OPTIMUM®
MASCHINEN - GERMANY

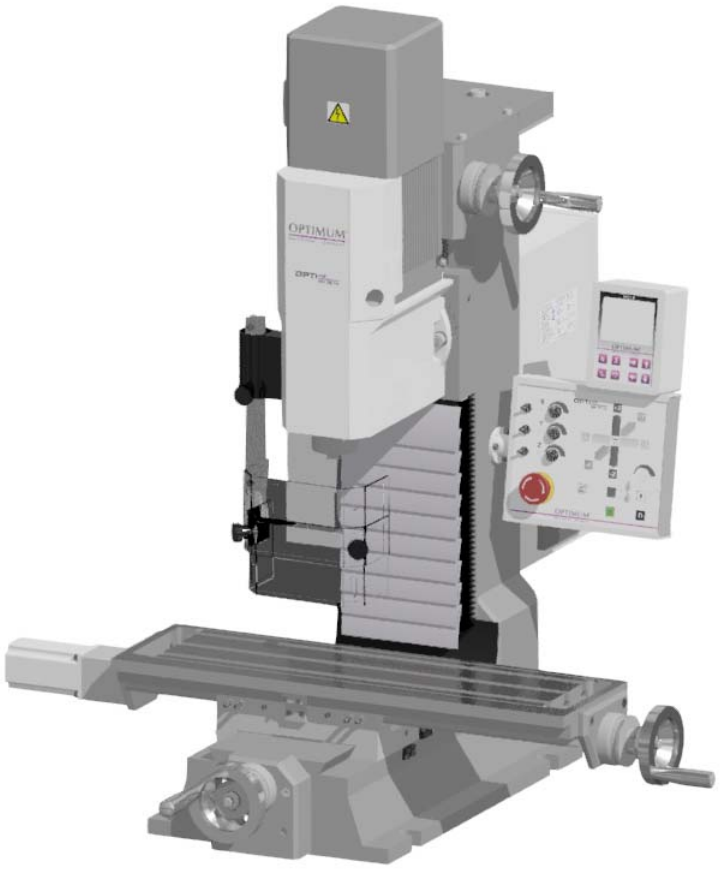
Operating Manual

Version 1.0.4

Milling machine

OPTImill® MH 25 SV

Item no. 333 8160



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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.

Optimum Maschinen Germany GmbH

Dr.- Robert - Pfleger - Str. 26

D-96103 Hallstadt

Mail: info@optimum-maschinen.de

Internet: www.optimum-maschinen.com

1 Safety

Glossary of symbols

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

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, it is necessary to observe the corresponding standards.

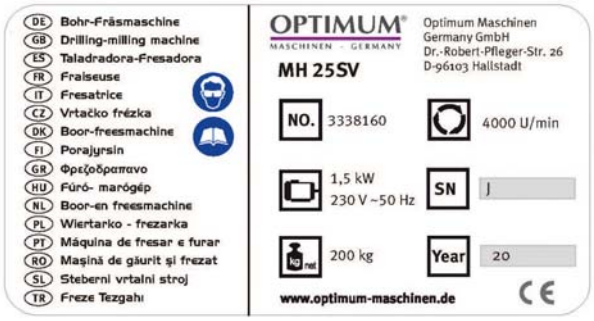
If European standards have not yet been incorporated in the national legislation of the country of destination, the specific applicable regulations of each country must be observed.

If required it is necessary to take the corresponding measures to comply with the country-specific regulations before putting the milling machine into operation.

Always keep this documentation near the milling machine.

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

1.1 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
Email: info@optimum-maschinen.de

1.2 Safety instructions (warning notes)

1.2.1 Classification of hazards

We classify the safety warnings into different categories. The table below gives an overview of the classification of symbols (pictograms) and the signal words for each specific danger and its (possible) consequences.

Symbol	Signal word	Definition / consequence
	**DANGER!**	Impending danger that will cause serious injury or death to people.
	WARNING!	A danger that can cause serious injury or death.
	CAUTION!	A danger or unsafe procedure that can cause personal injury or damage to property.
	**ATTENTION!**	Situation that could cause damage to the milling machine and products and other types of damage. No risk of injury to people.
	**INFORMATION**	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram with


general danger


with a warning of


injury to hands,


hazardous electrical voltage,

or


rotating parts.

1.2.2 Other pictograms


Warning: danger of slipping!


Warning: risk of stumbling!


Warning: hot surface!


Warning: biological hazard!


Warning: automatic start-up!


Warning: tilting danger!


Warning: suspended loads!


Caution, danger of explosive substances!


Activation forbidden!


Read the operating instructions before commissioning!


Disconnect the mains plug!


Wear protective glasses!


Wear protective gloves!


Wear safety shoes!


Wear a protective suit!


Use ear protection!


Only switch when stopped!


Protect the environment!


Contact address

1.3 Intended use

WARNING!

In the event of improper use, the milling machine

- **will endanger personnel,**
- **the milling machine and other material property of the operating company will be endangered,**
- **the correct function of the milling machine may be affected.**

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.

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

If the milling machine is used in any way other than described above, modified without the approval of the company Optimum Maschinen Germany GmbH, 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 or CE conformity will expire, if any constructive, technical or procedural changes are not performed by the company Optimum Maschinen Germany GmbH. It is also part of intended use that you

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

☞ Technical data on page 18

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WARNING!

Severe injuries due to non-intended use.

It is forbidden to make any modifications or alternations to the operation values of the milling machine. They could endanger the personnel and cause damage to the milling machine.

1.4 Reasonably foreseeable misuse

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

Any other use has to be discussed with the manufacturer.

It is only permissible to process metal, cold and non-inflammable materials with the milling machine.

In order to avoid misuse, it is necessary to read and understand the operating instructions before the machine is placed into operation for the first time.

The operators must be qualified.

1.4.1 Avoiding misuse

- ➜ Use of suitable cutting tools.
- ➜ Adapting the speed adjustment 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 operating company of the machine 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. The warranty is void. When processing carbons, graphite and carbon-fibre-reinforced carbons and similar materials, the machine can be damaged quickly, even if the dust generated is completely evacuated during the work process.

ATTENTION!

The workpiece must always be anchored in a machine vice, jaw chuck or other appropriate clamping tool, 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.
- ❍ Correctly adjust the bearing clearance and the guidings.

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 jams, immediately stop the main motor by pressing the emergency stop button,
- for hard materials, e.g. steel, use commercial cooling / lubricating agents,
- generally always back the spindle out of the workpiece while it is still turning.

ATTENTION!

Do not use the drill chuck as a milling tool. Never clamp a milling cutter into a drill chuck. Use a collet chuck and the corresponding collets for end mills (or shank cutters).

When milling make sure that

- the appropriate 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 in a way that the cutting speed remains constant,
- for hard materials, use commercial cooling / lubricating agents.

INFORMATION

The milling machine MH25SV is built according to the standard EN 61800-3 EMC class C2.

WARNING!

This machine is not intended for use in residential buildings, in which the power supply is provided via a public low voltage supply system. In these areas it may possibly be difficult to guarantee electromagnetic compatibility due to lead bound as well as emitted interferences.

Overview of the EMC categories:

Categorie C1

- required limit values Class B Group 1 according to EN 55011

Categorie C2

- Required limit values class A Group 1 according to EN 55011, Installation by EMC experts and warning: “This is a product of category C2 according to EN 61800-3. This product may cause radio interference in a residential area. In this case, it may be necessary for the operator to take appropriate action.“

Categorie C3

- Required limit values class A group 2 according to EN 55011, whereby these limit values are below those of class A group 1, plus warning: „This type is not suitable for connection to a public low-voltage network supplying residential buildings. When connecting to a public low voltage network, radio frequency interference is expected. "

This machine	☐	☒	☐	☐
Categorie	**C1**	**C2**	**C3**	**C4**
Environment	Residential area Business area Industrial area		Industrial area	
Voltage / Current	< 1000 V			> 1000 V
EMC knowledge	no requirement	Installation and commissioning by an EMC expert		

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1.5 Possible dangers caused by the milling machine

The milling machine was built using the latest technological advances.

Nonetheless, there remains a residual risk because the milling machine operates at

- high speeds,
- with rotating parts and tools,
- electrical voltage and currents.

We have used construction resources and safety techniques 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 incorrect or unsuitable maintenance of the milling machine.

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 performing cleaning or maintenance works.

WARNING!

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

If you detect a failure in the safety devices or if they are detached, disconnect the milling machine immediately!

All additional devices installed by the operator must be equipped with the prescribed safety devices.

As the operating company, this is your responsibility!

☞ **Safety devices on page 13**

1.6 Qualification of personnel

1.6.1 Target group

This manual is addressed to

- the operating companies,
- the operators,
- the maintenance personnel.

Therefore, the warning notes refer to both the operation and maintenance of the milling machine.

WARNING!

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

Operator

The operator is instructed by the operating company about the assigned tasks and possible risks in case of improper behaviour. Any tasks performed beyond operation in standard mode may only be performed by an operator if they are described in these instructions and if the operator has been specifically trained to perform them by the operating company.

Electrical specialist

Due to their 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.

Trained person

Trained persons have been 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 correct function of the milling machine may be affected.

1.6.2 Authorized personnel

WARNING!

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

Only authorized personnel may operate the machine!

Persons authorized to operate and maintain the machine should be technical personnel, instructed and familiarized with the equipment by the operating company and the manufacturer.

1.6.3 Obligations of the operating company

The operator must instruct the personnel at least once a year regarding

- all safety standards that apply to the machine,
- the operation,
- generally accepted engineering standards.

The operating company must also

- check the personnel‘s knowledge level,
- document the training/instruction,
- require personnel to confirm participation in training/instruction by means of a signature,
- check whether the personnel is working in a safe and risk-conscious manner and following the operating instructions.
- define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act.

1.6.4 Obligations of the operator

The operator must

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

1.6.5 Additional requirements regarding the qualification

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

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

Before beginning work on electrical parts or equipment, the following measures must be taken in the order listed below:

- ➜ disconnect all poles.
- ➜ secure against restarting,
- ➜ Ensure that there is no voltage.

1.7 Operator positions

The operator's position is in front of the milling machine.

1.8 Safety measures during operation

CAUTION!

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

Depending on the material to be processed and the additional resources used, dust or mist may be generated that is hazardous to your health.

Make sure that the dust and mist generated that is hazardous to health are safely vacuumed at their point of origin and extracted from the working area or filtered. To accomplish this, use a suitable extraction unit.

CAUTION!

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

Before processing inflammable materials (e.g. aluminium, magnesium) or using inflammable auxiliary materials (e.g. chemical spirits) it is necessary to take additional preventive measures in order to safely avoid health risks.

1.9 Safety devices

Use the milling machine only with properly functioning safety devices.

If there is a failure on the safety device or if it is not functioning for any reason, stop the milling machine immediately.

It is your responsibility!

If a safety device has been deactivated or is defective, the milling machine can only be used again if you

- ❍ eliminate the cause of the defect,
- ❍ have verified that there is no danger that could result for people or property.

WARNING!

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

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

WARNING!

The separation guard made available and delivered together with the machine is designed to reduce the risk of workpieces or scraps from the tools or workpieces being expelled, but not to

remove them completely. Always work carefully and observe the limits of your machining process.

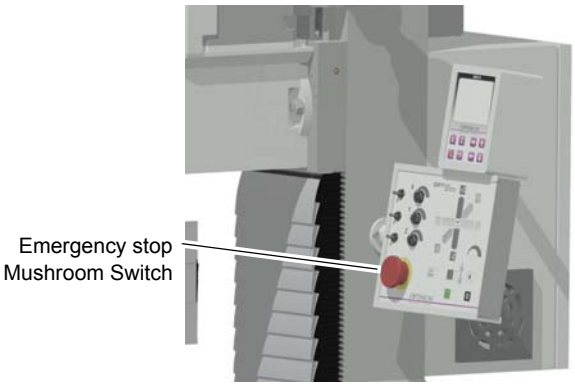
1.9.1 Emergency stop mushroom button

CAUTION!

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

The emergency stop mushroom button brings the machine to a standstill.

Turn the knob to the right to unlock and release the emergency stop mushroom button.



Img.1-1: Emergency stop mushroom button

CAUTION!

The emergency stop mushroom button may only be activated in an emergency. An operational shut-down of the machine must not be executed using the emergency stop mushroom button.

1.9.2 Lockable main switch

In the "0" position, the lockable main switch can be secured with a padlock against accidental or non-authorised switching on.

When the main switch is turned off, the power supply is interrupted.

The exceptions are the areas marked by the pictogram in the adjacent margin.

WARNING!

Dangerous voltage even if the main switch is switched-off. The areas marked with the pictogram in the margin may contain live voltage, even if the main switch is in the off position.

1.9.3 Stored charge

WARNING!

The frequency converter and controls of the feed contain capacitors that remain charged to a potentially lethal voltage after the machine has been disconnected from the power supply. If the frequency controller was under power, it must be disconnected for at least 10 minutes from the power supply. Before continuing to work, ensure there is no voltage. Normally, the capacitors are discharged by an internal resistor. In certain unusual error conditions, it is possible that the capacitors are not discharged or that the discharge is prevented by voltage in the adjacent motor connection terminal. If the frequency converter has a technical defect, so that nothing is shown on the display, it is possible that the capacitors are not discharged.

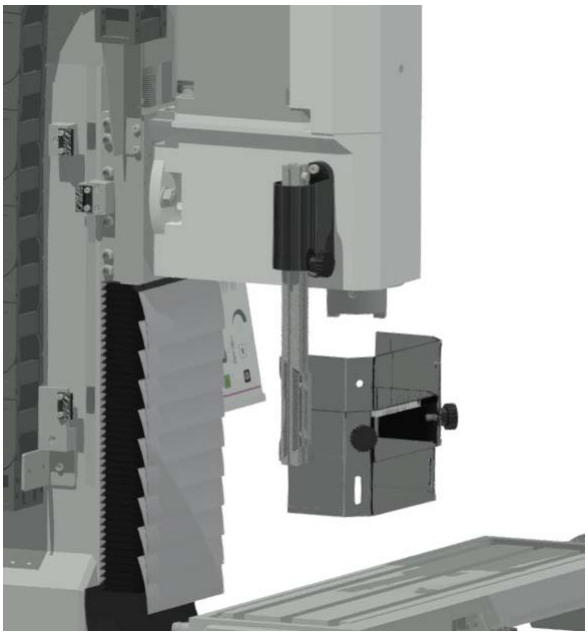
1.9.4 Separation guard

Adjust the guard to the correct height before you start working.
To do so, detach the clamping screw, adjust the required height and re-tighten the clamping screw.

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

INFORMATION

You cannot start the machine if the spindle protection is not closed.



Img. 1-2: Separation guard

1.10 Safety check

Check the milling machine at regular intervals.

Check all safety devices

- before each operation,
- once a week (with the machine in operation),
- 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 mushroom button	When the emergency stop mushroom button is activated, the milling machine must switch off. It is only possible to restart the machine if the emergency stop mushroom button is unlocked and the ON switch is activated.	
Separation guard around the drilling and milling spindle	The milling machine should only switch on 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 protection if the noise level (emission) in the workplace exceeds 80 dB (A).

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

CAUTION!

Dirty or contaminated personal 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 you activate the milling machine, ensure that it will neither endanger other persons nor cause damage to equipment.

Avoid any unsafe work methods:

Make sure that no one is endangered by your work.

- The instructions described in these operating instructions must be strictly observed during assembly, operation, maintenance and repair.
- Wear safety goggles.
- Switch off the milling machine before you measure the workpiece.
- If your concentration is reduced, for example, due to medications, do not work on the milling machine.
- Remain next to the milling machine until all movement is completely stopped.
- Use the prescribed personal protective equipment. Be sure to wear close-fitting clothing and, if necessary, a hairnet.
- Do not wear gloves while drilling or milling.
- Disconnect the safety plug from the outlet before changing tools.
- Use appropriate equipment to remove drilling and milling chips.
- Make sure that your work does not endanger anyone.
- Safely and firmly clamp the workpiece before switching on the milling machine.

For the specific dangers when working with and at the milling machine, we provide descriptions about specific dangers for these types of work.

1.13 Switching-off and securing the milling machine

Disconnect the mains plug before starting maintenance and repairs.

1.14 Using lifting equipment

WARNING!

The use of unstable lifting and load suspension equipment that might break under load may 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.

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

Fasten the loads properly.

Never walk under suspended loads!

1.15 Icons on the milling machine

Make sure that the command and warning symbols are legible.

1.16 Electrical system

Have the electrical equipment on the machine 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. Immediately disconnect the milling machine if there are any anomalies in the power supply!

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

The operating company responsible for 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 start-up and after modifications or repairs, prior to restarting the equipment
- and at certain intervals.

The deadlines must be set so that arising, foreseeable defects can be detected in a timely manner.

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

The inspection prior to initial operation is not required if the operator receives confirmation from the manufacturer or installer that the electrical systems and operating equipment comply with the accident prevention regulations.

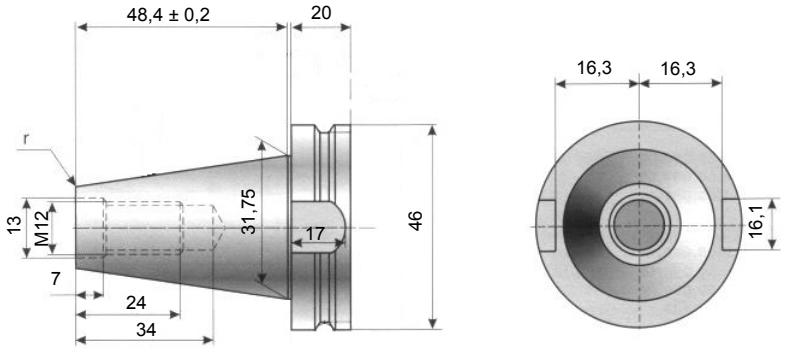
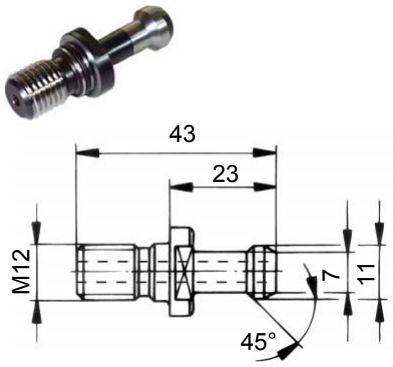
Permanently installed electrical systems and operating equipment are considered constantly monitored if they are continually serviced by qualified electricians and inspected by means of measurements in the scope of operation (e.g. monitoring the insulation resistance).

1.17 Inspection deadlines

Define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act. Also use the inspection intervals in the maintenance section as reference values.

2 Technical data

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

2.1 Electrical connection	MH25SV
Total connected load	230V / 50Hz / 2 KW
Milling spindle motor power	1.5 KW ; 10 Nm
2.2 Milling capacity	
Size of end mill cutter max. [mm]	max. Ø 25
Size of milling head max. [mm]	max. Ø 50
2.3 Spindle seat	
Spindle seat	Taper JIS (MAS 403 BT30)
	
Pull stud	BT30x45°
	
Maximum distance between spindle nose - milling table [mm]	308

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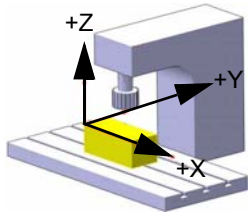
2.4 Drill-mill head	
	
Travel of Z axis [mm]	270
Throat [mm]	185
max. torque drive Z-axis	4.2 Nm
maximum movement speed Z-axis [m/min]	0.45
minimum movement speed Z-axis [m/min]	0.08
Scale on the Z-axis hand crank	4mm/rev - graduation 0.02mm
2.5 Cross table	
Table length [mm]	620
Table width [mm]	180
max. Load on cross table	30 kg
T - slot size / distance / number	12mm / 50mm / 3
Travel of X axis [mm]	400
max. torque drive X-axis	2.2 Nm
maximum movement speed of X axis [m/min]	0.93
minimum movement speed of X axis [m/min]	0.15
Scale on the X axis hand crank	4mm/rev - graduation 0.02mm
Travel of Y axis [mm]	210
maximum movement speed of Y axis [m/min]	0.58
minimum movement speed of Y axis [m/min]	0.1
max. torque drive Y-axis	2.2 Nm
Scale on the Y-axis hand crank	4mm/rev - graduation 0.02mm
Distance spindle - table max. [mm]	300
2.6 Dimensions	
	☞ Dimensions on page 23
Total weight [kg]	200
2.7 Working area	
	Keep a work area of at least one metre around the machine free for operation and maintenance.
2.8 Speeds	
Rotation speed electronically adjustable [min^{-1}]	200 - 4000

2.9 Environmental conditions	
Temperature	5-35 °C
Humidity	25 - 40%
2.10 Operating material	
Bare steel parts	Mobilgrease OGL 007 or, Mobilux EP 004, acid-free oil, e.g. weapon oil, motor oil
2.11 Emissions	
Maximum sound pressure level at 1 m distance from the machine and 1.60 m above the ground.	77 to 79 dB(A) in idle running

CAUTION!

The machine operator should use hearing protection.

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.

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 Scope of delivery

INFORMATION

The milling machine is pre-assembled.

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

Compare the scope of delivery with the attached packing list.

3.3 Installation and assembly

3.3.1 Requirements regarding the installation site

The working area for operating, maintenance and repair must not be hindered.

The milling machine's power plug must be readily accessible.

The illumination of the working place has to be such that an intensity of illumination of 500 Lux is attained at the tool tip.

If this is not ensured with normal illumination at the installation location, an additional lamp must be installed at the workplace.

3.3.2 Load suspension point

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. Use a lifting sling for this purpose.
- ➜ Firmly clamp all clamping levers on the drilling-milling machine before lifting the milling machine.
- ➜ Make sure that the load attachment does not cause damage to components or paint.

3.3.3 Assembly

- ➜ Check if the floor under the milling machine is level using a spirit level.
- ➜ Check that the foundation has sufficient floor-load capacity and rigidity.

ATTENTION!

Insufficient rigidity of the substructure leads to interaction of vibrations between the milling machine and the substructure (natural frequency of the components). If there is insufficient rigidity of the system as a whole, critical speeds and unpleasant vibrations in the axis are achieved rapidly and lead to poor milling results.

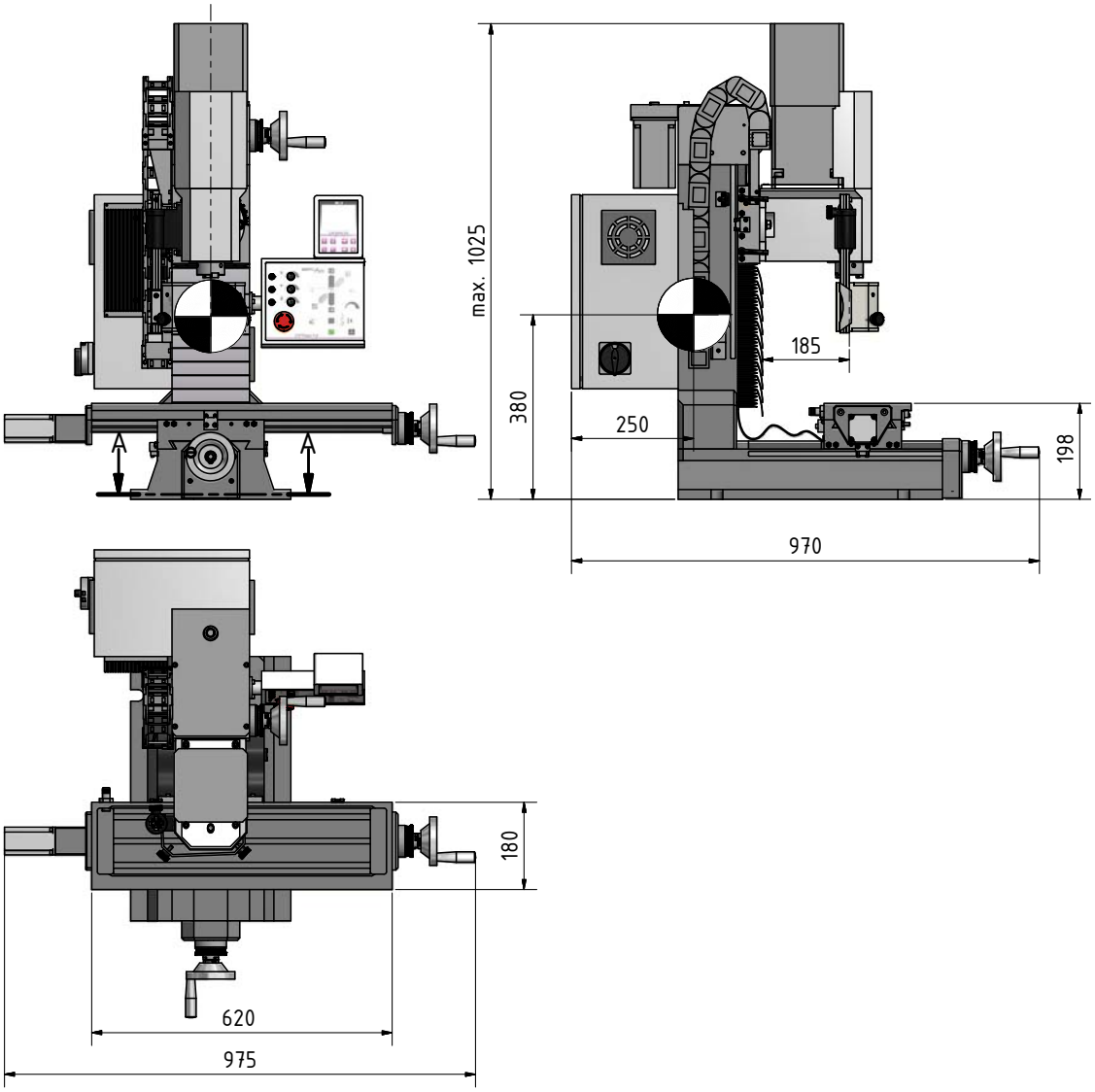
- ➜ Place the milling machine on the designated foundation.
- ➜ Fix the machine base to the floor/foundation with the provided through-holes.

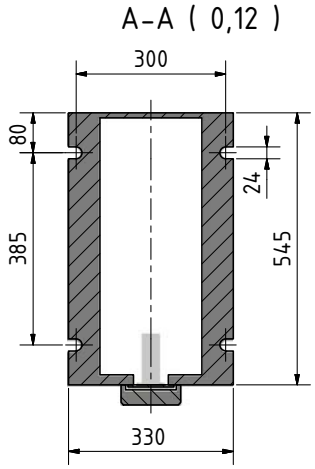
WARNING!

The condition of the foundation and the method of securing the machine base to the floor must be performed in a way that it can bear the loads of the milling machine. The underground must be level. Ensure that the foundation of the milling machine is level using a spirit level.

Fix the machine base of the milling machine to the foundation with the provided through-holes. We recommend that you use shear connector cartridges or heavy-duty anchors.

3.4 Dimensions





Schwerpunkt / Centre of gravity

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3.5 First commissioning

WARNING!

The machine may only be placed into operation after proper installation.

If the milling machine is operated initially by inexperienced personnel, you endanger people and the machine. We cannot accept liability for damages caused by incorrectly performed operation.

ATTENTION!

Before initially operating the machine, check all screws, fixtures and/or safety devices and tighten up the screws if necessary!

WARNING!

Risk by using improper tool holders or operating them at inadmissible speeds.

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 of the manufacturer of the clamping devices.

☞ Qualification of personnel on page 11

3.6 Electrical connection

CAUTION!

Install the connection cable of the machine in such a way that people will not stumble over it.

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. Main Fuse 16A. With an internal EMC filter the leakage current is greater than 3.5 mA. We ask for due attention while executing machine tests within the framework of industrial safety guidelines.

3.6.1 Current in the Protective Earth Ground Wire

The degree of the leakage current in the protective earthing conductor depends on whether the internal EMC filter in the Emerson M200 frequency converter is used for spindle rotation speed control or not. The standard frequency converter is fitted with an internal EMC filter. Instructions on how to remove the internal filter is in the converter manual.

- With the EMC filter, the leakage current is 15.4 mA AC 230V 50Hz (1 phase supply, phase-neutral power supply, neutral point earthed).
- Without an EMC filter, the leakage current is <1.9 mA (phase-neutral power supply, neutral point earthed).

Therefore, a fixed earth connection is required and the minimum cross section of the protective earthing conductor must conform to local safety regulations for devices with high leakage current. This is achieved by providing a permanent fixed earthing connection with two independent conductors, each having a cross section the same as the power supply cord or greater. To simplify this, the converter is provided with two earth terminals. Both earthing connections are required to comply with the standard EN 61800-5-1.

Since a direct current may be caused by the frequency converter in the protective earthing conductor, if an upstream residual current device (ELCB / RCD) is required in the network, the following guidelines must be followed:

There are three common types of FI (ELCB / RCD):

- AC - to detect AC fault currents

- A - to detect AC fault currents and pulsating DC fault currents (provided the DC current reaches zero at least once every half cycle).
- B - to detect AC fault currents, pulsating DC fault currents and smooth DC residual currents.

Type AC should never be used in converters.

Type A can only be used for single-phase converters.

Type B must be used for 3-phase converters.

When using an external EMC filter, to avoid false error shutdowns, a time delay of at least 50 ms is required. The leakage current can exceed the threshold trigger value for an error shutdown if the phases are not switched on at the same time.

3.7 Cleaning and lubrication

➜ Remove the anti-corrosive agents on the milling machine which had been applied for transportation and storage. Therefore, we recommend you to use paraffin.

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

➜ Oil all blank machine parts using an acid-free lubricating oil.

➜ Lubricate the milling machine according to the lubricating plan.
☞ Inspection and maintenance on page 37

➜ Check if all spindles are running smoothly. The spindle nuts are re-adjustable.

INFORMATION

The milling machine is lacquered with a one-component paint. Take this criterion into account when selecting your cooling lubricant.

The company Optimum Maschinen Germany GmbH does not assume any guarantee 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.

4 Operation

4.1 Safety

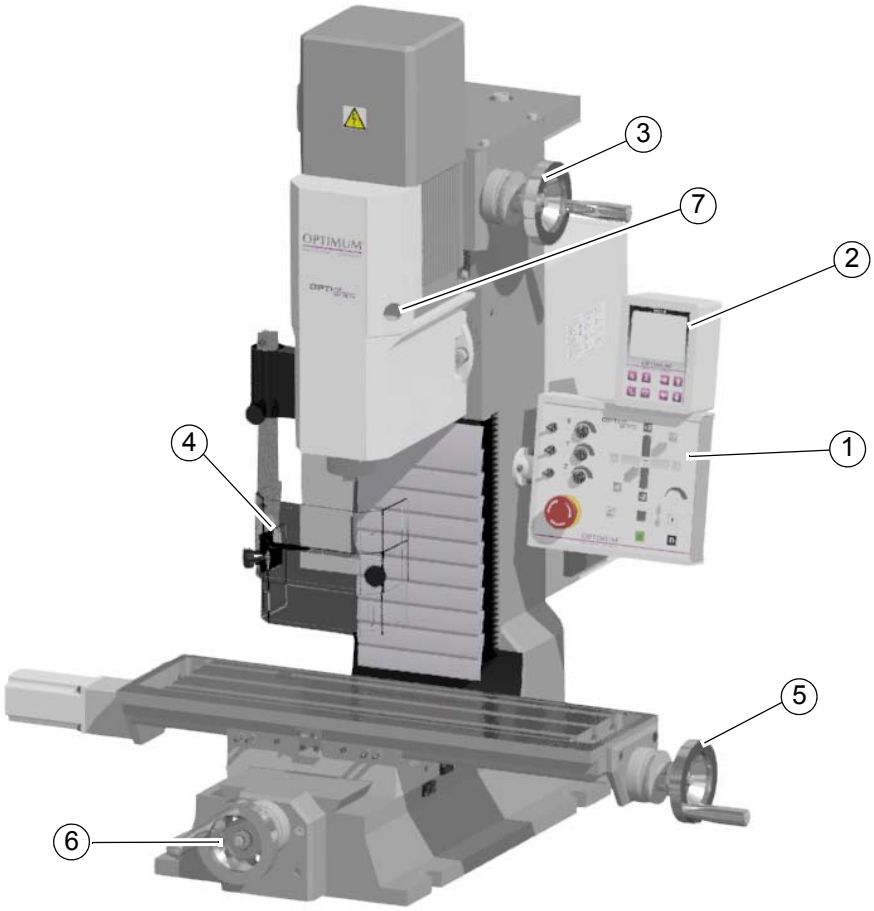
Place the milling machine in operation only under the following conditions:

- The milling machine is in proper working order.
- The milling machine is used as intended.
- The operating manual is 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

4.2 Control and indicating elements



Pos.	Designation	Pos.	Designation
1	Control panel ☞ Control panel on page 27	2	Digital position indicator ☞ DRO 5 on page 85
3	Hand crank for raising/lowering the milling head	4	Spindle protection
5 - 6	Hand crank for cross table	7	Opening Tool quick clamping system

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4.2.1 Control panel

Pos.	Designation	Pos.	Designation
10	Direction switch	11	Control feed speed
12	Rapid feed buttons	13	Emergency stop mushroom button
14	Reset key	15	Spindle rotation ON
16	Spindle rotation OFF	17	Spindle speed setting
18	Spindle direction selection	19	Control ON

4.3 Switching on the milling machine

➜ Move the axis direction switches to the neutral middle position.
➜ Turn on the main switch.
➜ Release the emergency stop mushroom button.
➜ Close spindle protection system.
➜ Switch the control on.

4.4 Switching off the milling machine

➜ Move the axis direction switches to the neutral middle position.
➜ Switch off the main switch.
➜ ☞ Switching-off and securing the milling machine on page 16

CAUTION!

The emergency stop mushroom button may only be activated in an emergency. A normal shut-down of the machine must not be executed using the emergency stop mushroom button.

4.5 Resetting an emergency stop situation

➜ Unlock the emergency stop mushroom button again.
➜ Move the axis direction switches to the neutral middle position.
➜ Switch the control on again.
➜ Switch on the spindle rotation again.

4.6 Power failure, Restoring readiness for operation

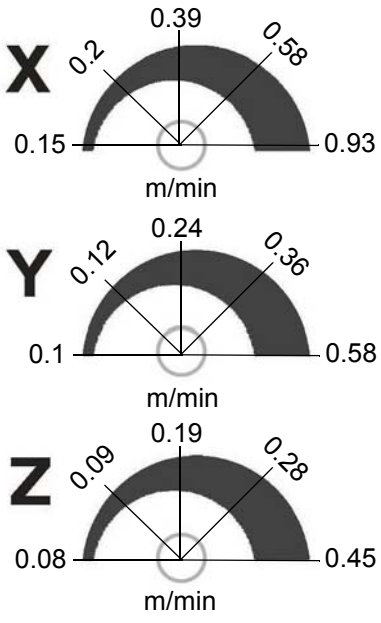
➜ Move the axis direction switches to the neutral middle position.
➜ Switch the control on again.
➜ Switch on the spindle rotation again.

4.7 Speed setting

The adjustment of the speed in the range from 200 - 4000 min^{-1} is continuously variable with the rotary knob on the control panel.

4.8 Feed speed

Adjust the feed speed for each axis with the rotary knob. The adjacent illustration shows the approximate automatic feed speed in metres per minute.



Img.4-1: Feed speed

4.8.1 Resetting the automatic feed

Reset key

To free an axis when the axis has traveled to the end position.

➜ Press and hold the reset button and press either the direction switch or the rapid feed button for the respective axis to move it away from the end position switch.

4.8.2 Automatic feed of an axis

➜ Set the direction switch to the desired direction.

➜ Set the feed speed.

4.8.3 Rapid feed

➜ Set the feed speed to maximum.

➜ Press the rapid feed button for the respective axis and hold.

4.9 Insert tool

4.9.1 Quick-change clamping system

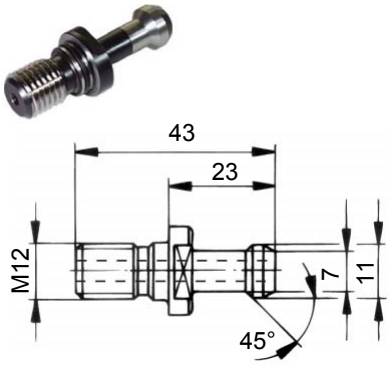
The milling head is equipped with a collet chuck for tightening with pull stud BT30x45 °.

➜ Tightening the pull stud into the taper.

➜ Clean the seat in the milling spindle.

➜ Clean the cone of your tool.

➜ Place the tool into the milling spindle. Put a 10mm Allen key in the mounting hole and turn it clockwise to open the collet chuck.

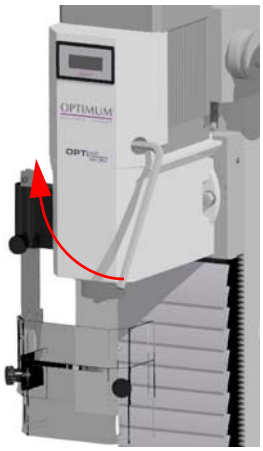


Img.4-2: pull stud

4.9.2 Removal

➜ Hold the tool.

➜ Put a 10mm Allen key in the mounting hole and turn it clockwise to open the collet chuck.



Img.4-3: MAS BT30

4.9.3 With draw bar - until version 1.0 (Building year to 10/2015)

CAUTION!

When milling operations are performed, the cone seat must always be fixed to the drawbar. All cone connections with the taper bore of the work spindle without using the drawbar is not permissible for milling operations. The cone connection is released using lateral pressure. Injuries may be caused by shavings flying off.

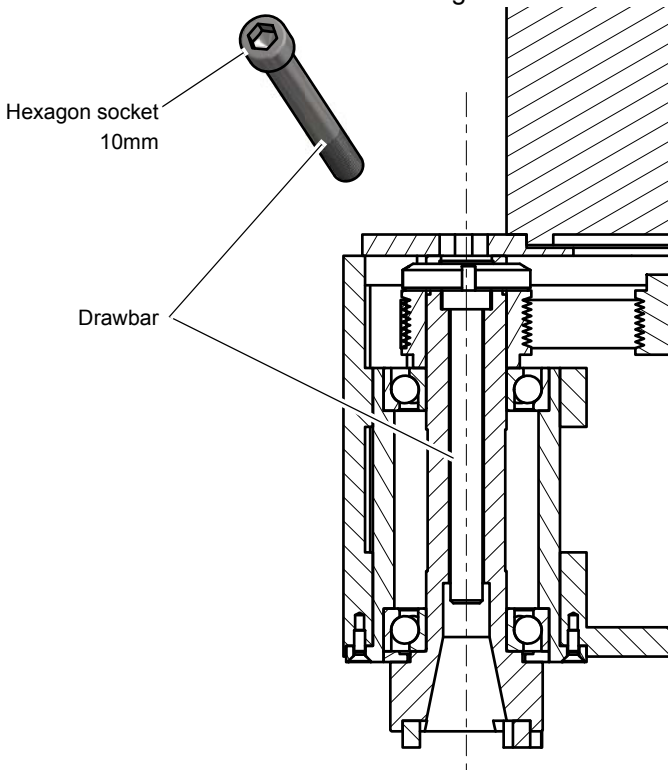
The milling head is fitted with an M12 drawbar with a 10mm hexagon socket.

➜ Clean the seat in the spindle/quill.

➜ Clean the taper of your tool.

➜ Place the tool into the spindle/quill.

➜ Screw the drawbar into the tool and tighten the drawbar securely.



Img.4-4: Drawbar

4.9.4 Removal

➜ Loosen the drawbar and turn it further to release the conical joint.

4.9.5 Use of collets

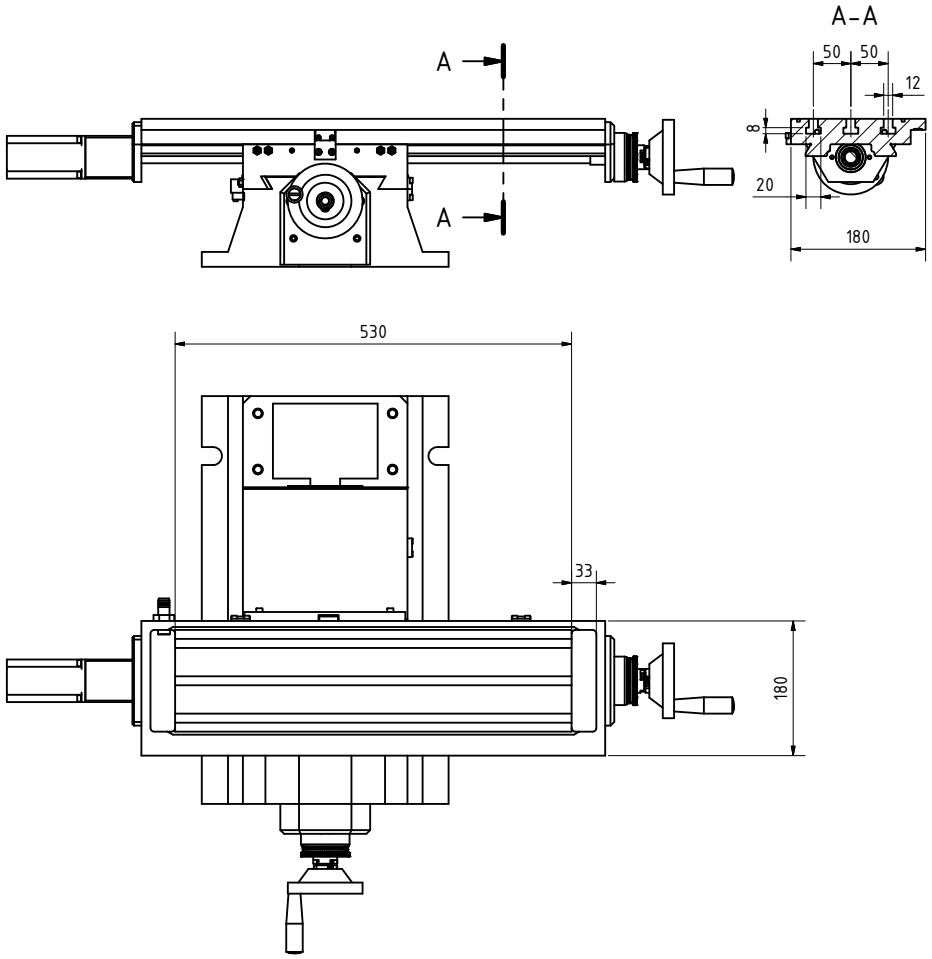
When using collets for the reception of milling tools, a higher operation tolerance can be achieved. The exchange of the collet for a smaller or larger end mill cutter is performed simply and rapidly and it is not necessary to remove the complete tool. The collet is pressed into the ring of the swivel nut and must rest there by itself. The milling cutter is clamped by fastening the swivel nut on the tool. Make sure that the correct collet is used for each milling cutter diameter, so that the milling cutter may be fastened securely and firmly.

4.10 Clamping the workpieces

CAUTION!

Injury caused by scraps flying off.

The workpiece must always be secured to the cross table in a machine vice, jaw chuck or with another suitable clamping tool, such as clamping claws.



Img.4-5: Cross table

4.11 Swivelling the milling head

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

➜ Loosen 2 fixing screws on the milling head.
➜ Turn the drill-mill head to the desired position.
➜ Retighten the fastening screws.

4.12 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 largely depends on the material of the workpiece and the material the tool is made of. With tools (milling cutters) made of hard metal or ceramic insert it is possible to work with higher speeds than with tools made of high-alloy high speed steel (HSS). You will achieve the optimal cutting speed by selecting the correct rotation speed.

In order to determine the correct cutting speed for your tool and for the material to be cut you may refer to the following standard values or a table reference book (e.g. Tabellenbuch Metall, Europa Lehrmittel, ISBN 3808517220).
The required speed is calculated as follows:

$$n = \frac{V}{\pi \times d}$$

n = speed in min^{-1} (revolutions per minute)

V = cutting speed in m/min (meter per minute)

d = tool diameter in m (Meter)

4.12.1 Standard values for cutting speeds

[m/min] with high-speed steel and hard metal in upcut milling.

Tool	Steel	Grey cast iron	Al alloy hardened
Plain mill and side milling cutters [m/min]	10 - 25	10 - 22	150 - 350
Relieved form cutters [m/min]	15 - 24	10 - 20	150 - 250
Cutter head with SS [m/min]	15 - 30	12 - 25	200 - 300
Cutter head with HM [m/min]	100 - 200	30 - 100	300 - 400

The results are the following standard values for speeds depending on the milling cutter diameter, cutter type and material.

Tool diameter [mm] shell end mill and side milling cutters	Steel 10 - 25 m/min	Grey cast iron 10 - 22 m/min	Al alloy cured 150 - 350 m/min
	Speed [min^{-1}]		
35	91 - 227	91 - 200	1365 - 3185
40	80 - 199	80 - 175	1195 - 2790
45	71 - 177	71 - 156	1062 - 2470
50	64 - 159	64 - 140	955 - 2230
55	58 - 145	58 - 127	870 - 2027
60	53 - 133	53 - 117	795 - 1860
65	49 - 122	49 - 108	735 - 1715

Tool diameter [mm] Form cutters	Steel 15 - 24 m/min	Grey cast iron 10 - 20 m/min	Al alloy cured 150 - 250 m/min
	Speed [min^{-1}]		
4	1194 - 1911	796 - 1592	11900 - 19000
5	955 - 1529	637 - 1274	9550 - 15900
6	796 - 1274	531 - 1062	7900 - 13200
8	597 - 955	398 - 796	5900 - 9900
10	478 - 764	318 - 637	4700 - 7900
12	398 - 637	265 - 531	3900 - 6600
14	341 - 546	227 - 455	3400 - 5600
16	299 - 478	199 - 398	2900 - 4900

4.12.2 Standard values for speeds with HSS – Eco – twist drilling

Material		Drill diameter									Cooling 3)
		2	3	4	5	6	7	8	9	10	
Steel, non-alloy, up to 600 N/mm^2	n 1)	5600	3550	2800	2240	2000	1600	1400	1250	1120	E
	f 2)	0.04	0.063	0.08	0.10	0.125	0.125	0.16	0.16	0.20	
Structural steel, alloyed, quenched and subsequently drawn, up to 900N/mm^2	n	3150	2000	1600	1250	1000	900	800	710	630	E/oil
	f	0.032	0.05	0.063	0.08	0.10	0.10	0.125	0.125	0.16	
Structural steel, alloyed, quenched and subsequently drawn, up to 1200 N/mm^2	n	2500	1600	1250	1000	800	710	630	560	500	Oil
	f'	0.032	0.04	0.05	0.063	0.08	0.10	0.10	0.125	0.125	
Stainless steels up to 900 N/mm^2 e.g. X5CrNi18 10	n	2000	1250	1000	800	630	500	500	400	400	Oil
	f	0.032	0.05	0.063	0.08	0.10	0.10	0.125	0.125	0.16	
1): Speed [n] in r/min											
2): Feed [f] in mm/r											
3): Cooling: E = Emulsion; oil = cutting oil											

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

INFORMATION

Friction during the cutting process causes high temperatures at the cutting edge of the tool. The tool should be cooled during the milling process. Cooling the tool with a suitable cooling lubricant ensures better working results and a longer edge life of the cutting tool.

4.13 Operation DRO5

- Display: three position display, one speed display
- Counting resolution setting function
- Counting direction setting
- Linear error compensation
- Metric / inches change-over
- LCD display status setting
- Speed mode setting
- Basic value setting

4.13.1 Keyboard (eight keys)

	The selection keys of axes
	Function selection key, enter key.
	Moving key
	Increase or decrease key of the digits

4.13.2 Operations

Axial function

In the normal display state, press (X,Y, Z) key to make the corresponding axial value flash. After flash several times, this axis will be cleared.

If the value of the indicator is blinking, press the corresponding axis button again to cancel the operation.

If the displayed value is in flashing state, press again the function button "PROG" in order to change the fundamental value of the axis.

Modification of the basic value of X, Y, Z

After entering this option, the basic value is highlighted, and the digital bit is located in the flashing state. The ↑ ↓ keys are used for changing the digital bit, the ← → keys are used for selecting the digital bit. After completing the changes, press the "PROG" key to exit the option.

4.13.3 Menu

The operating modes of the menus are nearly same. The ↑ ↓ key move the cursor to the specified options, the "PROG" key is used to select. For optional items, using ↑ ↓ key to select, and using the "PROG" key to exit after completing. For modifying items,
using ↑ ↓ key to modify the digital bit, using ← → key to select the digital bit, using "PROG" key to exit after completing. Pressing the "PROG" key in multilevel menus enters the next level menu.

4.13.4 The main menu

In the normal display state, press and hold the "PROG" key for three seconds to enter the main menu.

LCD display setting

LCD display setting: the secondary menu, press "PROG" key to enter to modify the LED display parameter.

Unit selection

Press "PROG" key to enter the menu, mm/inch as a select.

Language selection

Press "PROG" key to enter the menu, English/German as a select.

Working mode

Press "PROG" key to enter and select,

- X Y/Z0 Z
  Standard display
- X Z+Z0 Z
  for lathes, Z / Z0 axis overlay display, Sum of bedslide + top slide
- 2X Y/Z0 Z
  for lathes, duplicate value in the X axis display.

Decimal point

Selection of decimal places, 2 or 3 decimal places.

Channel setup

Multilevel menus, press the "PROG" key to enter the menu, to modify X Y Z as well as the speed axial parameter.

Operation

The introductions of the main functions.

Save and Exit

Saving new parameters, press the "PROG" key to confirm, then return to the normal display state.

4.13.5 LCD display parameter setting

Contrast

Press the "PROG" key to enter the menu, selection range is 0~31, the increment or decrement is 1.

Backlight

Press the "PROG" key to enter the menu, selection range is 0~63, the increment or decrement is 1.

Test sample

Selection of three different RGB display types.

Press the "PROG" key to enter the menu, selection range is 0~3, the increment or decrement is 1.

Save and Exit

Saving new parameter, press "PROG" key to confirm, then return to the main menu.

4.13.6 Parameter setting of X Y Z-axis and speed axis

X-axis parameter

Three-level menu, press "PROG" key to enter to modify the X-axis parameter.

Y-axis parameter

Three-level menu, press "PROG" key to enter to modify the Y-axis parameter.

Z-axis parameter

Three-level menu, press "PROG" key to enter to modify the Z-axis parameter.

Speed axis parameter

Three-level menu, press "PROG" key to enter to modify the speed axis parameter.

4.13.7 Parameter setting of X-axis

Sensor

Setting of sensor type. Press "PROG" to enter the menu, there are several digital sensor types selectable.

MS100 ; MS200 ; MS500 ; CSA010 ; CSA020 ; CSA050

Use the sensor setting MS200 for reading heads in scope of delivery of DRO5.

Resolution setting

Press "PROG" key to enter and choose.

For sensor type „MS200“ , there are 4 possibilities to choose from. 2µm I 5µm I 10µm I 50µm

Use a resolution of 50 microns for the magnetic tapes with the item no. 3383978 or 3383979 or 3383980 .

Other magnetic tapes from other manufacturers, or magnetic tapes with another item number can have a different resolution.

Setting counting direction

Press the "PROG" key to enter the menu. “+/-“ as a select.

Setting display mode

Press the "PROG" key to enter the menu. "On / Off" as a select.

Linear error compensation

Press the "PROG" key to enter the menu, use ↑ ↓ ← → keys to modify, then press the "PROG" key to exit.

Save and Exit

Saving new parameters, press the "PROG" key to confirm, then return to section 4.13.6

INFORMATION

The parameter setting of Y, Z-axis is the same as X-axis.

4.13.8 Parameter setting of speed axis

Teeth amount of every turn (pulses per rev)

Press "PROG" key to enter, selection range is 1~36, the increment or decrement is 1.

Display mode

Press the "PROG" key to enter the menu, "On / Off" as a select.

Save and Exit

Saving new parameters, press the "PROG" key to confirm, then return to section 4.13.6

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,**
- **long service 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:

- **Very serious injury to personnel working on the milling machine,**
- **Damage to the milling machine.**

Only qualified technical personnel should carry out maintenance and repair work on the milling machine.

5.1.1 Preparation

WARNING!

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

☞ Switching-off and securing the milling machine on page 16

Attach a warning sign.

5.1.2 Restarting

Before restarting, run a safety check.

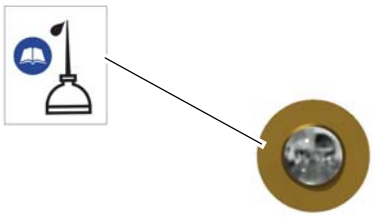
☞ Safety check on page 15

WARNING!

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

5.2 Inspection and maintenance

The type and level of wear depends to a large extent on the individual usage and operating conditions. 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 guides.
Weekly	**Cross table**	Oiling	➜ Oil all bare steel surfaces. Use acid-free oil.
Monthly	**Clamping bolts Milling head**	firmly tightened	➜ Ensure that the clamping bolts for swivelling the drill head are firmly tightened.
Monthly	**Oiler cup**	Oiling	➜ Lubricate all oilers with machine oil, do not use grease guns or the like. 

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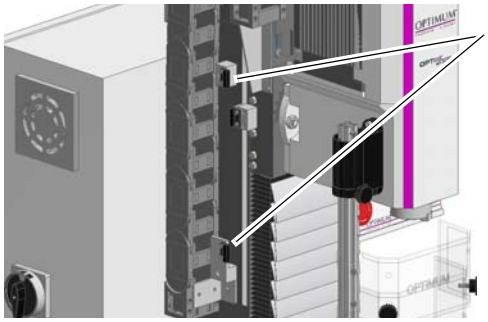
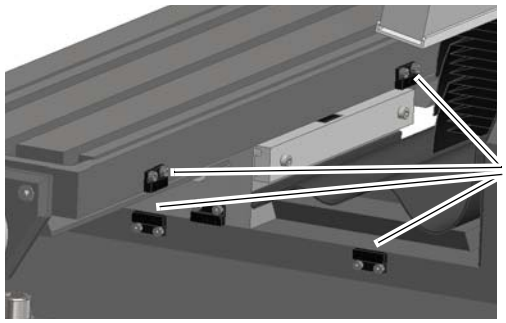
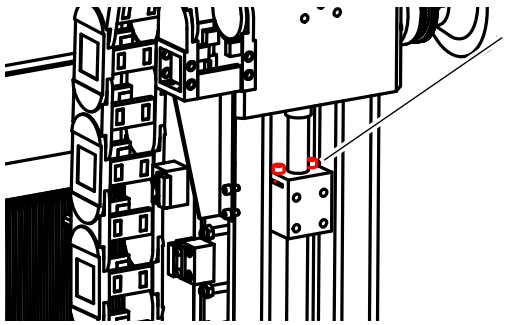
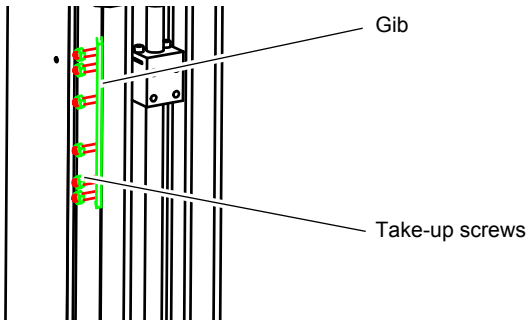
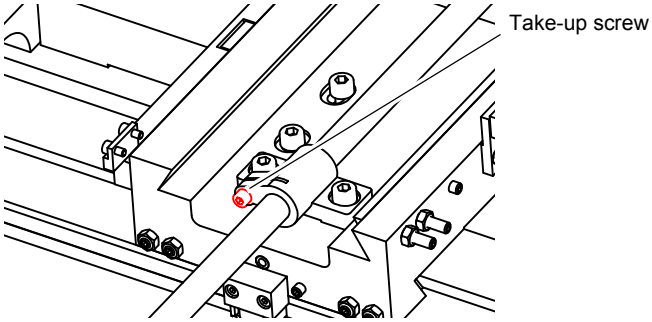
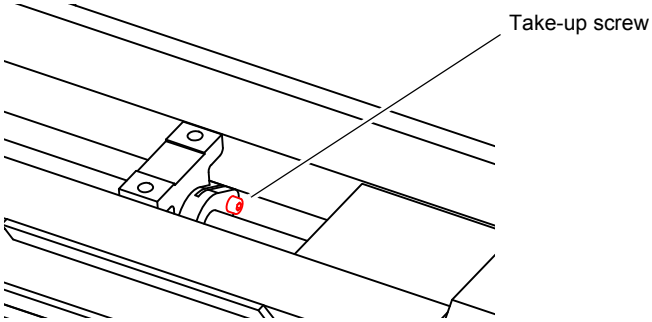
Interval	Where?	What?	How?
In case of soiling	**Limit switches, reed contacts**	Cleaning	The limit switches must be cleaned regularly to ensure further trouble-free operation.  Img.5-1: Milling head  Img.5-2: Milling table
As required	**Spindle nut Milling head**	Adjustment Z axis	Increased play in the milling head spindle can be reduced by adjusting the spindle nut. The spindle nuts are readjusted by reducing the thread flanks of the spindle nut with two take-up screws. Due to the readjustment, it is necessary to check if smooth movement over the entire way is still provided, otherwise wear is considerably increased due to friction between the spindle nut and the spindle.  Img.5-3: Milling head

Interval	Where?	What?	How?
As required	**Adjustment gib Milling head**	Adjustment Z axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide-way. ➜ Check the settings. The corresponding guideway must be more easily moveable but ensure a stable guiding.  Img.5-4: Take-up screws Z axis
	Spindle nut Cross table	Adjustment X axis	An extended clearance in the spindles of the cross table can be reduced by adjusting the spindle nuts. The spindle nuts are adjusted by reducing the thread flanks of the spindle nut by means of a take-up screw. Due to the readjustment, it is necessary to check if smooth movement over the entire way is still provided, otherwise wear is considerably increased due to friction between the spindle nut and the spindle.  Img.5-5: Cross table
	Spindle nut Cross table	Adjustment Y axis	

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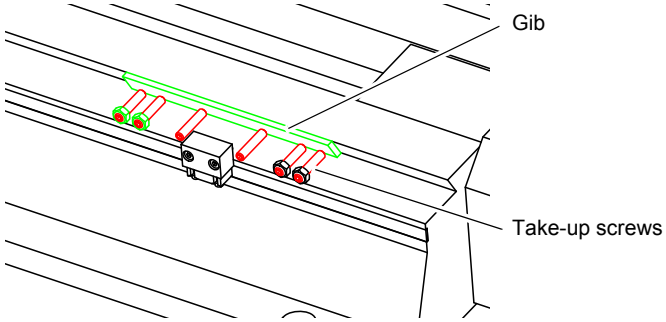
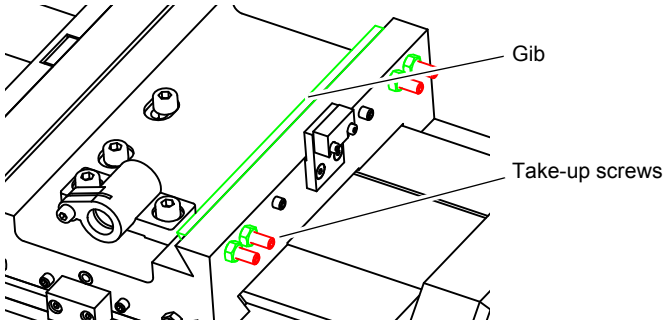
Interval	Where?	What?	How?
As required	**Adjustment gib Cross table**	Adjustment Y axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide-way. ➜ Check the settings. The corresponding guideway must be more easily moveable but ensure a stable guiding.  Img.5-6: Take-up screws Y axis
As required	**Adjustment gib Cross table**	Adjustment X axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide-way. ➜ Check the settings. The corresponding guideway must be more easily moveable but ensure a stable guiding.  Img.5-7: Take-up screws X axis
according to operator's empirical values in accordance with German DGUV (BGV A3)	**Electrical system**	Electrical inspection	☞ Obligations of the operating company on page 12 ☞ Electrical system on page 17

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

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,
- 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

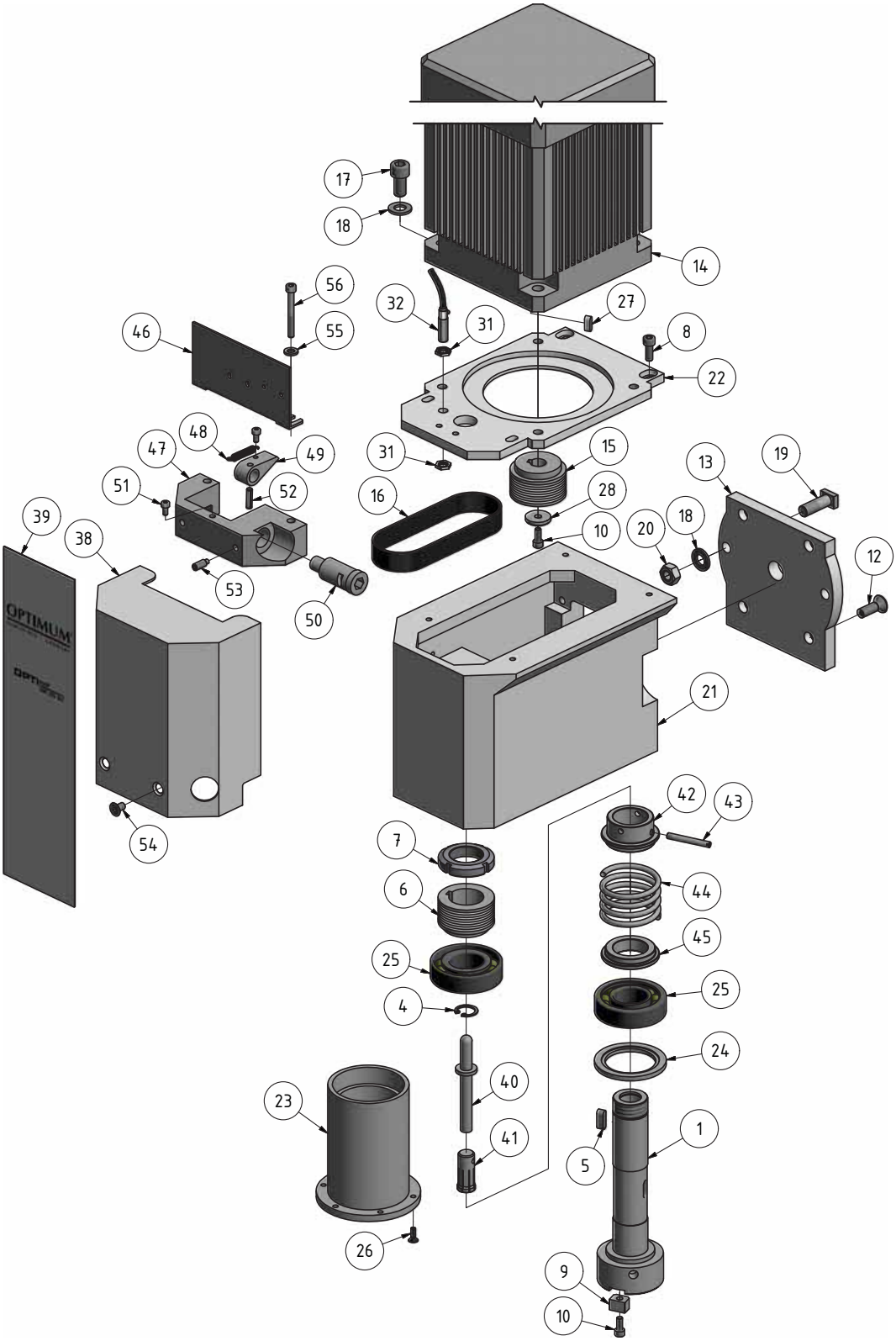
6.4 Elektrische Ersatzteile - Electrical spare parts

6.5 Schaltplan - Wiring diagram

Der aktuelle Schaltplan mit Ersatzteilliste befindet sich im Schaltschrank der Fräsmaschine.
The current circuit diagram and spare parts list is located in the control cabinet of the milling machine.

6.6 Ersatzteilzeichnungen - Spare part drawings

A Fräskopf - Milling head



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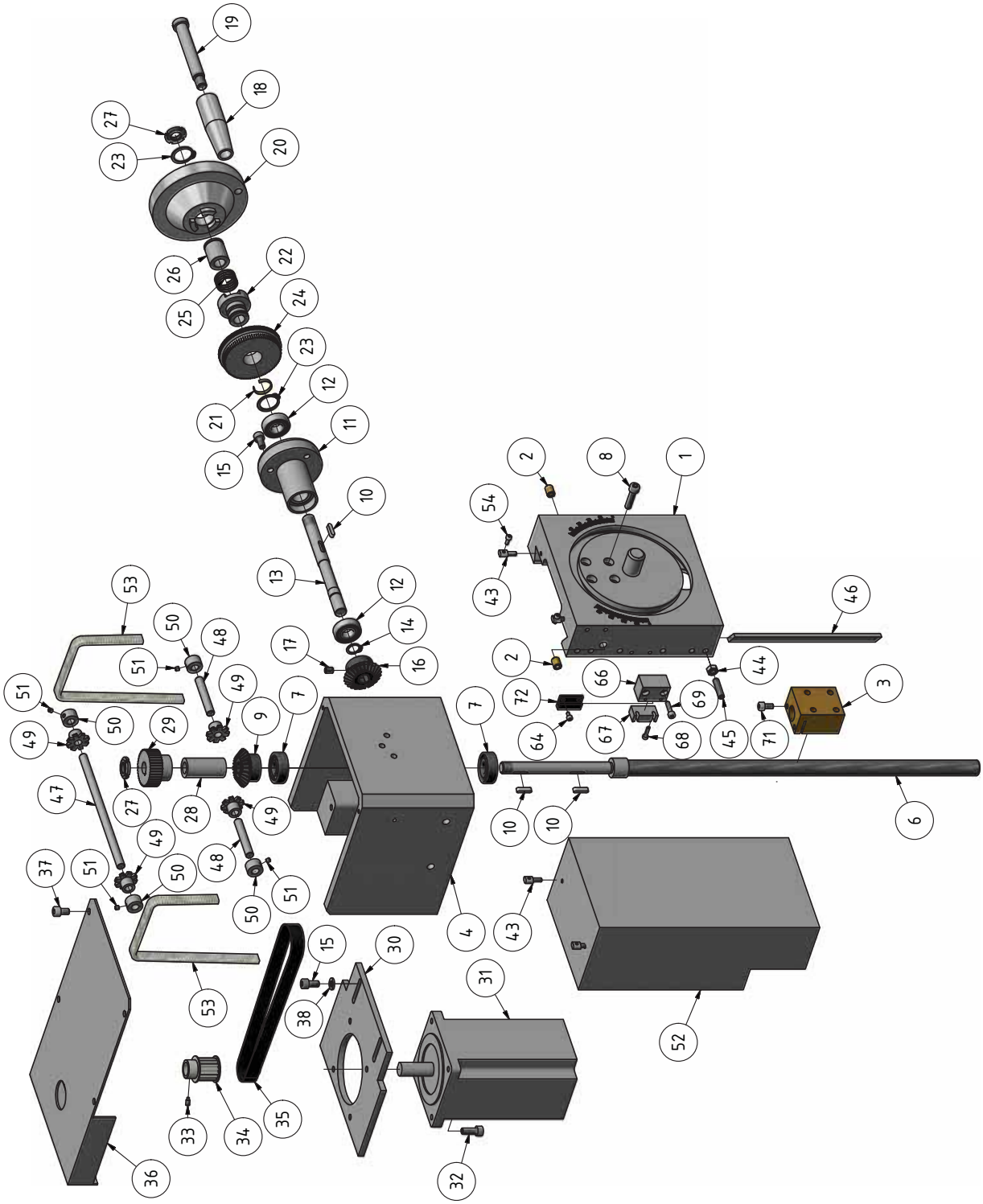
Img.6-1: Fräskopf - Milling head

Teileliste Fräskopf - Parts list milling head - MH25SV					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Bohrspindel	Drill spindle	1		03338160101
4	Sicherungsring	Retaining ring	1	19	
5	Passfeder	Fitting key	1	DIN 6885 - A 6 x 6 x 18	03338160105
6	Riemenscheibe	Pulley	1		
7	Nutmutter	Groove nut	1	M30 x 1,5	
8	Innensechskantschraube	Socket head screw	4	ISO 4762 - M6 x 16	
9	Nutenstein	Slot nut	2		03338160109
10	Innensechskantschraube	Socket head screw	3	ISO 4762 - M5 x 12	
11	Scheibe	Washer	2	DIN 125 - A 6,4	
12	Schraube	Screw	4	M8 x 25	
13	Platte	Plate	1		03338160113
14	Motor	Motor	1	SSM15 - A2 - 1.5-15/90 Senlima Electric Motor 1.5 KW ; 400/230V 3.5 / 6.1A ; 10.1 Nm S1 ; IP54 ; Ins. class F	03338160114
15	Riemenscheibe	Pulley	1		03338160115
16	Flachriemen	Flat belt	1		03338160116
17	Innensechskantschraube	Socket head screw	4	ISO 4762 - M10 x 20	
18	Scheibe	Washer	6	DIN 125 - A 10,5	
19	T-Schraube	T-Screw	2		03338160119
20	Sechskantmutter	Hexagon nut	2	ISO 4032 - M10	
21	Gehäuse	Housing	1		03338160121
22	Motorplatte	Motor plate	1		03338160122
23	Pinole	Sleeve	1		03338160123
24	Ring	Ring	1		03338160124
25	Kugellager	Ball bearing	2	7206	0407206
26	Schraube	Screw	6	ISO 7046/M4 x 12	
27	Passfeder	Fitting key	1	DIN 6885 - A 5 x 5 x 14	
28	Scheibe	Washer	1		03338160128
31	Sechskantmutter	Hexagon nut	2		03338160131
32	Drehzahlsensor	Rotation speed sensor	1		033381602B2
38	Abdeckung	Cover	1		03338160138
39	Frontlabel	Front lable	1		03338160139
40	Stößel	Plunger	1		03338155140
41	Schnapper	Catcher	1		03338155141
42	Buchse	Bushing	1		03338155142
43	Gewindestift	Grub screw	1		03338155143
44	Feder	Spring	1		03338155144

45	Ring	Ring	1		03338155145
46	Platte	Plate	1		03338155146
47	Führung	Guide	1		03338155147
48	Feder	Spring	1		03338155148
49	Exzenter	Eccentric	1		03338155149
50	Bolzen	Bolt	1		03338155150
51	Innensechskantschraube	Socket head screw	2	M4x8	
52	Spannstift	Spring pin	1		03338155152
53	Gewindestift	Grub screw	1	M6x14	
54	Senkschraube	Screw	2	M6x10	
55	Scheibe	Washer	2	5	
56	Innensechskantschraube	Socket head screw	2	M5x45	

B Säule - Column 1-2



Img.6-2: Säule - Column 1-2

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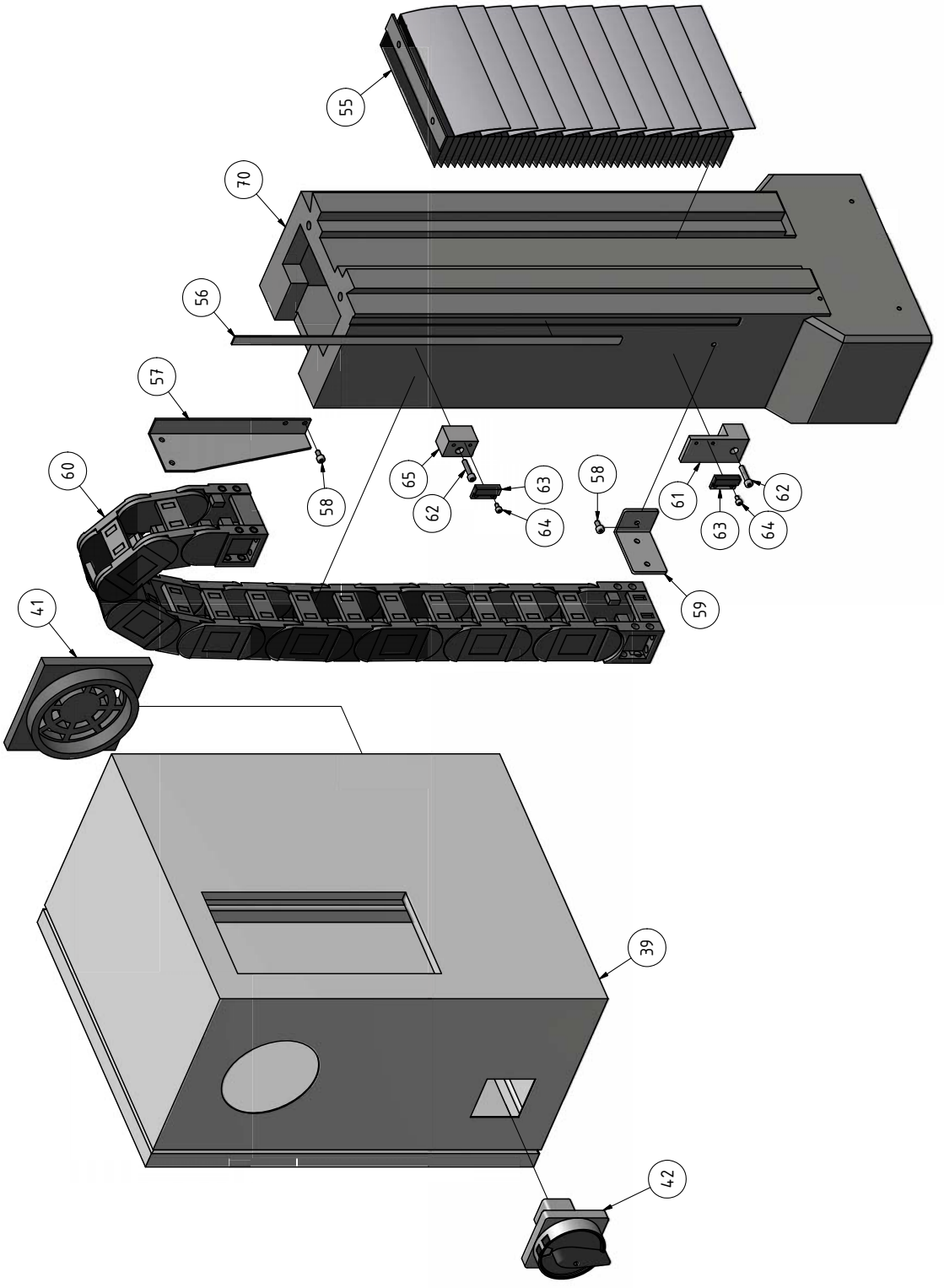
C Säule - Column 2-2



Img.6-3: Säule - Column 2-2

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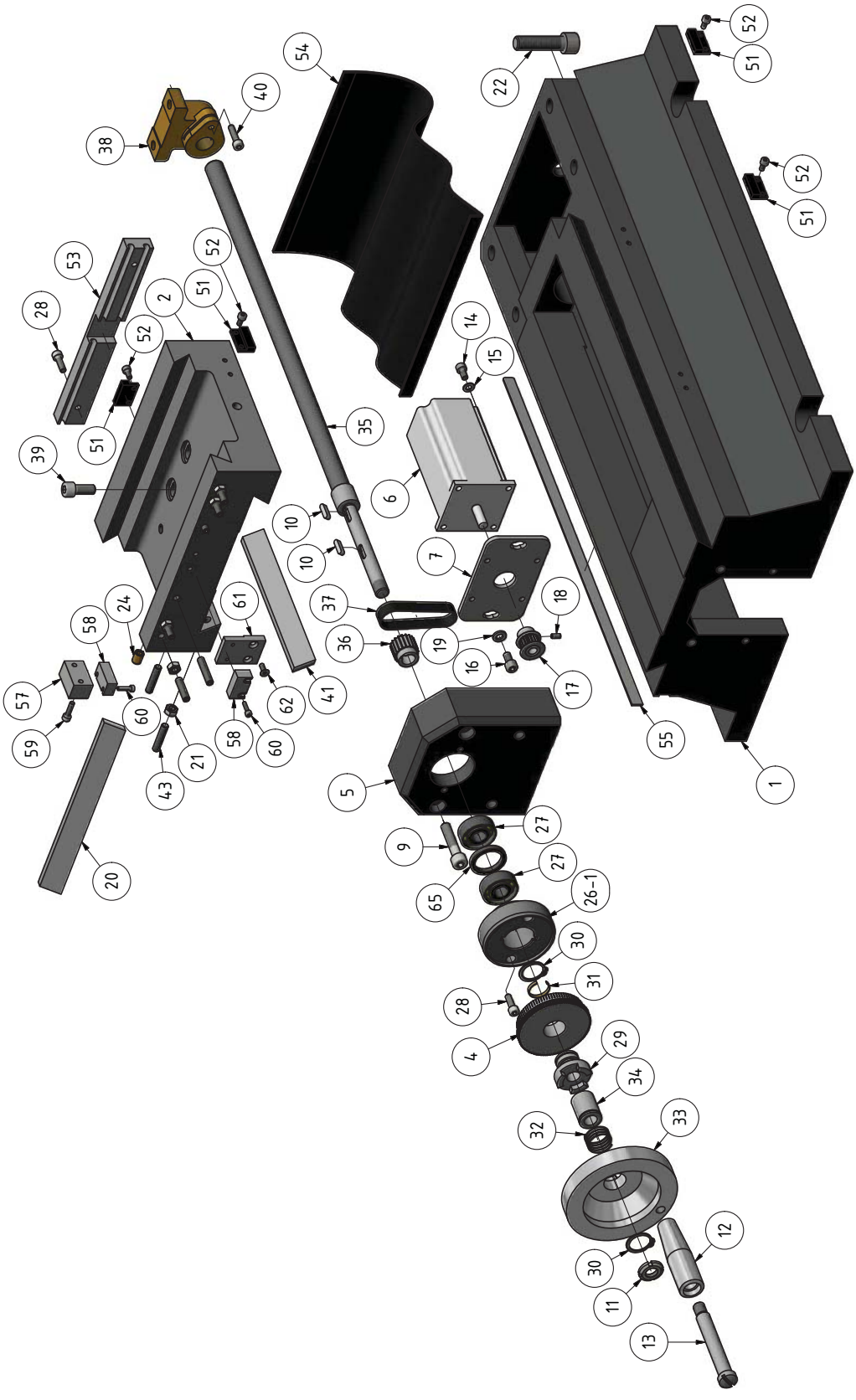
Teileliste Säule - Parts list column - MH25SV					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Führung	Guide	1		03338160201
2	Schmiernippel	Lubrication cup	2	8mm	03338160202
3	Spindelmutter	Spindle nut	1		03338160203
4	Halter	Holder	1		03338160204
5	Innensechskantschraube	Socket head screw	2	ISO 4762 - M8 x 25	
6	Spindel	Spindle	1		03338160206
7	Kugellager	Ball bearing	2	7201 BEP	0407201
8	Innensechskantschraube	Socket head screw	4	ISO 4762 - M6 x 25	
9	Kegelrad	Bevel gear	1		03338160209
10	Passfeder	Fitting key	3	DIN 6885 - A 4 x 4 x 16	
11	Flansch	Flange	1		03338160211
12	Kugellager	Ball bearing	2	6001-RZ	0406001.2R
13	Welle	Shaft	1		03338160213
14	Sicherungsring	Retaining ring	1	DIN 471 - 12x1	
15	Innensechskantschraube	Socket head screw	5	ISO 4762 - M6 x 12	
16	Kegelrad	Bevel gear	1		03338160216
17	Schraube	Screw	1	DIN 913 - M6 x 8	
18	Hülse	Sleeve	1		03338160218
19	Schraube	Screw	1		03338160219
20	Handrad	Handle	1		03338160220
21	Federblech	Spring	1		03338160221
22	Kupplung	Clutch	1		03338160222
23	Sicherungsring	Retaining ring	2	DIN 471 - 20x1,2	
24	Skalenring	Scala ring	1		03338160224
25	Feder	Spring	1		03338160225
26	Buchse	Bushing	1		03338160226
27	Nutmutter	Groove nut	2	DIN 981 - KM 1	
28	Buchse	Bushing	1		03338160228
29	Zahnrad	Gear	1		03338160229
30	Motorplatte	Motor plate	1		03338160230
31	Schrittmotor	Steppmotor	1	4,2 Nm ; 6A	3573307
32	Innensechskantschraube	Socket head screw	4	ISO 4762 - M6 x 16	
33	Gewindestift	Grub screw	1	ISO 4028 - M4 x 8	
34	Zahnriemenscheibe	Gear wheel	1		03338160234
35	Zahnrimen	Gear belt	1		03338160235
36	Abdeckung	Cover	1		03338160236
37	Innensechskantschraube	Socket head screw	4	ISO 4762 - M6 x 10	
38	Scheibe	Washer	2	DIN 125 - A 6,4	
39	Schaltschrank	Switch box	1		03338160239
41	Lüfter	Fan	2		03338160241
42	Hauptschalter	Main switch	1		03338160242
43	Spezialschraube	Special Screw	4	M4x10	03338160243

44	Sechskantmutter	Hexagon nut	6	ISO 4032 - M6	03338160245CPL
45	Gewindestift	Grub screw	6	ISO 4026 - M6 x 30	
46	Keilleiste	Gib	1		03338160246
47	Welle	Shaft	1		03338160247
48	Welle	Shaft	2		03338160248
49	Zahnrad	Gear	4		03338160249
50	Buchse	Bushing	4		03338160250
51	Gewindestift	Grub screw	4	DIN 913 - M4 x 4	
52	Gegengewicht	Balance weith	1		03338160252
53	Kette	Chain	2		03338160253
54	Innensechskantschraube	Socket head screw	2	ISO 4762 - M3 x 8	
55	Abdeckung	Cover	1		03338160255
56	Messstreifen	Measuring gib	1		03338160256
57	Halter	Holder	1		03338160257
58	Innensechskantschraube	Socket head screw	3	ISO 4762 - M4 x 8	
59	Halter	Holder	1		03338160259
60	Energiekette	Energie chain	1		03338160260
61	Halter	Holder	1		03338160261
62	Innensechskantschraube	Socket head screw	2	ISO 4762 - M4 x 20	
63	Signalgeber	Transmitter	2		03338160263
64	Innensechskantschraube	Socket head screw	6	ISO 4762 - M3 x 6	
65	Halter	Holder	1		03338160265
66	Halter	Holder	1		03338160266
67	Sensor Verfahrweg	Sensor traveling distance	1		03338160267
68	Innensechskantschraube	Socket head screw	2	ISO 4762 - M3 x 12	
69	Innensechskantschraube	Socket head screw	2	ISO 4762 - M4 x 16	
70	Säule	Columb	1		03338160270
71	Innensechskantschraube	Socket head screw	2	ISO 4762 - M5 x 10	
72	Signalgeber	Transmitter	1		03338160272

D Frästisch - Milling table 1-2



Img.6-4: Frästisch - Milling table 1-2

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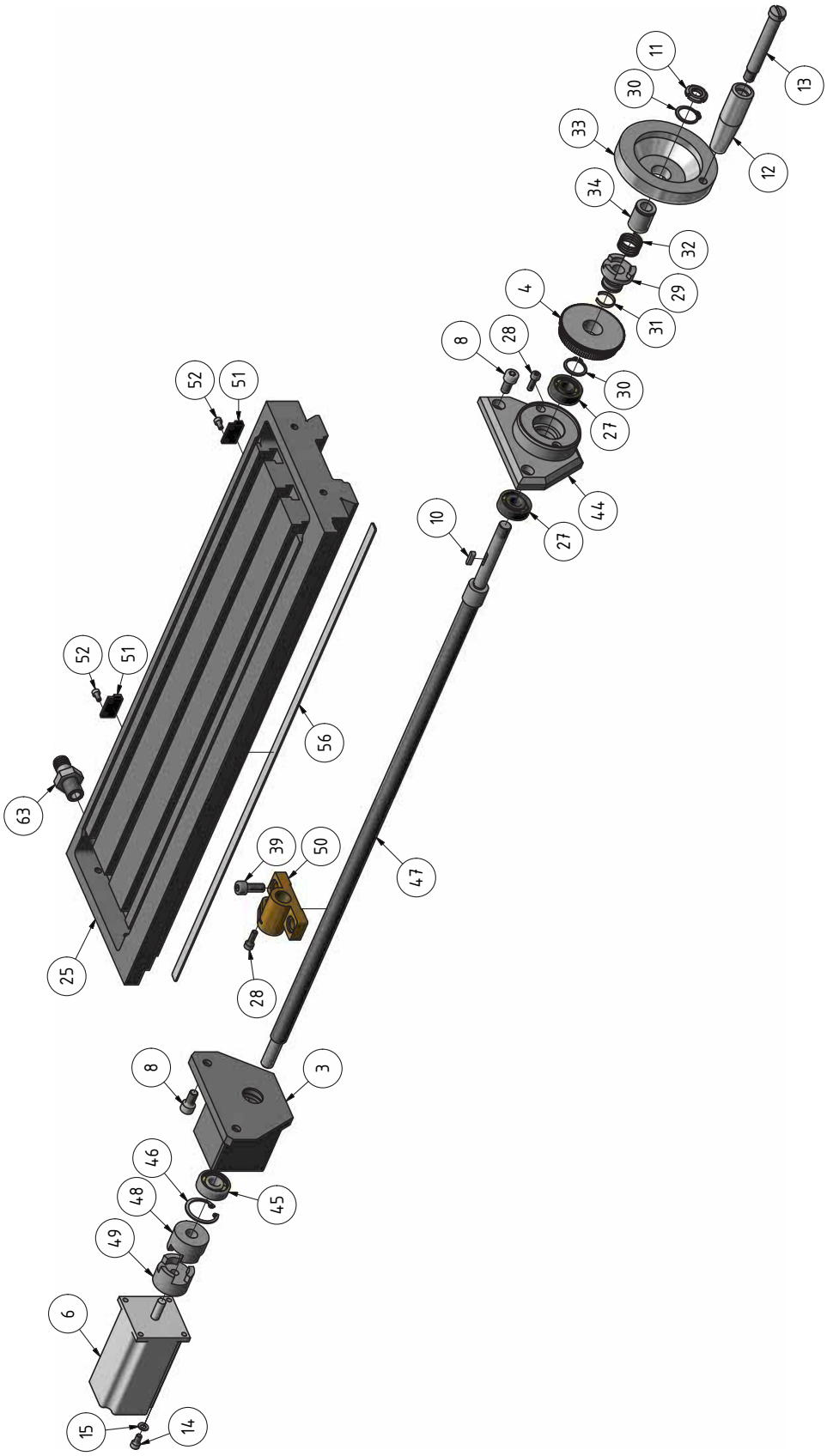
E Frästisch - Milling table 2-2



Img. 6-5: Frästisch - Milling table 2-2

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Teileliste Frästisch - Parts list milling table - MH25SV					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Führung	Guide	1	301303	03338160301
2	Tischführung	Table guide	1		03338160302
3	Lagerbock	Bearing block	1		03338160303
4	Skalenring	Scale ring	2		03338160304
5	Lagerbock	Bearing block	1		03338160305
6	Schrittmotor	Step motor	2	2,2Nm; 3A	357 3304
7	Platte	Plate	1		03338160307
8	Innensechskantschraube	Socket head screw	4	ISO 4762 - M8 x 16	
9	Innensechskantschraube	Socket head screw	2	ISO 4762 - M8 x 40	
10	Passfeder	Fitting key	3	DIN 6885 - A 4 x 4 x 16	
11	Nutmutter	Groove nut	2	DIN 981 - KM 1	
12	Hülse	Sleeve	2		03338160312
13	Schraube	Screw	2		03338160313
14	Innensechskantschraube	Socket head screw	8	ISO 4762 - M5 x 10	
15	Unterlegscheibe	Washer	8	DIN 125 - A 5,3	
16	Innensechskantschraube	Socket head screw	2	ISO 4762 - M6 x 12	
17	Zahnriemenscheibe	Gear wheel	1		03338160317
18	Gewindestift	Grub screw	1	ISO 4026 - M4 x 8	
19	Unterlegscheibe	Washer	2	DIN 125 - A 6,4	
20	Keilleiste	Gib	1		03338160320
21	Sechskantmutter	Hexogen nut	8	ISO 4032 - M6	
22	Innensechskantschraube	Socket head screw	4	ISO 4762 - M12 x 45	
23	Unterlegscheibe	Washer	4	DIN 125 - A 13	
24	Schmiernippel	Lubrication cup	2	8	03338160324
25	Frästisch	Mill table	1		03338160325
26	Flansch X-Achse bis 06.2017	Flange X-axis to 06.2017	1		03338160326
	Flansch X-Achse ab 06.2017	Flange X-axis from 06.2017	1		033381603261
27	Kugellager	Ball bearing	4	7201	0407201
28	Innensechskantschraube	Socket head screw	7	ISO 4762 - M5 x 16	
29	Kupplung	Clutch	2		03338160329
30	Sicherungsring	Retaining ring	4	DIN 471 - 20x1,2	
31	Federblech	Spring	2		03338160331
32	Feder	Spring	2		03338160332
33	Handrad	Handle	2		03338160333
34	Buchse	Bushing	2		03338160334
35	Spindel	Spindle	1		03338160335
36	Zahnriemenscheibe	Gear wheel	1		03338160336
37	Zahnriemen	Gear belt	1		03338160337
38	Spindelmutter	Spindle nut	1		03338160338
39	Innensechskantschraube	Socket head screw	4	ISO 4762 - M8 x 20	
40	Innensechskantschraube	Socket head screw	1	ISO 4762 - M5 x 20	

41	Keilleiste	Gib	1		03338160341
42	Gewindestift	Grub screw	4	ISO 4026 - M6 x 25	
43	Gewindestift	Grub screw	8	ISO 4026 - M6 x 30	
44	Lagerbock	Bearing block	1		03338160344
45	Kugellager	Bearing	1	6201	0406201
46	Sicherungsring	Retaining ring	1	DIN 472 - 32 x 1,2	
47	Spindel	Spindle	1		03338160347
48	Kupplung	Clutch	1		03338160348CPL
49	Kupplung	Clutch	1		
50	Spindelmutter	Spindle nut	1		03338160350
51	Signalgeber	Transmitter	4		03338160351
52	Innensechskantschraube	Socket head screw	12	ISO 4762 - M4 x 8	
53	Halter	Holder	1		03338160353
54	Gummiabdeckung	Rubber cover	1		03338160354
55	Messstreifen	Measuring strip	1		03338160355
56	Messstreifen	Measuring strip	1		03338160356
57	Halter	Holder	1		03338160357
58	Sensor Verfahrweg	Sensor traveling distance	2		03338160358
59	Innensechskantschraube	Socket head screw	2	ISO 4762 - M4 x 16	
60	Innensechskantschraube	Socket head screw	4	ISO 4762 - M3 x 12	
61	Halter	Holder	1		03338160361
62	Schraube	Screw	2	DIN 7991 - M4x10	
63	Anschluss	Plug	1		
64	Signalgeber	Transmitter	2		03338160364
65	Abstandring	Spacer	1		03338160365

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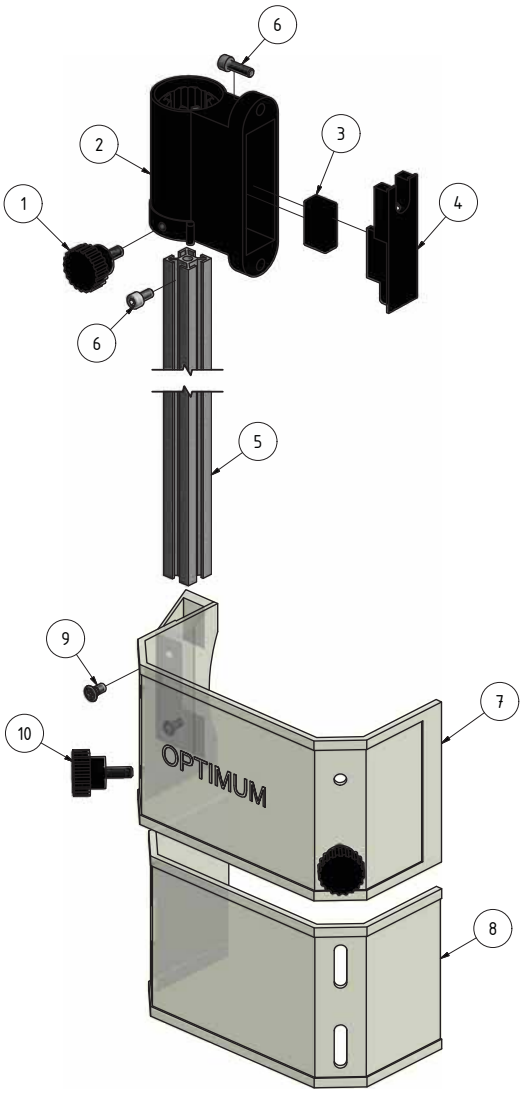
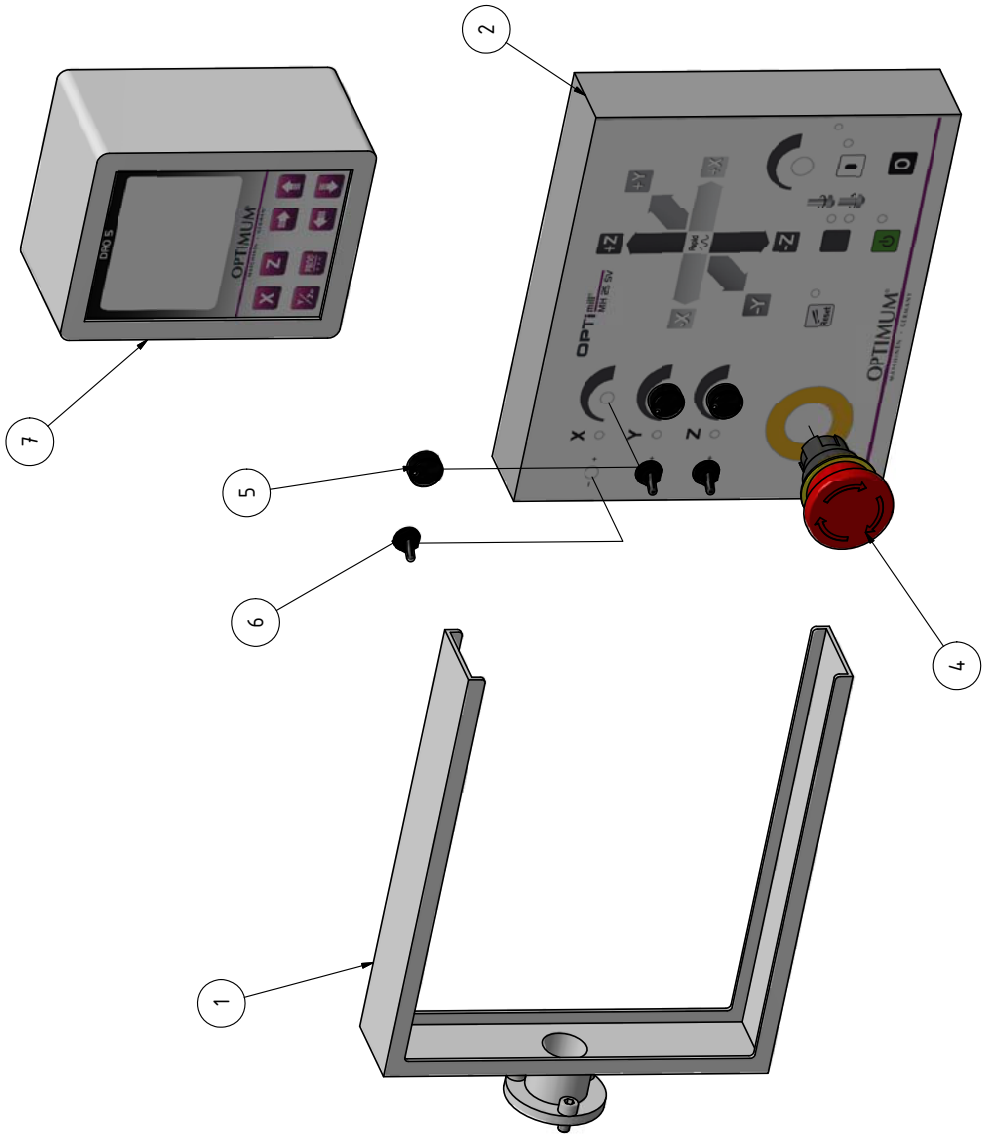
F Fräsfutterschutz - Milling chuck cover



Img.6-6: Fräsfutterschutz - Milling chuck cover

Teileliste Fräsfutterschutz - Parts list milling chuck cover - MH25SV					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
			Qty.	Size	Item no.
1	Rändelschraube	Knurled screw	1		033381604 01
2	Halterung	Fixture	1		033381604 02
3	Mikroschalter	Microswitch	1		033381602B1
4	Platte	Plate	1		033381604 04
5	Alu- Profil	Aluminium profile	1		03338160405
6	Schraube	Screw	2	M5x10	
7	Fräsfutterschutz A	Mill chuck cover A	1		03338160407
8	Fräsfutterschutz B	Mill chuck cover B	1		03338160408
9	Schraube	Screw	2	M5x10	
10	Rändelschraube	Knurled screw	2		03338160410

G Bedienpanel - Operating panel



Img.6-7:

Teileliste Bedienpanel - Parts list operating panel - MH25SV					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Halterung	Support	1		03338160501
2	Bedienpanel komplett	Operating panel complete	1		03338160502
4	Not-Halt Pilzkopfschalter	Emergency stop button	1		03338160504
5	Potentiometer	Potentiometer	1		03338160505
6	Schalter	Switch	2		03338160506
7	Digitale Positionsanzeige DRO5	Digital position display DRO5	1		3383975

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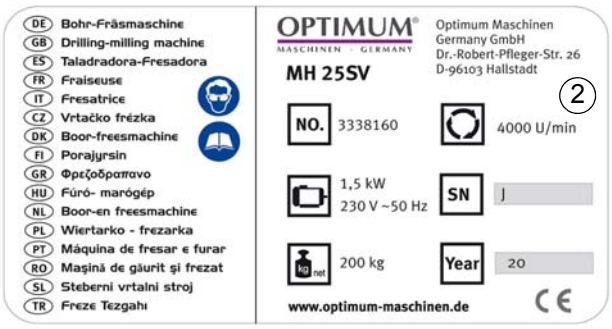
H Maschinenschilder - Machine labels

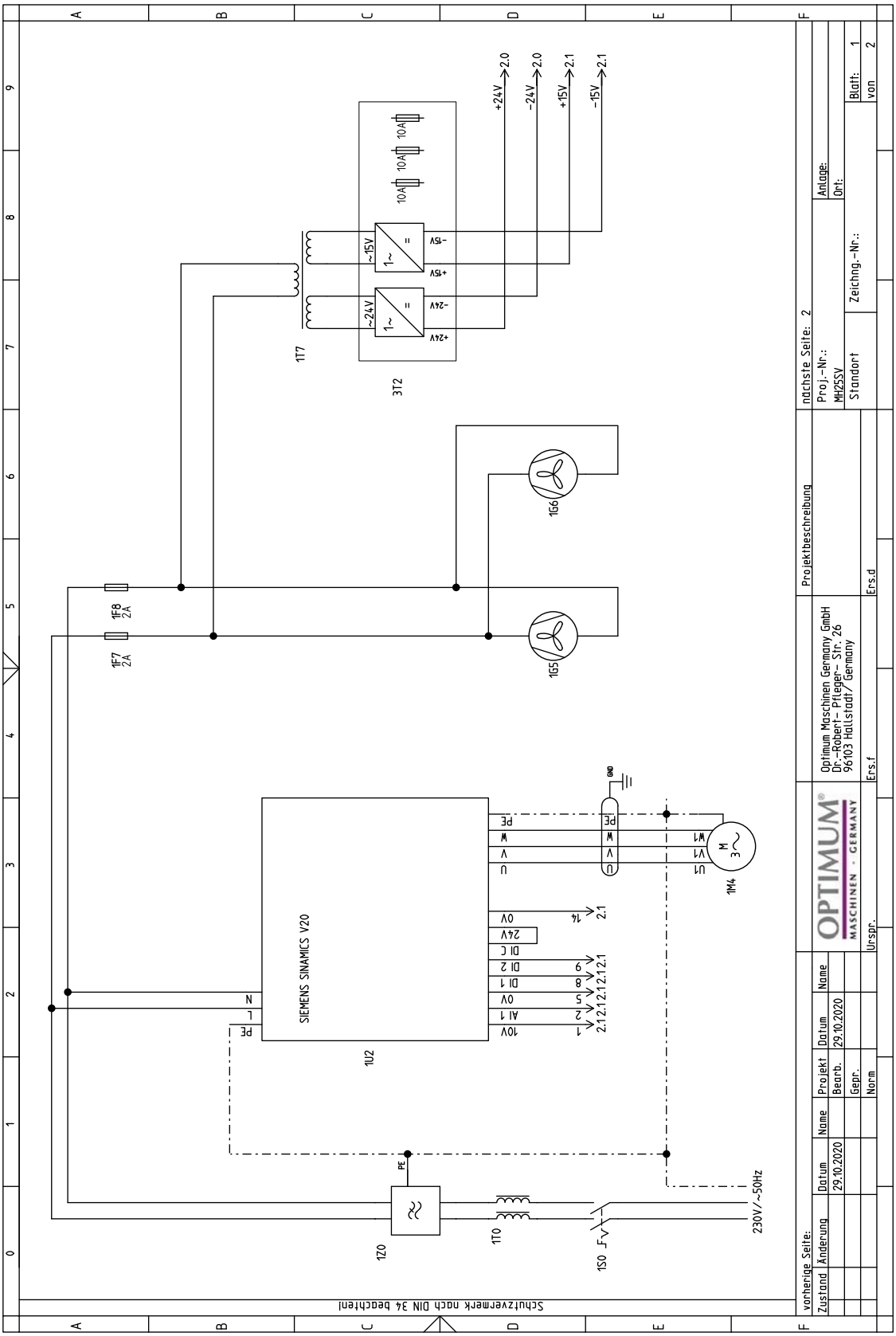


Img.6-8: Maschinenschilder - Machine labels

Ersatzteilliste Maschinenschilder - Spare part list machine labels - MH25SV					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Frontschild	Front lable	1		03338160L01
2	Maschinenlabel	Machine lable	1		03338160L02
3	Sicherheitsschild	Safety lable	1		03338160L03

6.7 Schaltplan, Einzelplatinen - Wiring diagram,single boards

I



Img.6-9: Schaltplan - Wiring diagram

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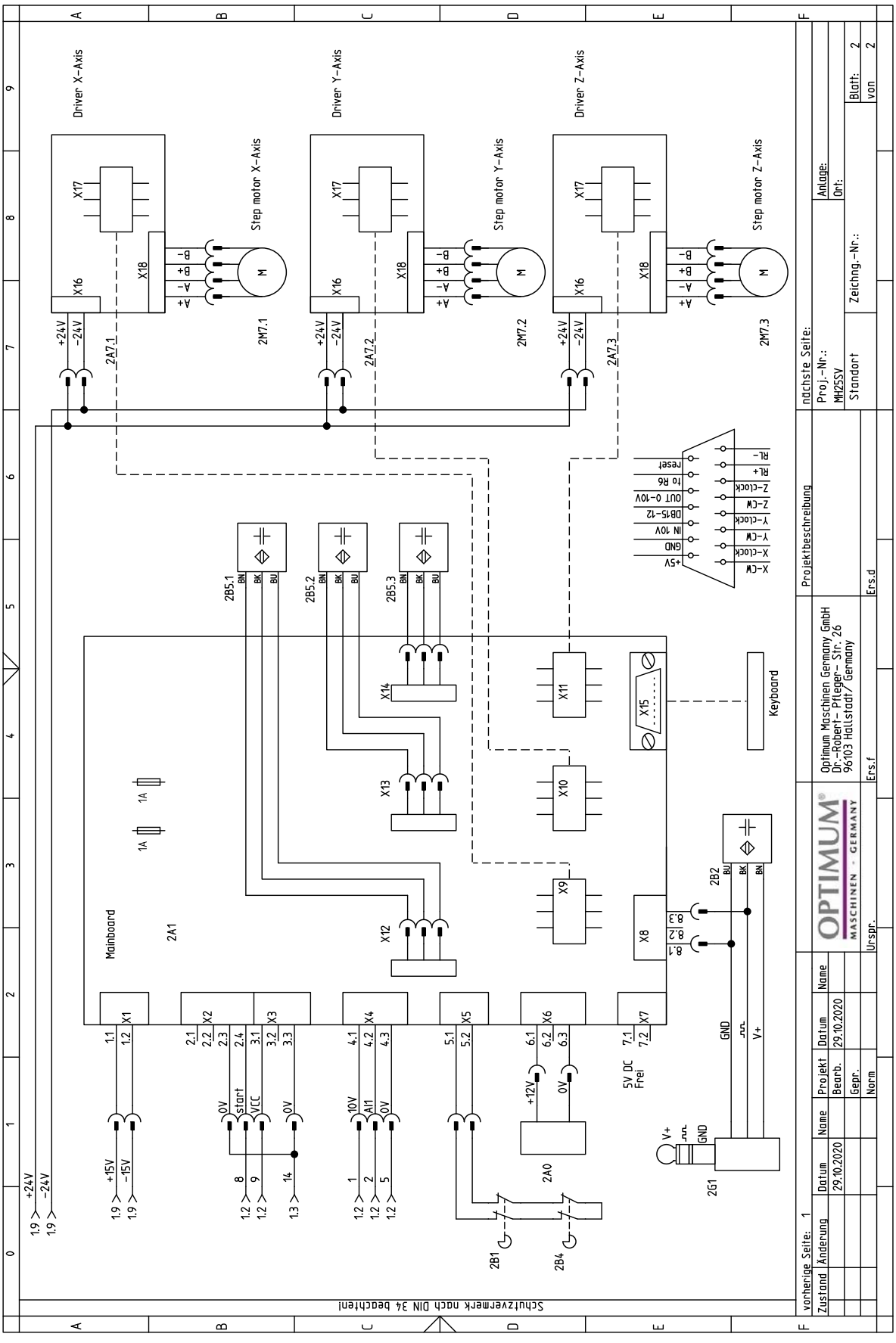
J



Img.6-10: Schaltplan - Wiring diagram

MH25SV - Teileliste elektrische Bauteile, Einzelplatinen - Electrical parts list, single boards					
Pos.	**Bezeichnung**	**Description**	**Menge**	**Grösse**	**Artikelnummer**
			Qty.	**Size**	**Item no.**
1Z0	Netzfilter	Line filter	1		033381601Z0
1F7	Feinsicherung	Microfuse	1	Träge 2A	033381601F7
1F8			1		
1G5	Ventilator Schaltkasten	Fan switch box	1		033381602 41
1G6	Ventilator Antriebsmotor	Fan drive motor	1		033381602 41
1T7	Transformer	Transformer	1		03338160PS
1T7microfuse	Feinsicherung	Micro fuse	3	Träge 10A	0333816021T7microfuse
					
3T2	Netztteil	Power pack	1		03338160PS
1M4	Antriebsmotor	Drive Motor	1	SSM15 - A2 - 1.5-15/90 Senlima Electric Motor 1.5 KW ; 400/230V 3.5 / 6.1A ; 10.1 Nm S1 ; IP54 ; Ins. class F	03338160114
1S0	Hauptschalter	Main switch	1		033381601S0
1U2	Frequenzumrichter	Frequency converter	1		033381601U2
2A0	Digitalpositionsanzeige DRO5	Digital indicator DRO5	1		3383975
2A1	Mainboard	Mainboard	1		033381602A1
2A1microfuse	Feinsicherung	Microfuse	2	Träge 1A	033381602A1microfuse
					
2A7.1	Steuerkarte X-Achse	Control card X-Axis	1		033381602A7
2A7.2	Steuerkarte Y-Achse	Control card Y-Axis	1		033381602A7
2A7.3	Steuerkarte Z-Achse	Control card Z-Axis	1		033381602A7
2B1	Schalter Fräsfutterschutz	Mill chuck switch	1		033381602B1
2B4	Schalter Werkzeugwechsler	Toll chnager switch	1		033381602B4
2B2	Drehzahlsensor	Rotation speed sensor	1		033381602B2
2B5.1	Sensor Endschalter Z-Achse	Sensor end switch Z-Axis	1		033381602S5
2B5.2	Sensor Endschalter Y-Achse	Sensor end switch Y-Axis	1		033381602S5
2B5.3	Sensor Endschalter X-Achse	Sensor end switch X-Axis	1		033381602S5
2G1	Stecker	Plug	1		03338160
2M7.1	Schrittmotor X-Achse	Stepp motor X-Axis	1		3573304
2M7.2	Schrittmotor Y-Achse	Stepp motor Y-Axis	1		3573304
2M7.3	Schrittmotor Z-Achse	Stepp motor Z-Axis	1		3573307

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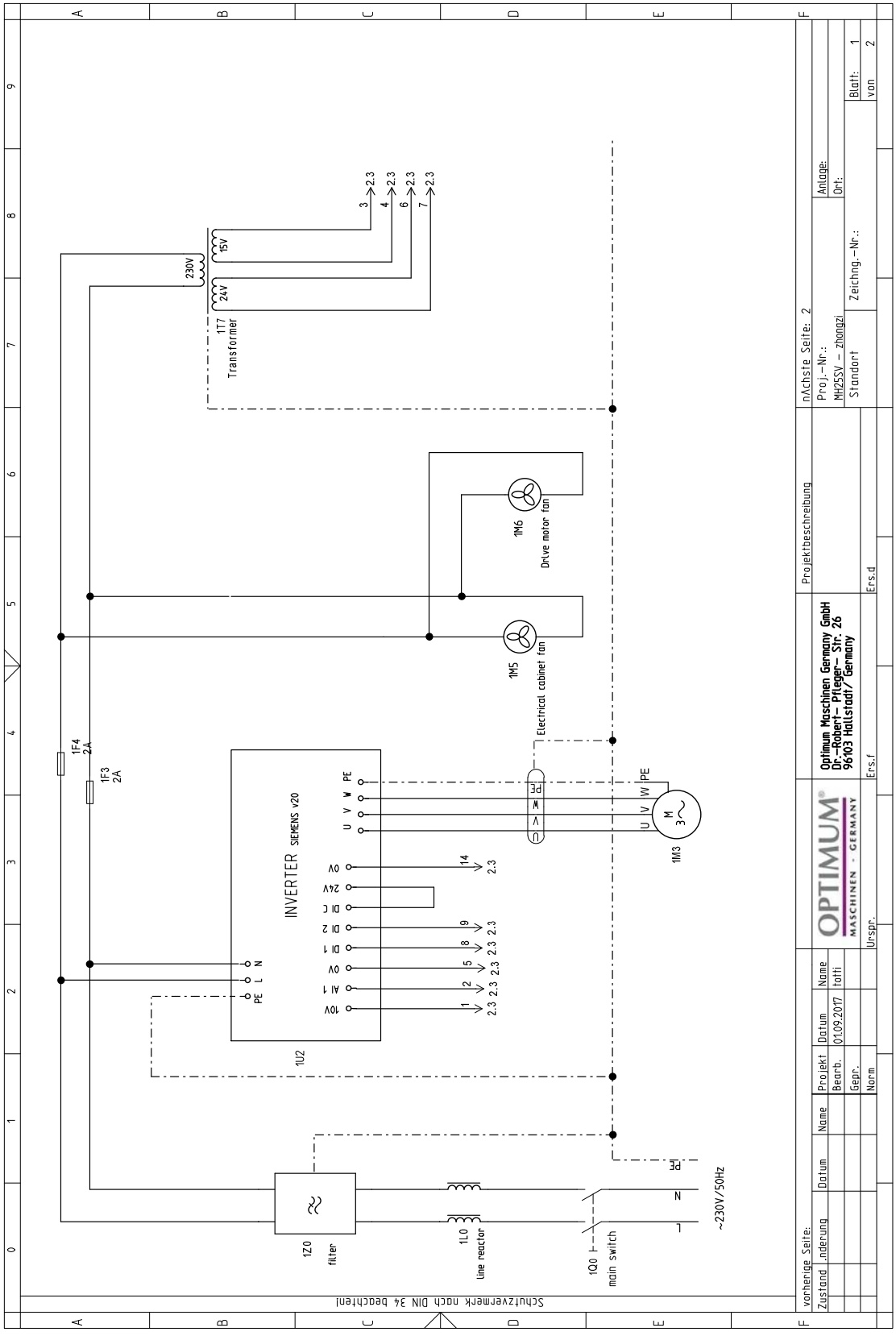
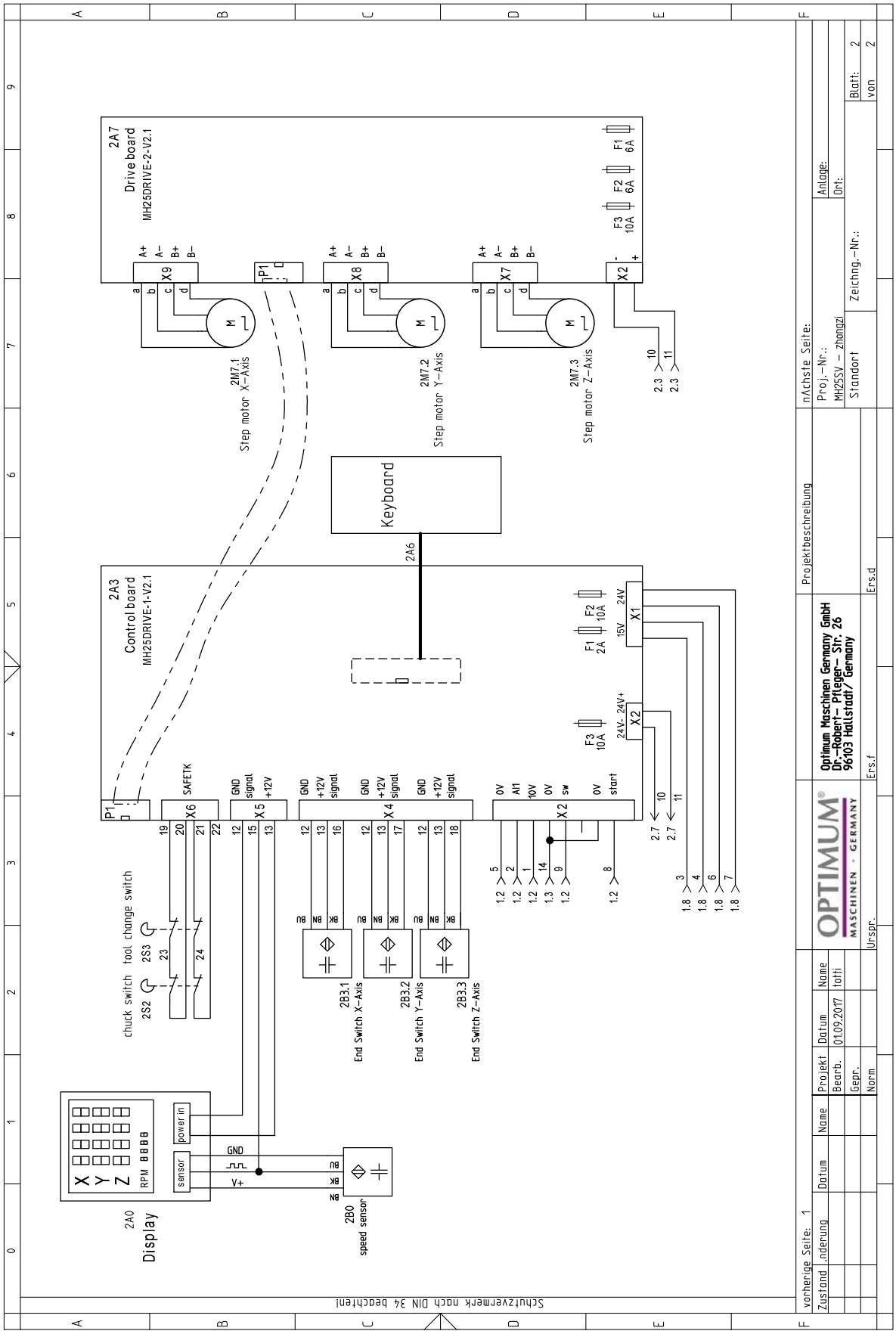
6.8 Schaltplan, zusammen gefasste Platinen - Wiring diagram,merged boards

K



Img.6-11: Schaltplan - Wiring diagram

L



Img.6-12: Schaltplan - Wiring diagram

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MH25SV - Teileliste elektrische Bauteile, zusammen gefasste Platinen - Electrical parts list, merged boards						
Pos.		Bezeichnung	Description	Menge	Grösse	Artikelnummer
				Qty.	Size	Item no.
1Q0		Hauptschalter	Main switch	1		033381601S0
1L0		Netzdrossel	Line reactor	1		033381601L0
1Z0		Netzfilter	Line filter	1		033381601Z0
1F3		Sicherung	Fuse	1	2A	033381601F7
1F4				1		
1U2		Frequenzumrichter	Frequency converter	1	Siemens V20	033381601U2
1M3		Antriebsmotor	Drive Motor	1	SSM15 - A2 - 1.5-15/90 Senlima Electric Motor 1.5 KW ; 400/230V 3.5 / 6.1A ; 10.1 Nm S1 ; IP54 ; Ins. class F	03338160114
1M5		Ventilator Schaltkasten	Control box fan	1		033381602 41
1M6		Ventilator Antriebsmotor	Drive motor fan	1		033381602 41
1T7		Transformer	Transformer	1		03338160PS
2A0		Digitalpositionsanzeige DRO5	Digital indicator DRO5	1		3383975
2B0		Drehzahlsensor	Rotation speed sensor	1		033381602B2
2S2		Schalter Fräsfutterschutz	Mill chuck switch	1		033381602B1
2S3		Schalter Werkzeugwechsler	Tool change switch	1		033381602B4
2B3.1		Sensor Endschalter Z-Achse	Sensor end switch Z-Axis	1		033381602S5
2B3.2		Sensor Endschalter Y-Achse	Sensor end switch Y-Axis	1		033381602S5
2B3.3		Sensor Endschalter X-Achse	Sensor end switch X-Axis	1		033381602S5
2A3		Steuerplatine	Control board	1	MH25DRIVE-1-V2.1	033381602A3
2A3	F1	Feinsicherung	Microfuse	1	Träge 2A	033381602A3F1
2A3	F2	Feinsicherung	Microfuse	1	Träge 10A	033381602A3F2
2A3	F3	Feinsicherung	Microfuse	1	Träge 10A	033381602A3F2
2A6		Tastatur Anschlussleitung	Keyboard Connection cable	1		033381602A6
Keyboard		Tastatur	Keyboard	1		03338160502
Keyboard	4	Not-Halt Pilzkopfschalter	Emergency stop button	1		03338160504
Keyboard	5	Potentiometer	Potentiometer	1		03338160505
Keyboard	6	Schalter	Switch	3		03338160506
2M7.1		Schrittmotor X-Achse	Stepp motor X-Axis	1		3573304
2M7.2		Schrittmotor Y-Achse	Stepp motor Y-Axis	1		3573304
2M7.3		Schrittmotor Z-Achse	Stepp motor Z-Axis	1		3573307
2A7		Antriebsplatine	Drive board	1	MH25DRIVE-2-V2.1	033381602A7
2A7	F1	Feinsicherung	Microfuse	1	Träge 6A	033381602A7F1
2A7	F2	Feinsicherung	Microfuse	1	Träge 6A	033381602A7F1
2A7	F3	Feinsicherung	Microfuse	1	Träge 10A	033381602A3F2

7 Malfunctions

7.1 Malfunctions on the milling machine

Malfunction	Cause/ possible effects	Solution
The milling machine does not start	• Power-on sequence not observed.	• ☞ Resetting an emergency stop situation on page 28. • ☞ Power failure, Restoring readiness for operation on page 28 • ☞ Switching on the milling machine on page 27
Tool “is burning".	• Incorrect speed. • Chips are not coming out of the bore hole. • Tool blunt. • Operating without cooling agent.	• Select another speed, feed too high. • Pull out tool more often. • Sharpen or replace tool. • Use cooling agent.
Spindle taper cannot be inserted into the quill.	• Remove any dirt, grease or oil from the internal conical surface of the quill or the grip cone.	• Clean the surfaces thoroughly. Keep surfaces free of grease.
It is not possible to push-out the taper.	• Taper sleeve has shrunk onto the cone.	• Let the machine run at highest speed for two minutes to warm it up and attempt to remove the taper again. • ☞ Removal on page 30
Motor does not start	• Defective fuse.	• Have it checked by authorised personnel.
Working spindle rattling on rough workpiece surfaces	• Climb milling machining not possible under the current operating conditions. • Clamping lever of the movement axes not tightened. • Loose collet chuck, loose drill chuck, loose drawbar. • Tool is blunt. • The workpiece is not fastened. • Excessive slack in bearing. • Working spindle moves up and down.	• Perform conventional milling. • Tighten clamping lever. • Check, re-tighten. • Sharpen or replace tool. • Clamp the workpiece firmly. • Readjust bearing slack or replace bearing • Readjust bearing slack or replace bearing
Automatic feed is not functioning.	• End position of the axis has been reached. • Limit position switch soiled.	• ☞ Resetting the automatic feed on page 28 • Clean contactless position switches. ☞ Page 39

8 Appendix

8.1 Copyright

8.2 Terminology/Glossary

Term	Explanation
Cross table	Bearing surface, clamping surface for the workpiece with X-axis and Y-axis travel
Taper mandrel	Cone of the tool holder, cone of the drill or of the drill chuck
Workpiece	piece to be milled, drilled or machined.
Drawbar	Threaded rod to fix the taper mandrel in the quill.
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
Quill lever	Manual operation for the drill feed
Quick action - drill chuck	Drill chuck can be fixed by hand.
Workpiece	Piece to be drilled or machined.
Tool	Milling cutter, drill bit, etc.
Emergency stop	Stops the operation of a machine.
Emergency switching off	Interrupts the power supply of the machine.

8.3 Change information operating manual

Chapter	Short summary	new version number
2 , 4 , 6	Drawbar replaced with quick tool system BT30	1.0.1
5 , 7	Cleaning contactless position switches.	1.0.2
3	Interdepartmental transport	1.0.3
parts	Wiring diagram, merged boards	1.0.4

8.4 Liability claims for defects / warranty

Besides the legal liability claims for defects submitted by the customer to the seller, the manufacturer of the product, OPTIMUM GmbH, Robert-Pfleger-Straße 26, D-96103 Hallstadt, grants no 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. Ownership of 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:

- Using the product beyond the technical options and proper use, in particular due to overstraining of the machine.
- Any defects arising due to one's own fault due to faulty operations or if the operating manual is disregarded,
- Inattentive or incorrect handling and use of improper equipment
- 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

The following items are also not subject to liability or warranty claims:

- Wearing parts and components which are subjected to normal or expected wear, e.g. V-belts, ball bearings, illuminants, filters, sealings, 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. Such services neither delay nor interrupt the warranty period.

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

If one of the aforementioned agreements is totally or partially inoperative and/or invalid, a provision closest to the intent of the warrantor is considered agreed upon, which remains within the framework of the limits of liability and warranty which are specified by this contract.

8.5 Advice for disposal / Options of reuse:

Please dispose of your machine in an environmentally friendly way, not by disposing of the waste not in the environment, but by acting in a professional way.

Please do not simply throw away the packaging or the used machine later on, but dispose of them according to the guidelines established by your city council/municipality or by the corresponding waste management enterprise.

8.6 Storage

ATTENTION!

Incorrect and improper storage could 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 machine and accessories are stored for more than three months or are stored under different environmental conditions than those specified here .

8.7 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 the electrical components are disposed of professionally and according to the statutory provisions.

The machine includes electrical and electronic components and must not be disposed of as household waste. According to the European directive 2002/96/EG regarding used electrical and electronic devices and the implementation in national law, used electrical tools and electrical machines must be collected separately and collected for environmentally compatible recycling.

As the machine operator, you should obtain information regarding the authorized 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.

8.7.1 Decommissioning

CAUTION!

Used machines need to be decommissioned in a professional manner in order to avoid later misuse and endangerment of 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.**

8.7.2 Dismantling

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

8.7.3 Disassembly

➜ Disassemble the drive motor.

8.7.4 Packing and loading

➜ Place the machine on 1 palettes to allow for removal transport.
☞ Installation and assembly on page 22

8.8 Disposal of new device packaging

All used packaging materials and packaging aids from the machine are recyclable and generally need to be supplied to the material reuse.

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

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

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

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

8.9 Disposal of lubricants and coolants

ATTENTION!

Please imperatively make sure to dispose of the used coolant and lubricants in an environmentally compatible manner. Observe the disposal instructions of your municipal waste management companies.

INFORMATION

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

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

8.10 Disposal via municipal collection facilities

Disposal of used electrical and electronic components
(Applicable in the countries of the European Union and other European countries with a 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, the municipal waste collection station or the shop where you have bought the product.

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 lathe which might be important for other users
- Recurring failures

Optimum Maschinen Germany GmbH
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D-96103 Hallstadt

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

OPTIMUM®
MASCHINEN - GERMANY

EC Declaration of Conformity

according to Machinery directive 2006/42/EC, Annex II 1.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: MH25SV

fulfills all the relevant provisions of the directive specified above and the additionally applied directives (in the following) - including the changes which applied 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 13128:2001+A2:2009/AC:2010 Safety of machine tools - Milling machines (including boring machines)

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

EN 13849-1:2015 - Safety of machinery - Safety related parts of controls - Part 1: General design principles

EN 13849-2:2012 - Safety of machinery - Safety related parts of controls - Part 2: Validation

EN ISO 12100:2013 - Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 50370-2 - Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 2: Immunity

EN 50370-2 - Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 2: Immunity

EN 55011:2016 + A1:2017 - Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement - class A

EN 61000-6-3:-2 - Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)

EN 61000-6-3:-3 - 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, 2020-11-09

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Quellenverzeichnis von Ihrem Fachhändler Metallbau Mehner

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  - OPTImill MH 25 V SV Ersatzteile
  - OPTImill MH 25 V SV Zubehör

- CNC OPTImill MH 25 V / MH 25 SV
  - OPTImill MH 25 V SV Ersatzteile
  - OPTImill MH 25 V SV Zubehör

- OPTImill Zubehör

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