiece	Part to be drilled, part to be machined.
Tool	Milling cutter, drill bit, etc.
Emergency stop	Stops the operation of a machine.
Emergency switch-off	Interrupts the power supply to the machine.

8.3 Change information operating manual

8.4 Change information operating manual

Chapter	Short summary	new version number
All	Tool installation, shrinking after cooling ; Mains fluctuations and their destructive effect ; High-speed adapter option removed ; Adapter option 3356572 removed ; Internal transport ; Updated motor control board setting instructions ; Updated drawing + list E	4.0.3

8.5 Liability claims/warranty

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

The processing of the liability claims or of the warranty is performed as chosen by OPTIMUM GmbH either directly or through one of its dealers.
Any defective products or components of such products will either be repaired or replaced by components which are free from defects. Title to replaced products or components is transferred to OPTIMUM Maschinen Germany GmbH.

The automatically generated original proof of purchase which shows the date of purchase, the type of machine and the serial number, if applicable, is the precondition in order to assert liability or warranty claims. If the original proof of purchase is not presented, we are not able to perform any services.

Defects resulting from the following circumstances are excluded from liability and warranty claims:

- Use of the product beyond the technological capability and intended use, in particular due to overloading of the machine.
- Damage caused personally through incorrect use or failure to observe our operating instructions,
- negligent or incorrect handling and use of improper operating materials.
- Unauthorized modifications and repairs.
- Insufficient installation and safeguarding of the machine.
- Disregarding the installation requirements and conditions of use.
- Atmospheric discharges, overvoltage and lightning strokes as well as chemical influences.

Neither are the following items covered by liability or warranty claims:

- Wearing parts and components which are subject to normal and intended wear, such as V-belts, ball bearings, lighting, filters, seals, etc.
- Non reproducible software errors

Any services, which OPTIMUM GmbH or one of its agents performs in order to fulfil any additional warranty are neither an acceptance of the defects nor an acceptance of its obligation to compensate. These services neither delay nor interrupt the warranty period.

The court of jurisdiction for legal disputes between businessmen is Bamberg.

If any of the aforementioned agreements is totally or partially inoperative and/or invalid, a provision which nearest approaches the intent of the guarantor and remains within the framework of the limits of liability and warranty which are specified by this contract is deemed agreed.

8.6 Advice for disposal / Options of reuse:

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

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

8.7 Storage

ATTENTION!

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

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

Follow the instructions and information on the transport box:

- Fragile goods
  (Goods require careful handling)

- Protect against moisture and humid environment

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

- Maximum stacking height

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

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

8.8 Dismantling, disassembling, packing and loading

INFORMATION

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

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

Please make sure that electrical components are disposed of professionally and in accordance with the statutory provisions.

The machine contains electrical and electronic components and must not be disposed of as household waste. In accordance with European Directive 2011/65/EU on waste electrical and

electronic equipment and its transposition into national law, used electrical machines must be collected separately and recycled in an environmentally friendly manner.

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

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

8.8.1 Putting out of operation

CAUTION!

Disused machines must be taken out of service immediately and professionally to prevent subsequent misuse and danger to the environment or persons.

- ❍ **Disassemble the machine if required into easy-to-handle and reusable assemblies and component parts.**
- ❍ **Dispose of machine components and operating fluids using the intended disposal methods.**

8.8.2 Dismantling

➜ Pull the power cord or unplug the connection cable and disconnect the connection cable.

8.8.3 Disassembly

➜ Remove the drive motor.

8.8.4 Packing and loading

➜ Place the machine on a pallet for removal.
☞ Lifting the machine on page 23

8.9 Disposal of new device packaging

All packaging materials and packaging aids used in the machine are recyclable and must always be recycled.

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

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

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

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

8.10 Disposal of lubricants and cooling lubricants

ATTENTION!

Please ensure that the coolants and lubricants used are disposed of in an environmentally friendly manner. Observe the disposal instructions of your municipal waste management companies.

INFORMATION

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

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

8.11 Disposal through municipal collection facilities

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

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

8.12 Product follow-up

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

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

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

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

D-96103 Hallstadt, Germany

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

OPTIMUM®
MASCHINEN - GERMANY

EC Declaration of Conformity

according to Machinery Regulation 2023/1230 Annex V Part A

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

hereby declares that the following product

Product designation: Hand-controlled milling machine

Type designation: BF20 | BF20L | BF20LD

complies with all relevant provisions of the above-mentioned Machinery Regulation and the other applicable directives (hereinafter) - including their amendments in force at the time of the declaration.

Description:

Hand-controlled milling machine

The following additional EU directives have been applied:

EMC Directive 2014/30/EU ; Restriction of the use of certain hazardous substances in electrical and electronic equipment 2015/863/EU

The following harmonized standards were applied:

EN ISO 16090-1: 2019-12 Machine tools safety - Machining centres, Milling machines, Transfer machines - Part 1: Safety requirements

EN 60204-1: 2019-06 Safety of machines - Electrical equipment of machines - Part 1 General requirements

EN ISO 13849-1: 2016- 06 Safety of machinery- Safety related parts of control systems- Part 1: General design principles

EN ISO 13849-2: 2013- 02 Safety of machinery - Safety related parts of control systems - Part 2: Validation

EN ISO 12100: 2011- 03 Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 61000-6-2: 2019-11 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments

EN 55011: 2022-05 Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement - class B

EN 61000-3-2: 2023-10 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)

EN 61000-3-3: 2023-02 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection

Name and address of the person authorized to compile the technical file:

Kilian Stürmer, phone: +49 (0) 951 96555 - 800

Kilian Stürmer (CEO, General Manager)
Hallstadt, 2024-01-24

Index