

Operating Manual

Version 1.0.4

Milling machine

OPTimill®
MH 15V

Item no. 3338110



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Preface

Dear customer,

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

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

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

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

Information

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

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

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

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

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

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

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1 Safety

Glossary of symbols

▶	provides further instructions
→	calls on you to act
O	listings

This part of the operating instructions

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

In addition to these operation instructions, please observe

- O the applicable laws and regulations,
- O the statutory provisions for accident prevention,
- O 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.

INFORMATION

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

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1.1 Safety instructions (warning notes)

1.1.1 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.
	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



or



general danger

with a warning of

injury to hands,

hazardous electrical voltage,

rotating parts.

1.1.2 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

1.2 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 17

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.



1.3 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.

1.3.1 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.

1.4 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 12



1.5 Qualification

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

1.5.1 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.

1.5.2 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.

1.5.3 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 expressly 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.

1.5.4 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.

1.5.5 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.

1.5.6 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.

1.5.7 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.

1.6 User positions

The user position is in front of the milling machine.

1.7 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.



1.8 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.



1.8.1 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.



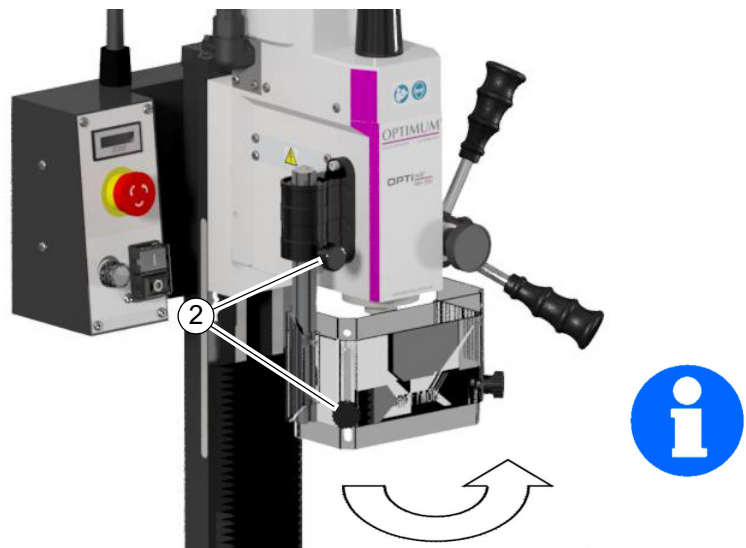
Img. 1-1: Emergency-stop

1.9 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.



Img. 1-2: Separation guard

INFORMATION

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

1.9.1 Main switch

WARNING!

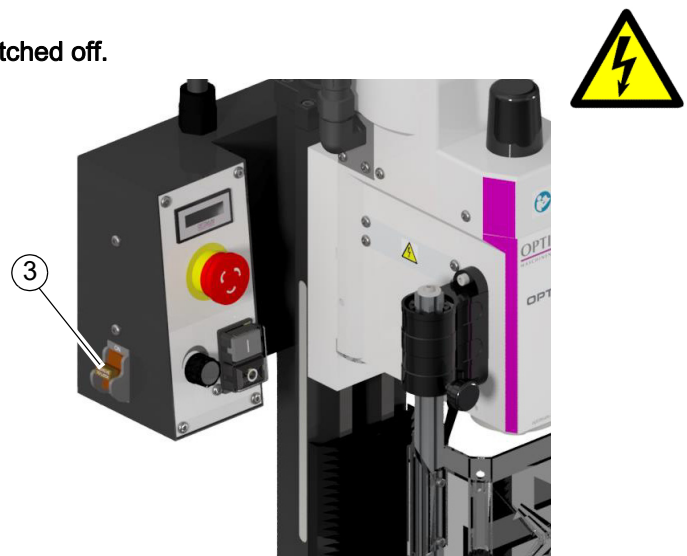
Dangerous voltage even if the main switch is switched off.

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

Switch off the milling machine with the main switch (3) and lock it so it cannot be activated by unauthorised personnel or switched on by accident.

The main switch (3) can be locked by removing the shift lever.

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



Img. 1-3: Main switch

1.9.2 Cover cap for the tightening rod

CAUTION!

Refit the cover cap after each tool change.



Img. 1-4: Cover cap

1.10 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.	

1.11 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.



1.12 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.



1.13 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!



1.14 Symbols on the milling machine

Make sure that the mandatory and warning symbols are legible.

1.15 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).

1.16 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	
Motor	230 V / 50Hz / 500 W
2.2 Drill-mill capacity	
Drilling capacity in steel (S235JR)	max. 13mm
Continuous drilling capacity in steel (S235JR)	max. 11mm
Max. milling head size	max. 50mm
Max. end mill cutter size	max. 13mm
Throat depth	145 mm
2.3 Spindle seat	
Spindle seat	MK 2
Tightening rod	M10
Spindle sleeve stroke	45 mm
Spindle sleeve diameter	60 mm
2.4 Drill-mill head	
Swivelling	+ / - 45°
Gear stages	2
Z axis travel	150 mm
2.5 Cross table	
Table length	400 mm
Table width	120 mm
X axis travel	240
Y axis travel	135
T - slot size / distance	10mm / 35mm
Distance spindle - Cross table	250
2.6 Dimensions	
Height [mm]	► Dimensions on page 17
Depth [mm]	
Width [mm]	
Net weight	58.5 kg
2.7 Speeds	
Gear stage slow [rpm]	90 - 1400
Gear stage rapid [rpm]	140 - 2250

2.8 Environmental conditions	
Temperature	5 - 35 °C
Humidity	25 - 80 %
2.9 Operating material	
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 by the MH22V 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.

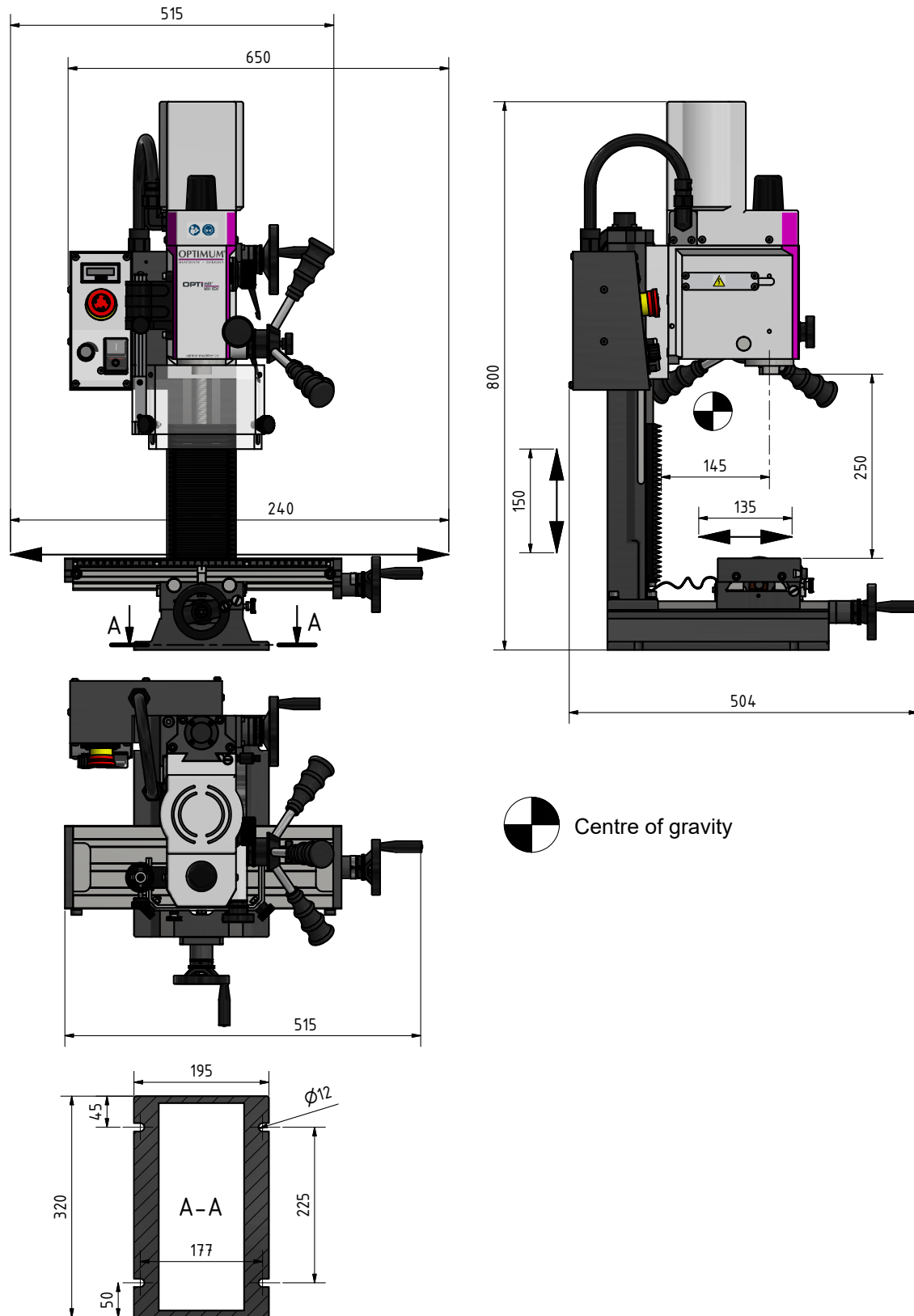
CAUTION!

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.



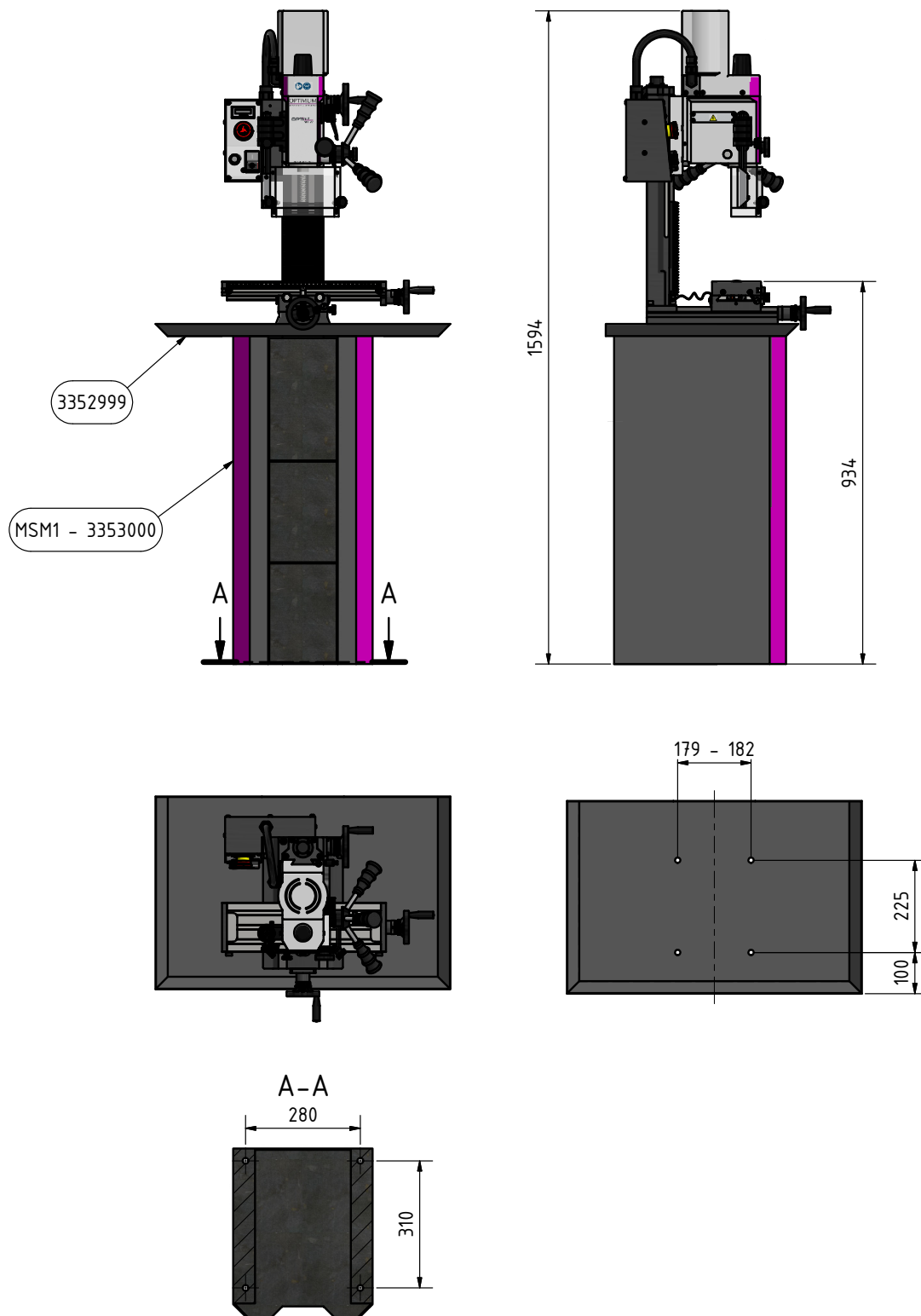
2.10 Dimensions, installation plan



2.11 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

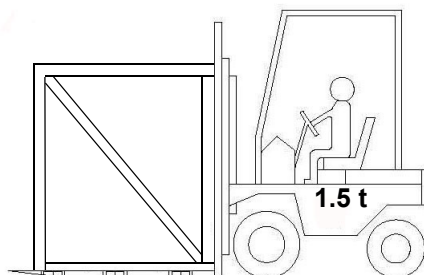
The machine is pre assembled. It is delivered in a transport box.

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

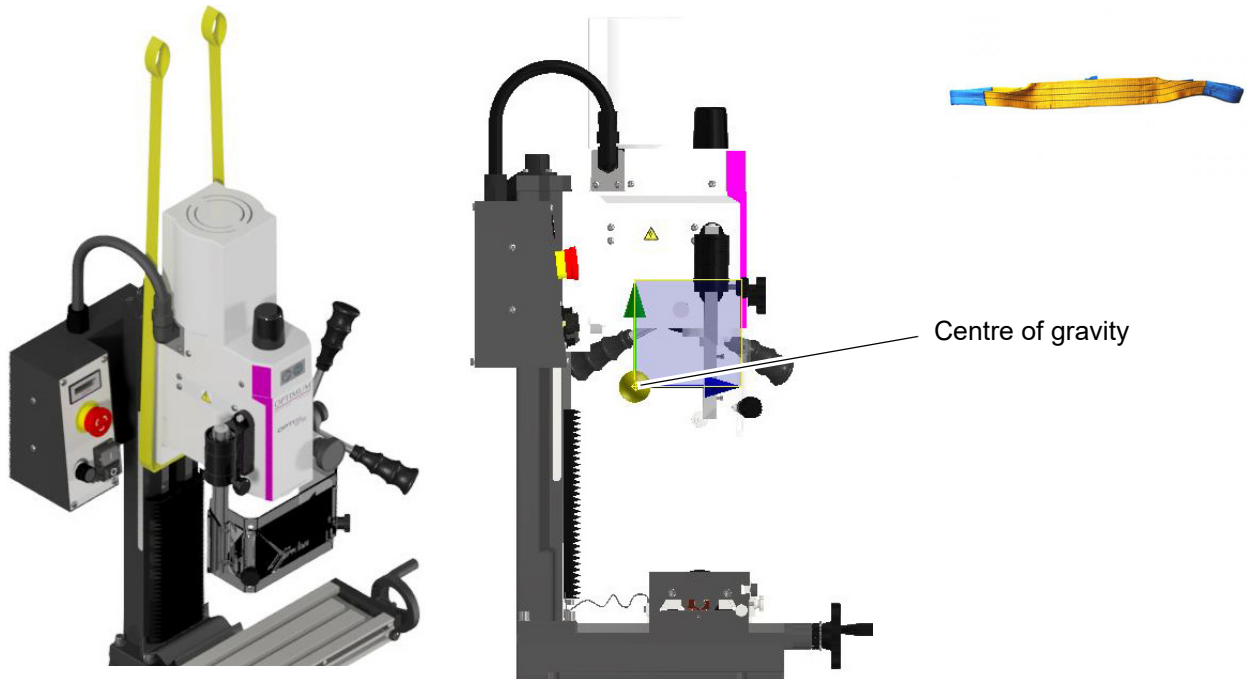
WARNING!

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. Weight 58kg.



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

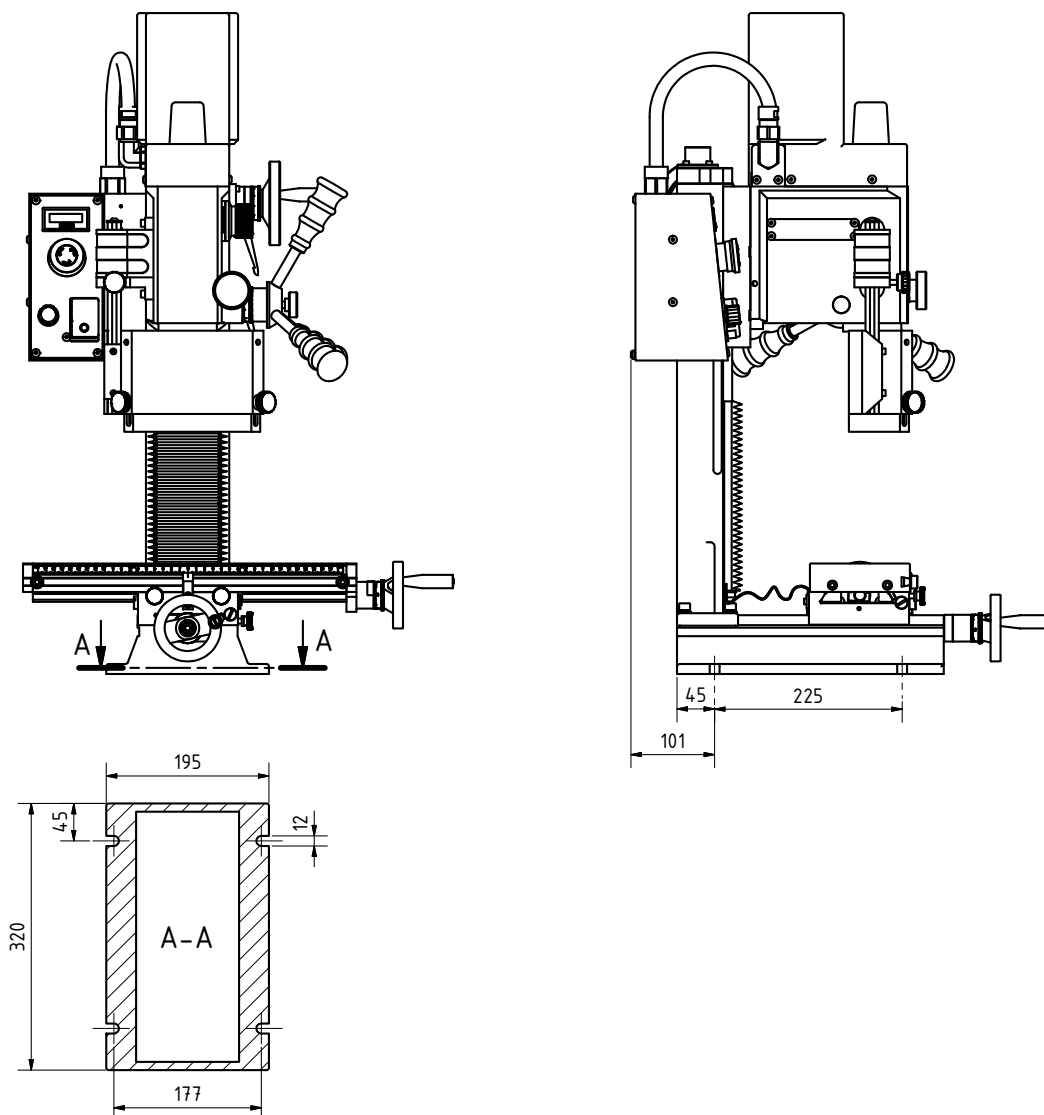


foundation must be level. Check that the milling machine foundation is horizontal by using a spirit level.

→ 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 9

WARNING!

First commissioning may only take place after proper installation.

First commissioning 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 33
- Check that all spindles are running smoothly. All spindle nuts are re-adjustable.

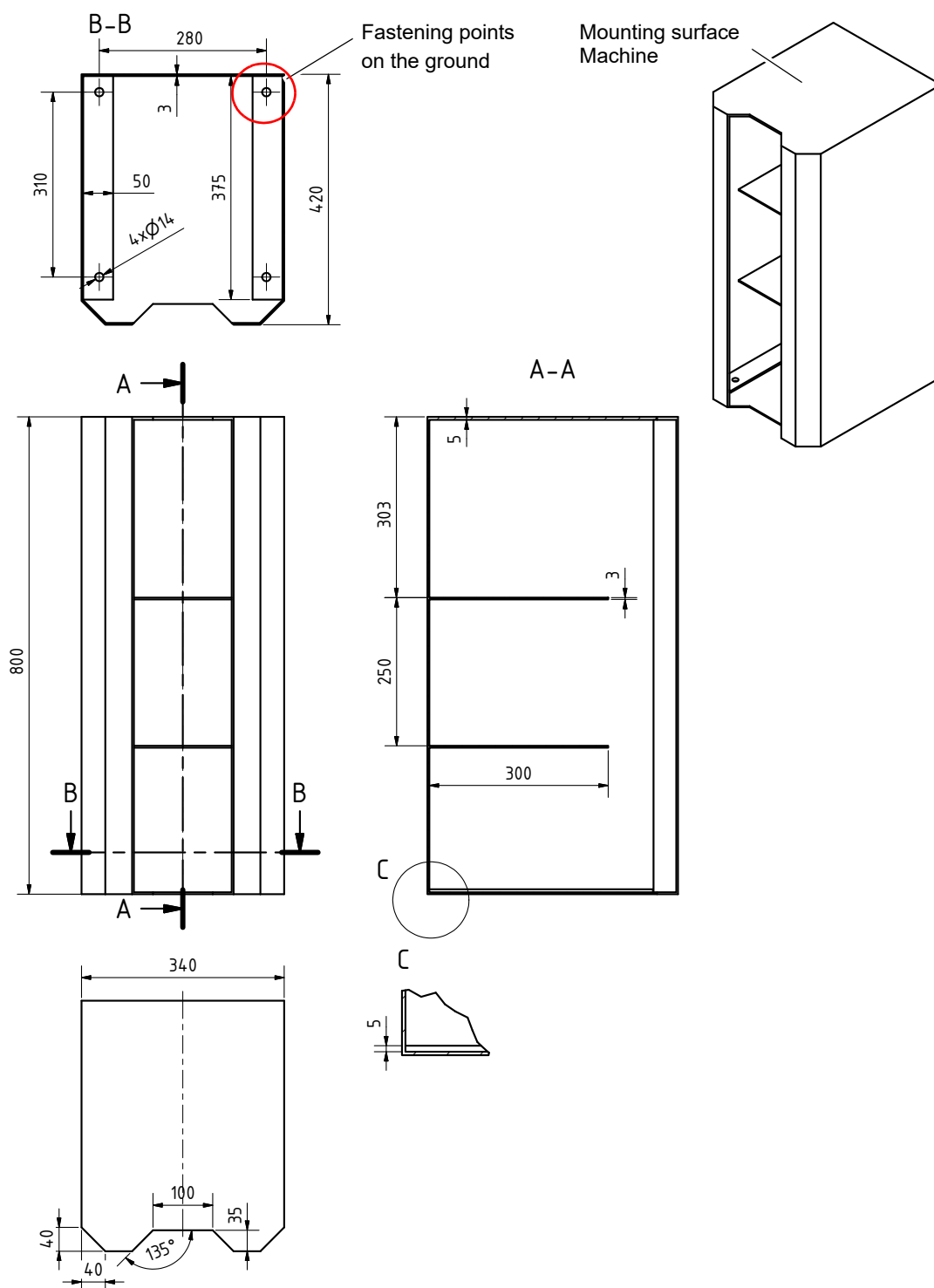
INFORMATION

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 flash point, the occurrence of flammable aerosol-air mixtures cannot be ruled out. There is a risk 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.

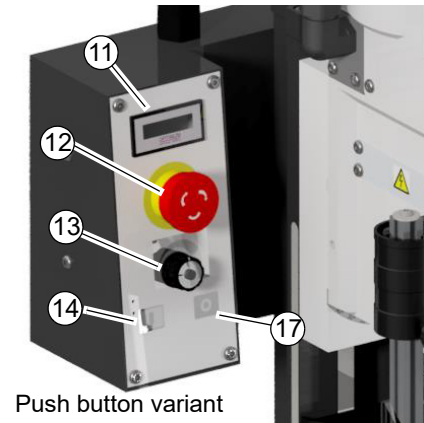
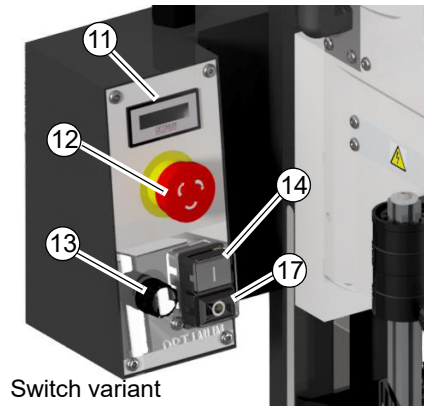
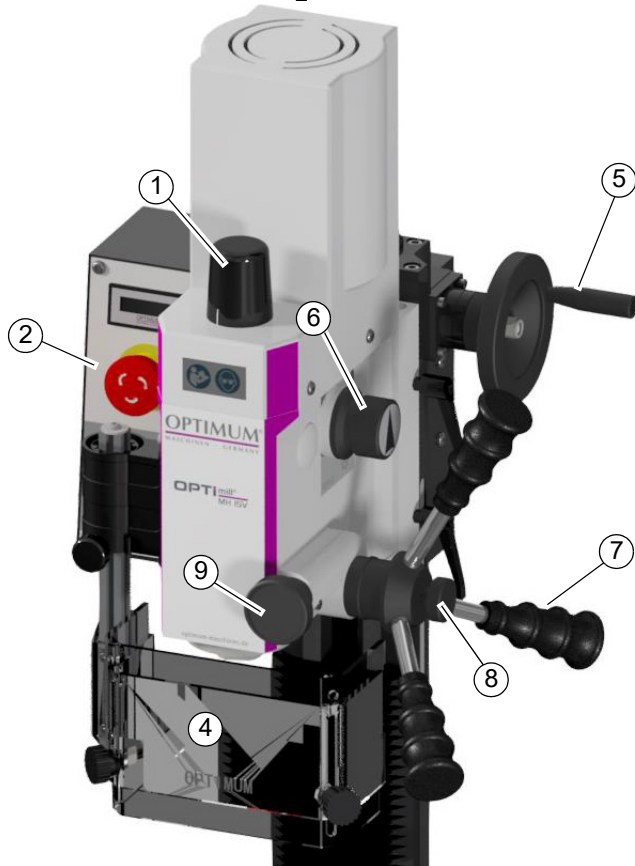
Detect and prevent over voltage

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
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
11	Digital speed display	12	Emergency stop
13	Electronic speed adjustment	14	Start push-button (push-button control panel on newer machines)
17	Stop push-button (push-button control panel on newer machines)		

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 15



4.3 Switching the milling machine on

- Switch on the main switch.
- Select the gear stage
- Close the spindle guard.
- Actuate the push button "ON".
- 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". Disconnect the mains plug if the machine is not used for a longer period of time.

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.



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.

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!

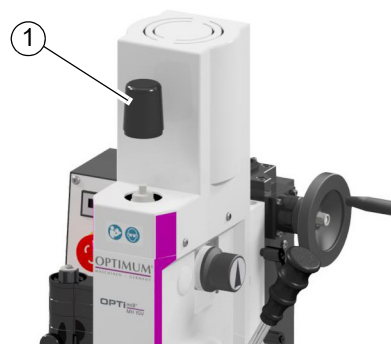
Always remove the tool again at the end of the work.

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.



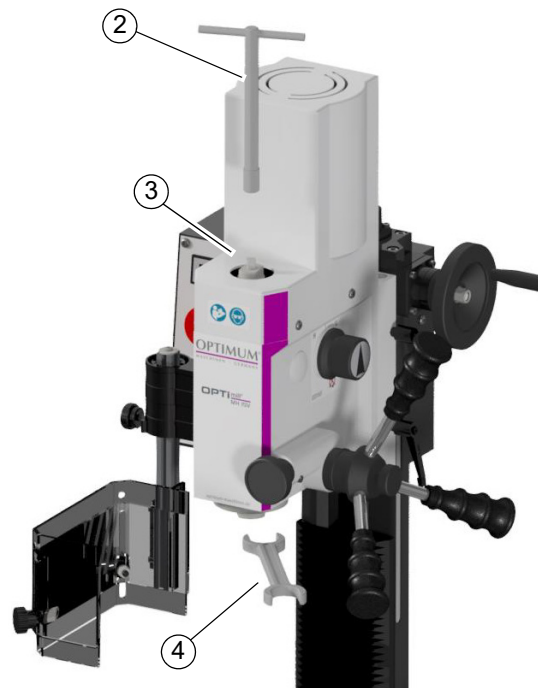
The milling head is equipped with an M10 tightening rod.

- 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.

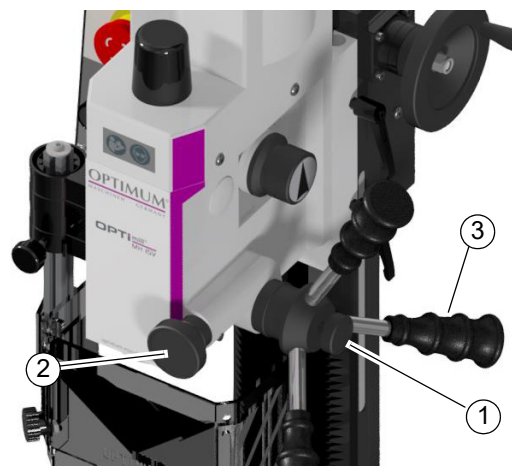
4.12 Manual quill feed with the fine feed

- 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).

When milling, always work with the quill fully retracted and tighten the quill clamping lever.



Img. 4-3: Fine feed

4.13 Swivelling the milling head

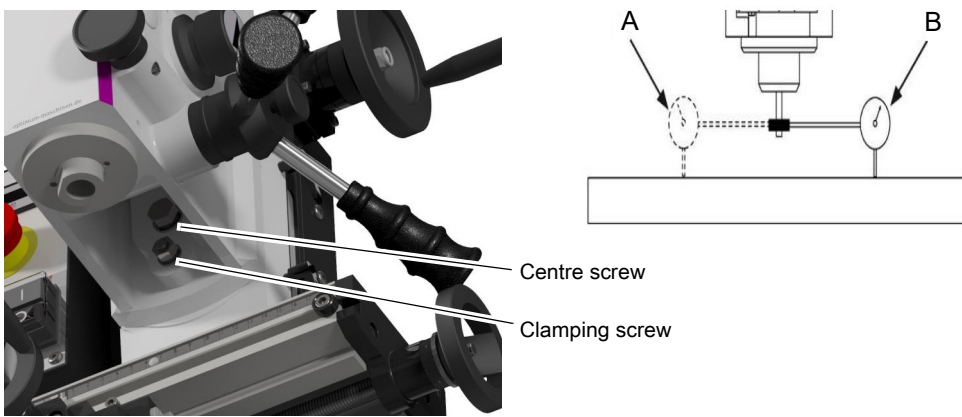
The milling head can be swivelled to the right and to the left.

- Loosen the clamping screw on the milling head.
- Turn the drill-mill head to the desired position.
- Retighten the clamping screw.
- If necessary, loosen the centre screw slightly and then tighten it again.

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

4.14 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).



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

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

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

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 $k_{c1.1}$ and the chip thickness exponent m_c 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 F_c 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 14

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.

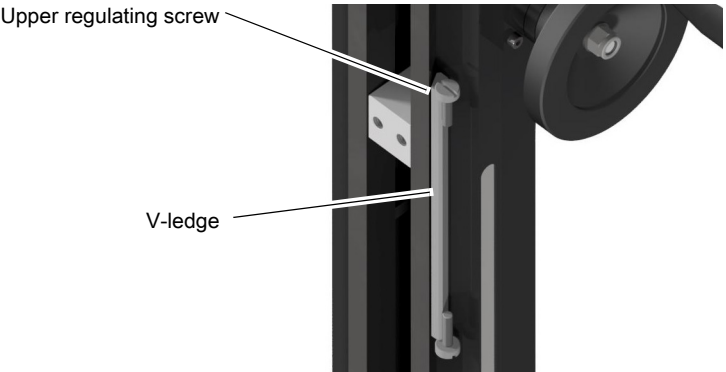


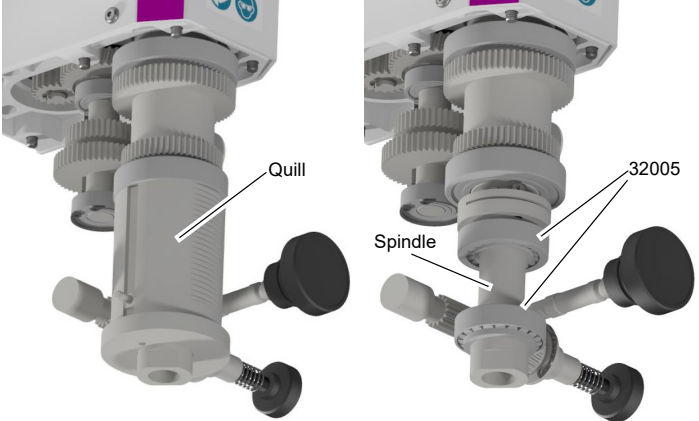
5.2 Inspection and maintenance

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 14	

MH15V_GB_5.fm

Interval	Where?	What?	How?
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 adjusting screws on the wedge moulding to move the moulding. The gib is pushed further inward thus reducing the play in the guide rail. → Check the settings. The guideway must still be slightly movable due to the readjustment, but must provide stable guidance.  Upper regulating screw V-ledge Img. 5-1: Adjusting screws Z axis
	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.
	Spindle nut Cross table	readjust Y axis	
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.

Interval	Where?	What?	How?
Annually	Drilling-milling head gearbox	Greasing	1. possibility Remove the milling head from the column to gain full access to the rear cover plate of the milling head. At the time of writing, it is not possible to remove the rear cover plate if the milling head on the column has been rotated by 45°. 2. possibility Removal and subsequent reinstallation of the cover cap on the right-hand side of the milling head to access some components via the opening. Replace the cover cap and, if necessary, glue it in place.
When necessary	Spindle bearing	Greasing	The spindle is equipped with tapered roller bearings. Lubrication with commercially available bearing grease is carried out after removing the bearing cover on the underside of the sleeve. The interior of the sleeve for lubricating the tapered roller bearings is filled with grease on delivery. After using the machine for a long time, the grease may be completely used up or may have escaped from the underside due to excessive load and temperature. 
based on operator's historic values in accordance with German DGUV (BGV A3)	Electronics	Electrical inspection	► Operator's obligations on page 11 ► 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

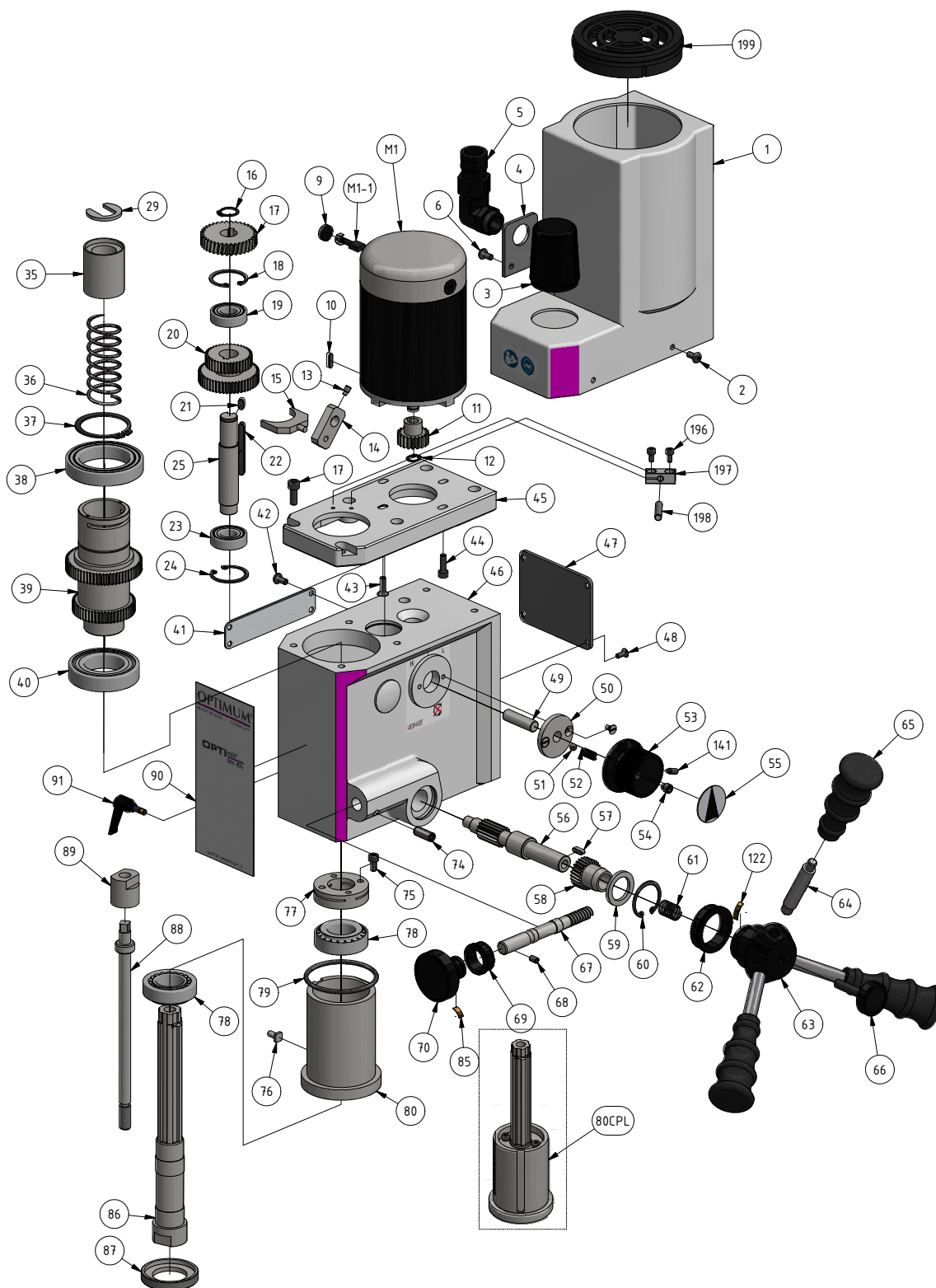


+49 (0) 951-96555 -100
service@stuermer-maschinen.de

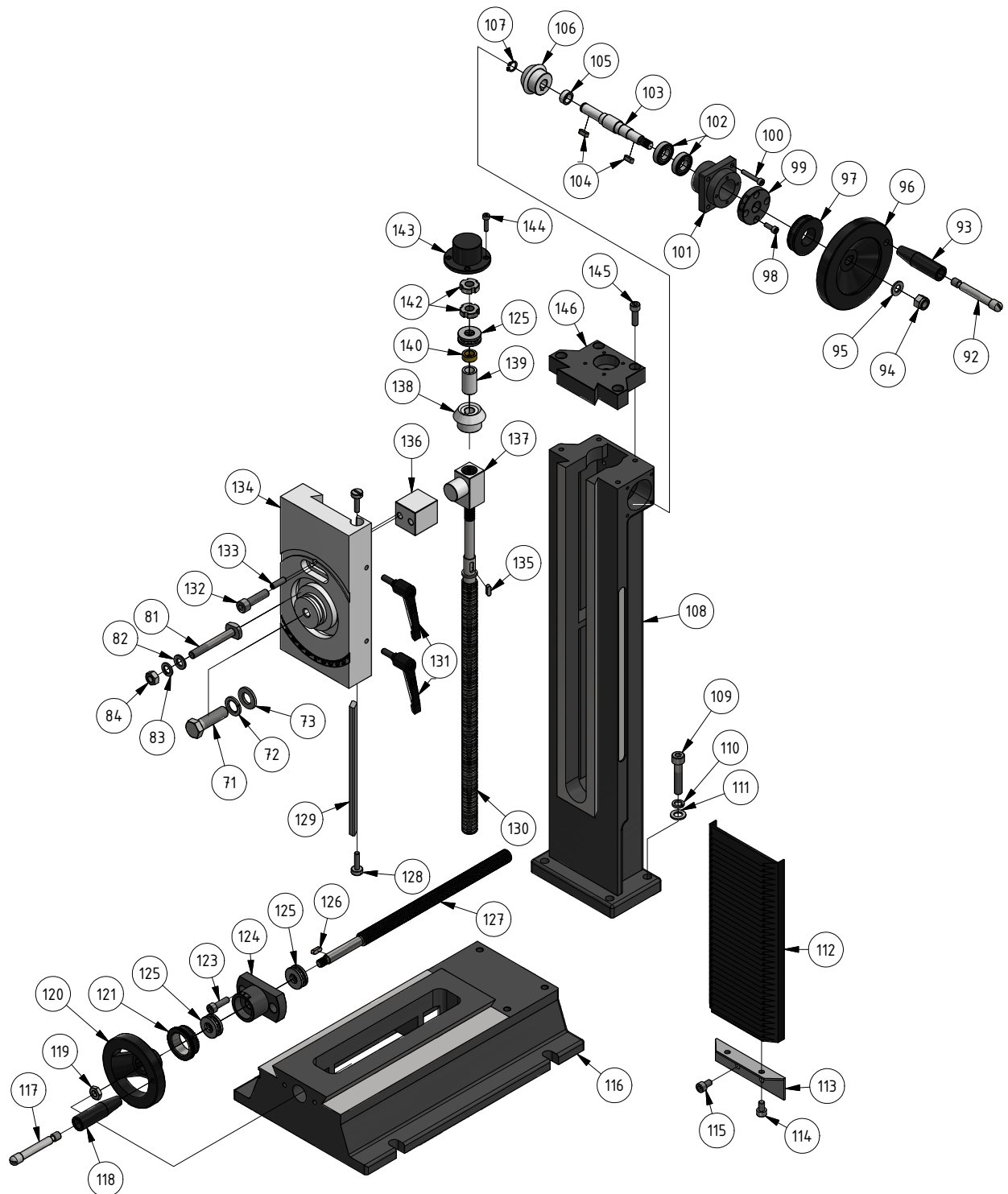


6.4 Ersatzteilzeichnungen - Spare part drawings

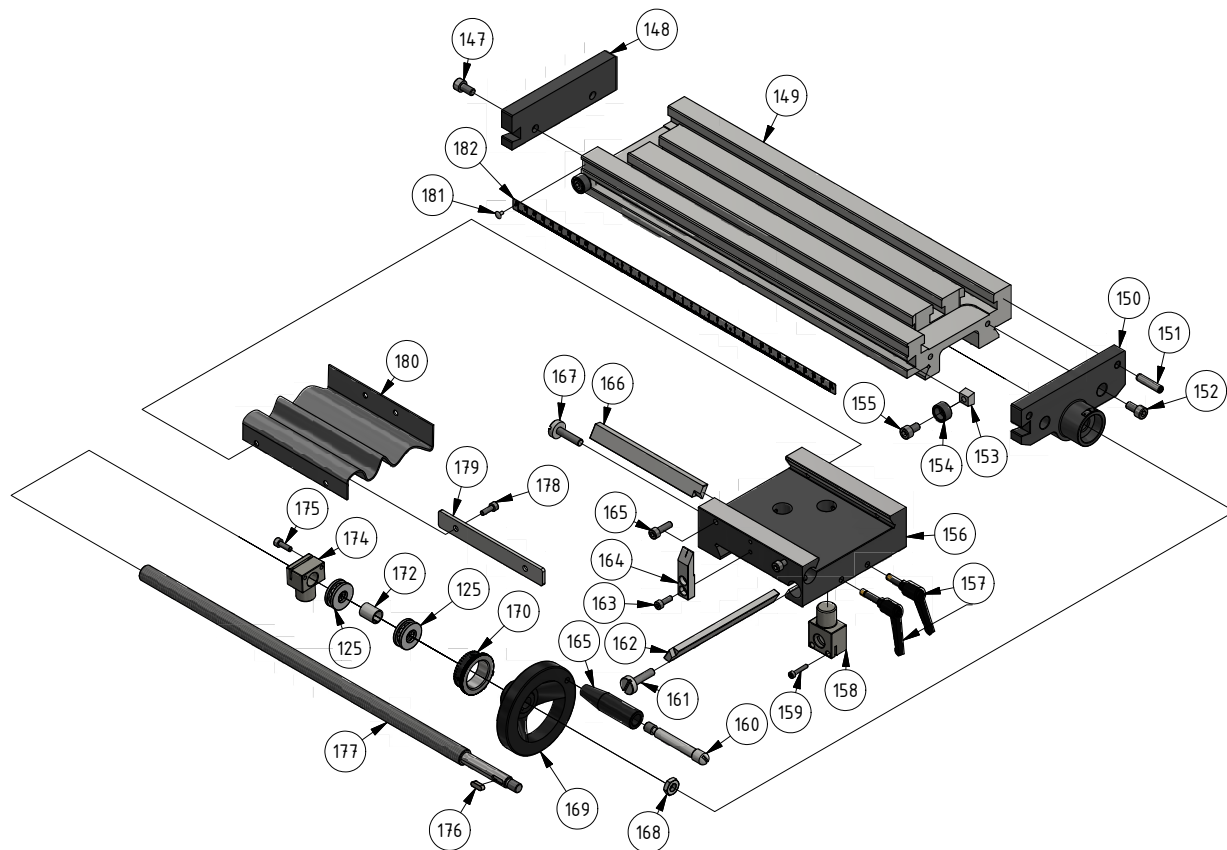
A Fräskopf - Milling head



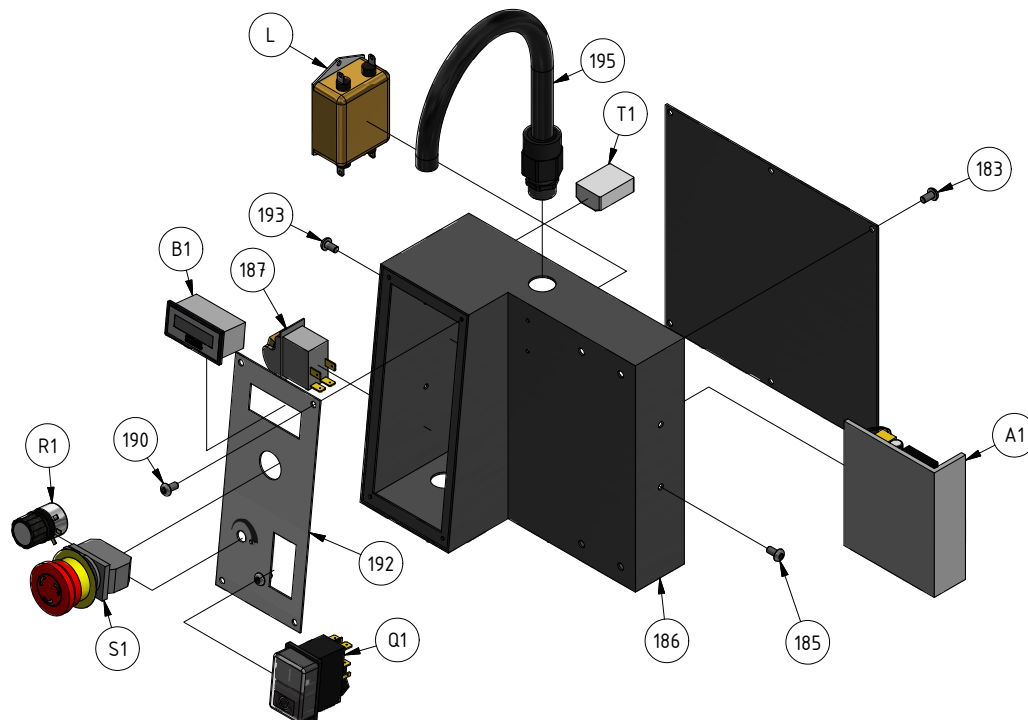
B Säule - Column



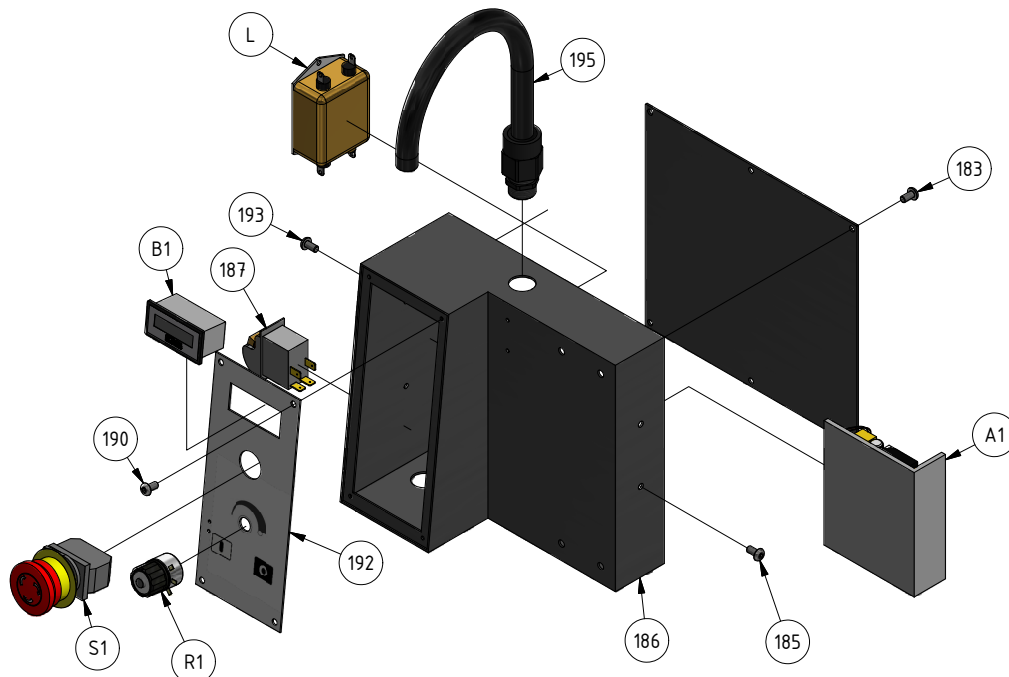
D Kreuztisch - Cross table



F Bedienkonsole, Schalttafel - Operation panel, switch panel



H Bedienkonsole, Drucktastenbedienfeld - Operation panel, push button panel



Ersatzteilliste - Spare part list - MH15V					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Motorgehäuse	Motor housing	1		03338110001
2	Schraube	Screw	4	DIN EN ISO 4762 M5x10	
3	Anzugsstange Abdeckung	Screw rod cover	1		03338110003
4	Zugentlastung Halteplatte	Strain relief holding plate	1		03338110004
5	Zugentlastung (Kabel)	Strain relief (cable)	1		03338110005
6	Schraube	Screw	2	DIN EN ISO 4762 M5x10	
7	Gleichstrommotor	DC motor	1	500W	03338116221
9	Abdeckkappe (Kohlebürste)	Cover cap (carbon brush)	2		03338110009
10	Passfeder	Key	1	DIN 6885 - 1 4x4x14	
11	Zahnrad	Gear	1		03338110011
12	Sicherungsring	Circlip	1	DIN 471 Ø10	
13	Stiftschraube	Stud screw	1	ISO 4028 M5x8	
14	Getriebschalthebel	Gearbox shift lever	1		03338110014
15	Getriebschaltgabel	Gear shift fork	1		03338110015
16	Sicherungsring	Circlip	1	DIN 471 Ø15	
17	Zahnrad	Gear	1		03338110017
18	Sicherungsring	Circlip	1	DIN 471 Ø32	
19	Lager	Bearing	1	6002-2Z	0406022Z
20	Zahnrad	Gear	1		03338110020
21	Passfeder	Key	1	DIN 6885 - 1 5x5x10	
22	Passfeder	Key	1	DIN 6885 - 1 5x5x50	
23	Lager	Bearing	1	6002-2Z	04060022Z
24	Sicherungsring	Circlip	1	DIN 471 Ø32	
25	Getriebewelle	Gear shaft	1		03338110025
26	Drehzahlsensor-Ring	Speed sensor ring	1		03338110026
27	Schraube	Screw	2	DIN EN ISO 4762 M3x8	
28	Schraube	Screw	2	DIN EN ISO 4762 M3x8	
29	Federhaltering	Spring retaining ring	1		03338110029
30	Drehzahlsensor	Spindle Speedsensor	1		03338110030
31	Mutter	Nut	2	DIN 934 M3	
32	Schraube	Screw	2	DIN EN ISO 4762 M3x8	
33	Unterlegscheibe	Washer	2	DIN ISO 7091 Ø3	
34	Winkelhalter	Angle holder	1		03338110034
35	Buchse	Bushing	1		03338110035
36	Feder	Spring	1		03338110036
37	Sicherungsring	Circlip	1	DIN 471 Ø 45	
38	Lager	Bearing	1	61909-2Z	040619092Z
39	Zahnrad	Gear	1		03338110039

Ersatzteilliste - Spare part list - MH15V

Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
40	Lager	Bearing	1	6007-2Z	04060072Z
41	Abdeckung	Cover	1		03338110041
42	Schraube	Screw	4	DIN EN ISO 4762 M5x10	
43	Schraube	Screw	1	ISO 10642 M5x16	
44	Schraube	Screw	3	DIN EN ISO 4762 M5x16	
45	Abdeckung	Cover	1		03338110045
46	Umhausung Fräskopf	Milling head housing	1		03338110046
47	Abdeckplatte	Coverplate	1		03338110047
48	Schraube	Screw	4	ISO 10642 M4x10	
49	Welle Getriebeverstellung	Shaft gear shift	1		03338110049
50	Einstellring Getriebestufe	Adjustment ring gear stage	1		03338110050
51	Kugel	Ball	1		03338110051
52	Feder	Spring	1		03338110052
53	Wahldrehschalter	Rotary selector	1		03338110053
54	Stiftschraube	Locking screw	1	DIN EN ISO 4028 M8x8	
55	Anzeiger	Indicator	1		03338110055
56	Ritzelwelle	Pinion shaft	1		03338110056
57	Passfeder	Key	1	DIN 6885 - 1 4x4x12	
58	Zahnrad	Gear	1		03338110058
59	Ring	Ring	1		03338110059
60	Sicherungsring	Circlip	1	DIN 471 Ø 32	
61	Feder	Spring	1		03338110061
62	Skalenring	Scale ring	1		03338110062
63	Nabe	Hub	1		03338110063
64	Griffhebel	Handle lever	3		03338110064
65	Griff	Handle	3		03338110065
66	Einstellschraube (Feinvorschub)	Adjusting screw (fine feed)	1		03338110066
67	Feinvorschub Welle	Fine feed shaft	1		03338110067
68	Stiftschraube	Stud screw	1	ISO 4026 M5x8	
69	Skalenring	Scale ring	1		03338110069
70	Drehrad	Rotary wheel	1		03338110070
71	Schraube	Screw	1	ISO 4017 M12 x 40	
72	Federring	Spring washer	1	DIN 128 Ø12	
73	Unterlegscheibe	Washer	1	DIN 125 Ø13	
74	Passstift	Fitting pin	1	ISO 8735 Ø8x20	
75	Schraube	Screw	2	DIN EN ISO 4762 M5x10	
76	Verdrehsicherung	Anti-rotation lock	1		03338110076
77	Klemmmutter	Clamping nut	1		03338110077
78	Einreihiges Kegelrollenlager	Single row tapered roller bearing	2	32005	04032005
79	O-Ring	O-Ring	1	DIN 3771 Ø58x3,55	
80	Spindelhülse	Spindle sleeve	1		03338110080
80CPL	Pinole komplett	Quill complete	1		03338110080CPL
81	Schraube	Screw	1	GB/T 37 M8x60	03338110081
82	Unterlegscheibe	Washer	1	DIN 125 Ø8,4	
83	Federring	Spring washer	1	DIN 128 Ø12	
84	Mutter	Nut	1	ISO 4032 M8	
85	Federblech	Spring plate	1		03338110085
86	Spindel	Spindle	1		03338110086
87	Spindelmutter	Spindle nut	1		03338110087
88	Anzugsstange	Screw rod	1		03338110088
89	Buchse	Bushing	1		03338110089
90	Frontschild	Front panel	1		03338110090
91	Einstellbarer Handgriff	Adjustable hand lever	1		03338110091
92	Griffschraube	Handle screw	1		03338110092
93	Handgriff	Handle	1		03338110093
94	Mutter	Nut	1	DIN 934 M8	
95	Unterlegscheibe	Washer	1	DIN ISO 7091 Ø8	
96	Handrad	Handwheel	1		03338110096
97	Skalenring	Scale ring	1		03338110097
98	Schraube	Screw	4	DIN EN ISO 4762 M4x12	
99	Haltering	Retaining ring	1		03338110099
100	Schraube	Screw	4	DIN EN ISO 4762 M4x25	
101	Lagersitz	Bearing holder	1		03338110101
102	Lager	Bearing	2	6190-2Z	
103	Welle Z-Achse	Shaft Z-axis	1		03338110103
104	Passfeder	Key	2	DIN 6885 - 1 8x12	
105	Distanzring	Spacer ring	1		03338110105
106	Kegelrad	Bevel gear	1		03338110106
107	Sicherungsring	Circlip	1	DIN 471 Ø 10	
108	Säule	Column	1		03338110108
109	Schraube	Screw	4	DIN EN ISO 4762 M8x40	
110	Federring	Spring washer	4	DIN 127 Ø8	

Ersatzteilliste - Spare part list - MH15V

Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
111	Unterlegscheibe	Washer	4	DIN ISO 7091 Ø8	
112	Späneabdeckung	Chip cover	1		03338110112
113	Halter Späneabdeckung	Holder Chip cover	1		03338110113
114	Schraube	Screw	2	DIN EN ISO 4762 M6x10	
115	Schraube	Screw	2	DIN EN ISO 4762 M6x10	
116	Maschinenfuß	Machine base	1		03338110116
117	Griffschraube	Handle screw	1		03338110117
118	Handgriff	Handle	1		03338110118
119	Mutter	Nut	1	DIN 934 M8	
120	Handrad	Handwheel	1		03338110120
121	Skalenring	Scale ring	1		03338110121
122	Federblech	Spring plate	1		03338110122
123	Schraube	Screw	2	DIN EN ISO 4762 M6x20	
124	Lagersitz	Bearing holder	1		03338110124
125	Axialrillenkugellager	Axial deep groove ball bearing	5	51100	04051100
126	Passfeder	Key	1	DIN 6885 - 1 8x12	
127	Gewindespindel Y-Achse	Lead screw Y-Axis	1		03338110127
128	Einstellschraube Keilleiste	Adjustingscrew V-Bar	2		03338110128
129	Keilleiste	V-Bar	1	Customised adjustment by scraping required	03338110129
130	Gewindespindel Z-Achse	Lead screw Z-Axis	1		03338110130
131	Griffschraube	Handle screw	2		03338110131
132	Schraube	Screw	2	DIN EN ISO 4762 M8x30	
133	Stiftschraube	Stud screw	1	ISO 4026 M6x20	
134	Halteplatte Fräskopf	Holding plate millhead	1		03338110134
135	Passfeder	Key	1	DIN 6885 - 1 8x12	
136	Anschraubblock	Mounting block	1		03338110136
137	Mitnehmerblock	Driving block	1		03338110137
138	Kegelrad	Bevel gear	1		03338110138
139	Distanzring	Spacer ring	1		03338110139
140	Distanzring	Spacer ring	1		03338110140
141	Stiftschraube	Stud screw	1	ISO 4028 M5x12	
142	Kontermutter	Counter nut	2		03338110142
143	Spindelabdeckung	Spindle cover	1		03338110143
144	Schraube	Screw	4	DIN EN ISO 4762 M4x16	
145	Schraube	Screw	4	DIN EN ISO 4762 M6x20	
146	Abdeckplatte	Cover plate	1		03338110146
147	Schraube	Screw	2	DIN EN ISO 4762 M6x12	
148	Lagersitz X-Achse	Bearing holder X-Axis	1		03338110148
149	Maschinentisch	Machine table	1		03338110149
150	Lagersitz X-Achse	Bearing holder X-Axis	1		03338110150
151	Passstift	Fitting pin	2	ISO 8735 Ø6x20	
152	Schraube	Screw	2	DIN EN ISO 4762 M6x12	
153	Nutenstein	Slot nut	2		03338110153
154	Endanschlag	Limit stop	2		03338110154
155	Schraube	Screw	2	DIN EN ISO 4762 M6x10	
156	Kreuztischführung	Cross table guide	1		03338110156
157	Einstellbarer Handgriff	Adjustable hand lever	2		03338110157
158	Mitnehmerblock	Driving block	1		03338110158
159	Schraube	Screw	2	DIN EN ISO 4762 M3x16	
160	Griffschraube	Handle screw	1		03338110160
161	Einstellschraube Keilleiste	Adjustingscrew V-Bar	4		03338110161
162	Keilleiste	V-Bar	1	Customised adjustment by scraping required	03338110162
163	Schraube	Screw	2	DIN EN ISO 4762 M4x12	
164	Anzeiger platte	Indicator plate	1		03338110164
165	Schraube	Screw	2	DIN EN ISO 4762 M5x16	
166	Keilleiste	V-Bar	1	Customised adjustment by scraping required	03338110166
167	Handgriff	Handle	1		03338110167
168	Mutter	Nut	1	DIN 934 M8	
169	Handrad	Handwheel	1		03338110169
170	Skalenring	Scale ring	1		03338110170
172	Distanzring	Spacer ring	1		03338110172
174	Mitnehmerblock	Driving block	1		03338110174
175	Schraube	Screw	2	DIN EN ISO 4762 M4x12	
176	Passfeder	Key	1	DIN 6885 - 1 8x12	
177	Gewindespindel X-Achse	Lead screw X-Axis	1		03338110177
178	Schraube	Screw	2	DIN EN ISO 4762 M4x12	
179	Halteplatte	Retaining plate	1		03338110179
180	Späneabdeckung	Chip cover	1		03338110180
181	Niete	Rivet	4	DIN 674 Ø2,5	
182	Messleiste	Measuring strip	1		03338110182

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G Fräsfutterschutz - Mill chuck safety

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Ersatzteilleiste Fräsfutterschutz - Spare parts list milling chuck protection					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
4	Platte	Plate	1		
5	Alustange	Aluminium rod	1	230mm	
6	Futterschutz	Chuck cover	1		
7	Futterschutz	Chuck cover	1		
8	Klemmschraube	Clamping screw	2		

Elektrische Bauteile - Electric components - MH15V					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
L	Netzfilter	Line filter	1		03338110L
F1	Feinsicherung	Microfuse	1	10A	
B2	Drehzahlsensor	Speed sensor	1		03338110B2
T1	Transformator	Transformer	1	230V / 5V	03338110T1
B1	Digitale Drehzahlanzeige	Digital speed display	1	+5V	03338110B1
Q1	Ein / Aus Schalter	On / Off switch	1	KJD17B	0342025108
A1	DC-Bürstenmotor-Steuerung	DC brush motor controller	1	608BK 230V	03338116314V2
M1	Gleichstrommotor	DC motor	1	500W	03338116221
M1-1	Motor Kohlebürste	Motor carbon brush	2		0340286
R1	Potentiometer	Potentiometer	1	RV24YN20S B502	03338120R15
S1	Not-Halt	Emergency stop	1	LA103B-02 ZS/1	0460082
S2	Sicherheitsschalter für Fräsfutterschutz	Chuck cover safety switch	1	HY50-3	03338110S2
	Hauptschalter	Main switch	1		03338135407

Elektrische Bauteile Drucktastenbedienfeld - Electric components push button - MH15V					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
L	Netzfilter	Line filter	1		03338110L
F1	Feinsicherung	Microfuse	1	6A	
F2	Feinsicherung	Microfuse	1	4A	
F3	Feinsicherung	Microfuse	1	4A	
Display	Digitale Drehzahlanzeige	Digital speed display	1	+5V	03338110B1
B2	Drehzahlsensor	Speed sensor	1		03338110B2
A1	DC-Bürstenmotor-Steuerung	DC brush motor controller	1	608BK 230V	03338116314V2
A2	Drucktastenbedienfeld	Push button board	1		03338110A2
M1	Gleichstrommotor	DC motor	1	500W	03338116221
M1-1	Motor Kohlebürste	Motor carbon brush	2		0340286
R1	Potentiometer	Potentiometer	1	RV24YN20S B502	03338120R15
S1	Not-Halt	Emergency stop	1	LA103B-02 ZS/1	0460082
S2	Sicherheitsschalter für Fräsfutterschutz	Chuck cover safety switch	1	HY50-3	03338110S2
S0	Hauptschalter	Main switch	1		03338135407

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.	• MT2 taper is shrunk 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 30
Motor does not start.	• Spindle guard not closed. • Defective fuse.	• Close the spindle guard, check the microswitch in the spindle guard if necessary. • Check the fuse in the control panel.
Chattering of the work spindle with rough work-piece 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

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Subject to technical changes without notice.

8.2 Terminology/Glossary

Term	Explanation
Cross table	Bearing surface, clamping surface for the workpiece with X- and Y-axis travel
Taper mandrel	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 tightening rod.
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 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.

8.4 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.

8.5 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.

8.6 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.



8.6.1 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.

8.6.2 Dismantling

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

8.6.3 Disassembly

→ Remove the drive motor.

8.6.4 Packing and loading

→ Place the machine on a pallet for removal. ► Lifting the machine on page 22

8.7 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.

8.8 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.



8.9 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 it 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.

8.10 Change information operating manual

Chapter	Short summary	new version number
1.10.1 ; 4.3 ; parts	Main switch added.	1.0.1
	Additional circuit diagram added for machines with pushbutton control panel	1.0.2
2.1	Technical data corrected	1.0.3
parts	Changed spare parts inserted	1.0.4

8.11 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

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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: MH15V

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:

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Kilian Stürmer (CEO, General Manager)
Hallstadt, 2025-01-23

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