OPTIMUM®
MASCHINEN - GERMANY

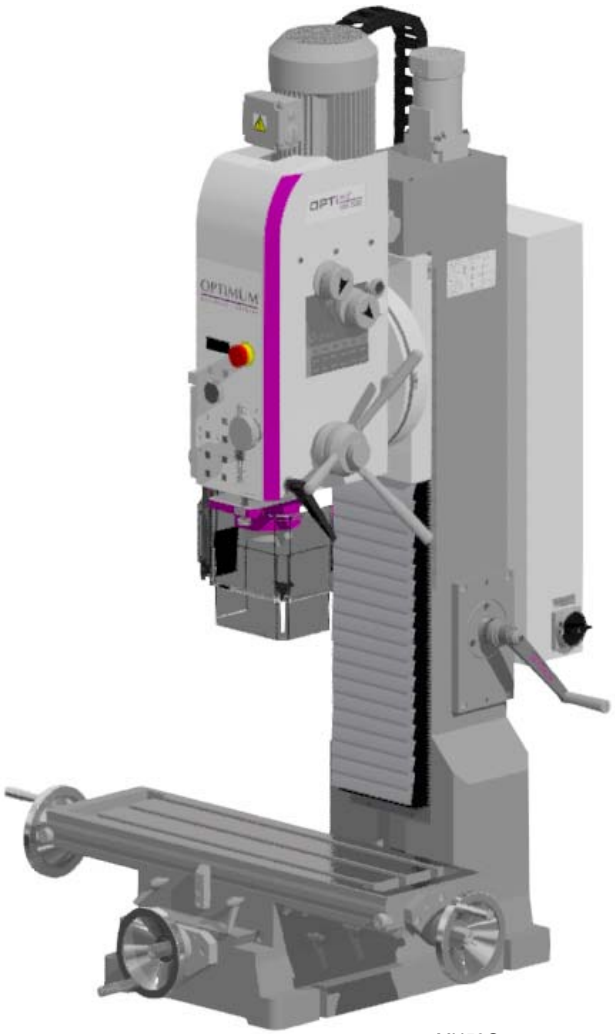
Operating Manual

Version 1.0.4

Milling machine

○ OPTImill® MH 50G — Part no. 3338180

○ OPTImill® MH 50V — Part no. 3338185



MH50G

GB

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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, Germany
Fax (+49)0951 / 96555 - 888
Email: info@optimum-maschinen.de
Internet: www.optimum-machines.com

1 Safety

Glossary of symbols

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

This part of the operating instructions

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

In addition to these operation instructions, please observe

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

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

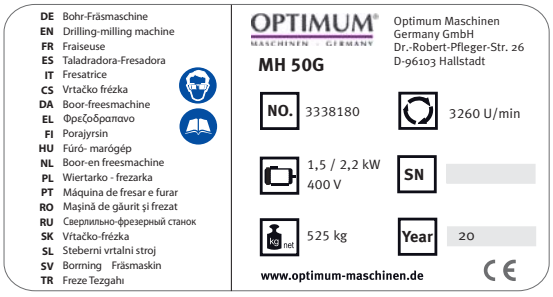
If European standards have not yet been incorporated in the national legislation of the country in question, the specific applicable regulations of each country must be observed.

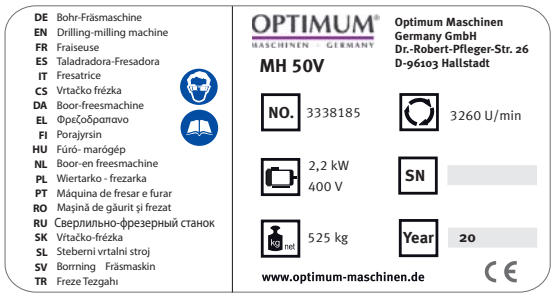
If necessary, relevant measures must be taken to comply with national regulations before commissioning the milling machine.

Always keep this documentation close to the milling machine.

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

1.1 Rating plates





INFORMATION

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

Optimum Maschinen Germany GmbH
Dr. Robert-Pfleger-Str. 26
D-96103 Hallstadt, Germany
Email: info@optimum-maschinen.de

1.2 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 (ideogram) and the warning signs for each specific danger and its (possible) consequences.

Symbol	Alarm expression	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 product, as well as other types of damage. No risk of injury to persons.
	**INFORMATION**	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram with

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!


Switching on forbidden!


Operating with rotary current plug is not permitted!


Read the operating instructions before commissioning!


Pull out the mains plug!


Wear protective glasses!


Wear protective gloves!


Wear safety shoes!


Wear a protective suit!


Use ear protection!


Only switch during standstill!


Protect the environment!


Contact address

1.3 Intended use

WARNING!

In the event of improper use, the milling machine

- **may be a hazard to personnel,**
- **the machine and other property of the operating company and**
- **the functionality of the milling machine may be compromised.**

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

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

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

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

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

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

☞ Technical data on page 19

WARNING!

Extremely severe injuries due to non-intended use.

It is forbidden to make any modifications or alternations to the operating parameters values of the milling machine. They could pose an accident hazard to persons and cause damage to the milling machine.

1.4 Reasonably foreseeable misuse

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

Any other use must be discussed with the manufacturer.

Only metallic, cold and non-flammable materials may be machined with the milling machine.

In order to avoid misuse, the operating instructions must be read and understood before first commissioning.

Operators must be duly qualified.

1.4.1 Avoiding misuse

➜ Use of suitable cutting tools.

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

➜ Clamp workpieces firmly and free of vibration.

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

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

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

ATTENTION!

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

WARNING!

Risk of injury caused by flying workpieces.

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

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

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

❍ Sufficiently lubricate the machine.

❍ Set the bearing clearance and guides correctly.

Recommendations:

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

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

❍ Clamp end face mills using shell end mill arbors.

When drilling, make sure that

- the suitable speed is set depending on the diameter of the drill,
- the pressure must only be such that the drill can cut without load,
- if there is too much pressure, the drill will wear quickly and may even break or jam in the borehole. If the drill jams, immediately stop the main motor by pressing the emergency stop button,
- use commercial cooling/lubricating agents for hard materials, e.g. steel and
- generally always back the spindle out of the workpiece while it is still turning.

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 appropriate collets for end mills.

When milling, ensure that

- the right cutting speed is selected;
- for workpieces with normal strength values, e.g. steel, 18-22 m/min,
- for workpieces with high strength values, 10-14 m/min,
- the pressure is selected so that the cutting speed remains constant,
- normal trade coolants/lubricants are used for hard materials.

CAUTION!

Additional for MH50V

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.

INFORMATION

The milling machine MH50V with frequency converter for regulating the speed are built according to the standard EN 61800-3 class C2.

The machine MH50V is authorized for industrial and commercial use in the business and commercial areas, as well as in industrial areas. The use of the machine in public supply networks requires a different configuration and/or additional measures.

This machine MH50 installed within the domestic environment require supply authority acceptance for connection to the public low-voltage power supply network. Please contact your local supply network provider.

The machine MH50V installed within the category C3 (industrial) environment do not require connection approval.

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. "

MH50V	☐	☒	☐	☐
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		

1.5 Possible dangers posed by the milling machine

The milling machine was built using state-of-the-art technology.

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

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

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

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

INFORMATION

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

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

Always disconnect the milling machine from the electrical power supply before performing cleaning or maintenance tasks.

WARNING!

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

Disconnect the milling machine immediately, whenever you detect a failure in the safety devices or when they are not fitted!

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

This is your responsibility being the operating company or private user!

☞ **Safety devices on page 14**

1.6 Qualification

1.6.1 Private Users

The MH50G milling machine is also used in the private domain. The acumen of people in the private sector with training in metal working was taken into consideration for creating this operation manual. Vocational training or further instruction in a metal working profession is a prerequisite for safe operation of the machine. It is essential that the private user is aware of the dangers involved in operating this machine. We recommend visiting a training course in the operation of milling machines. Your specialist dealer can offer you an appropriate training course. These courses are also offered by adult education centres in Germany.

1.6.2 Obligations of the User

The user must

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

1.6.3 Craftsman or industrial use

This manual is addressed to

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

Consequently, the warning notes refer both to the use of the milling machine and to its maintenance.

WARNING!

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

Operator

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

Qualified electrician

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

Qualified personnel

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

Instructed person

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

INFORMATION

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

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

In the event of improper use

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

1.6.4 Authorized personnel

WARNING!

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

Only authorized personnel may operate the machine!

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

1.6.5 Operator's obligations

The operator must instruct personnel at least once a year in

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

The operator must also

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

1.6.6 Obligations of the operator

The user must

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

1.6.7 Additional requirements regarding qualification

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

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

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

➜ disconnect all poles,

➜ secure against restarting,
➜ check that there is no voltage.

1.7 User positions

The user position is in front of the milling machine.

1.8 Safety measures during operation

CAUTION!

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

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

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

CAUTION!

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

Extra precautionary measures must be taken before machining flammable materials (e.g. aluminium, magnesium) or using combustible agents (e.g. spirit) to avert a health hazard.

1.9 Safety devices

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

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

This is your responsibility!

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

- ❍ have eliminated the cause of the fault and
- ❍ have verified that there is no danger to personnel or objects.

WARNING!

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

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

WARNING!

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

1.9.1 Emergency stop button

CAUTION!

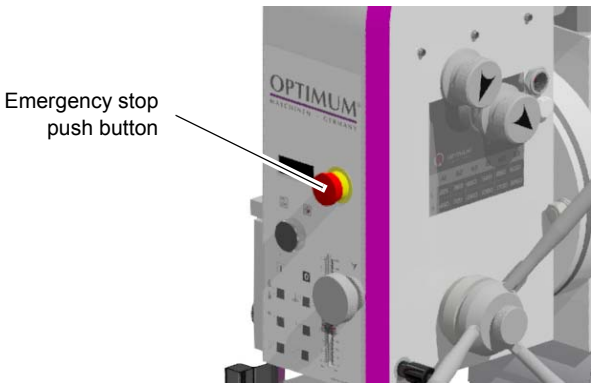
Only press the emergency stop button in a genuine emergency. Do not use the emergency stop button to stop the machine during normal operation.

CAUTION!

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

The emergency stop button brings the machine to a standstill.

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



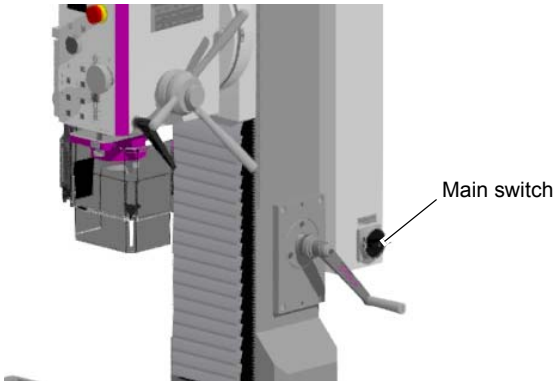
Img. 1-1: Emergency stop button

1.9.2 Lockable master switch

The lockable master switch can be secured in the "0" position by means of a padlock to guard against the milling machine being switched on accidentally or by an unauthorised person.

The power supply is cut off when the master switch is in the off position.

Except for the areas marked by the pictogram in the margin.



Img. 1-2: Main switch

WARNING!

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

1.9.3 Stored charge on MH50V

WARNING!

The frequency converter of MH50V contains capacitors that remain charged with a potentially lethal voltage after the machine has been isolated from the mains. If the frequency controller was under power, it must be disconnected from the power supply for at least 10 minutes. 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 a discharge is prevented by voltage on the adjacent motor connection terminals. If the frequency converter has a technical defect, so that nothing is shown on the display, the capacitors may not be discharged.

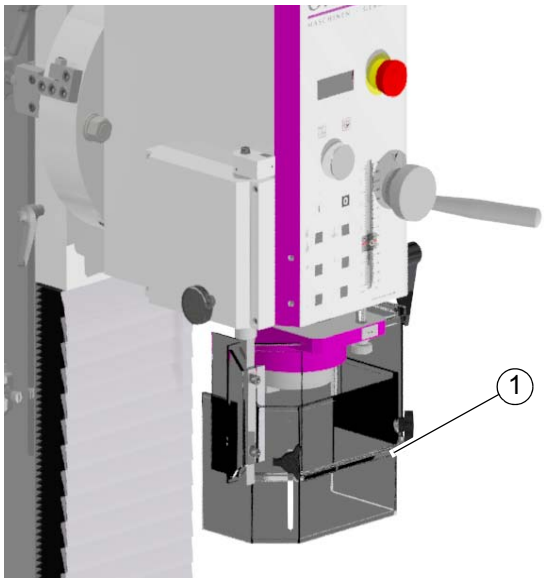
1.9.4 Separation guard

Adjust the guard (1) to the correct height before you start working.
To do so, slacken the clamping screw, set the required height and re-tighten the clamping screw.

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

INFORMATION

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



Img. 1-3: Separation guard

1.10 Safety check

Check the milling machine regularly.

Check all safety devices

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

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

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

1.11 Personal protective equipment

For certain work, personal protective equipment is required.

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

Wear protective gloves when handling pieces with sharp edges.

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

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

1.12 For your own safety during operation

WARNING!

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

Avoid any unsafe work methods:

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

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

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

1.13 Switching-off and securing the milling machine

1.13.1 Lockable main switch

WARNING!

Dangerous voltage even if the main switch is switched off.

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

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

The power supply is cut off when the master switch is in the off position.

1.14 Using lifting equipment

WARNING!

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

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

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

Fasten the loads carefully. Never walk under suspended loads!

1.15 Symbols on the milling machine

Make sure that the mandatory and warning symbols are legible.

1.16 Electronics

Craftsman or industrial use

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

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

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

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

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

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

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

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

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

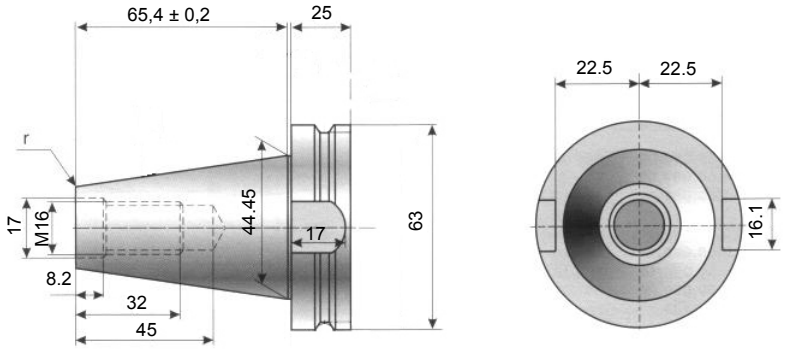
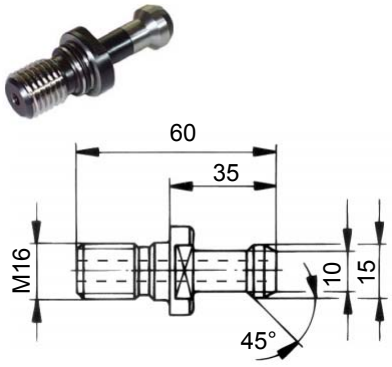
1.17 Inspection deadlines

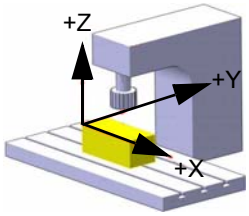
Craftsman or industrial use

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	MH50G	MH50V
Total connection	400V ; 3 KVA	400V ; 3 KVA
Milling spindle motor power	1.5 / 2.2 KW	2.2 KW
Rapid traverse motor power Z-axis	0.12 KW S6-60%	
2.2 Milling capacity	**MH50G**	**MH50V**
Drilling capacity in steel (S235JR) [mm]	max. Ø 38	
Drilling capacity in steel (S235JR) [mm]	max. Ø 32	
Max. milling head size [mm]	max. Ø 80	
Max. end mill cutter size [mm]	max. Ø 32	
2.3 Spindle seat	**MH50G**	**MH50V**
Spindle seat	Taper JIS (MAS 403 BT40)	
		
Pull stud	BT40x45°	
		
Maximum distance between spindle nose - milling table [mm]	0 until 545	

2.4 Drill-mill head	MH50G	MH50V
		
Spindle sleeve stroke [mm]	115	
Quill diameter [mm]	Ø 80	
Travel Z axis - rapid traverse [mm]	350	
Manual travel Z axis [mm]	460	
Throat [mm]	260	
Inclination range	± 30°	
Z axis handwheel scale	3mm/rev - graduation 0.05mm	
2.5 Cross table	**MH50G**	**MH50V**
Table length [mm]	850	
Table width [mm]	240	
Max. bearing load	175 kg	
T-slot size / distance / number	18 mm / 80 mm / 3	
X axis travel [mm]	520	
X axis handwheel scale	3mm/rev - graduation 0.05mm	
Y axis travel [mm]	260	
Y axis handwheel scale	3mm/rev - graduation 0.05mm	
2.6 Dimensions	**MH50G**	**MH50V**
	☞ Dimensions, balance point on page 26	
Total net weight [kg]	525	515
Total gross weight [kg]	605	595
2.7 Work area	**MH50G**	**MH50V**
	Keep a work area of at least one metre around the machine free for operation and maintenance.	
2.8 Speeds	**MH50G**	**MH50V**
Speed range / Gear stages / Motor stages [rpm]	225 to 3260 / 6 / 2 (~50Hz) 270 to 3912 / 6 / 2 (~60Hz)	-
Electronic speed range / Gear stages [rpm]	-	50 to 3260 / 3
2.9 Environmental conditions	**MH50G**	**MH50V**
Temperature	19 - 21 °C (for an optimum milling result) permissible range + 10° to + 35°C	

Admissible relative humidity	5...90 % no condensation 30% to 90% at 35°C 90 % at 21°C	
Compressed air	700...1060 hPa	
Environmental conditions - storage	5 - 45 °C	
2.10 Operating material	**MH50G**	**MH50V**
Gear	Oil quantity 1.2 litre. Mobilgear 627, ISO VG 100 Viscosity 100 cSt at 40°C or a comparable oil ☞ Lubricant on page 72	
Bare steel parts	Mobilgrease OGL 007 or, Mobilux EP 004, acid-free oil, e.g. weapon oil, motor oil	
2.11 Emissions	**MH50G**	**MH50V**
Maximum sound pressure level at 1 m distance from the machine and 1.60 m above the ground.	72 - 76 dB(A) (~50Hz) 76 - 80 dB(A) (~60Hz)	76 - 80 dB(A)

Emission measurement

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

The generation of noise emitted by the MH50G is 74 dB(A) on no-load running at 80% of max. spindle speed, measured at a distance of one meter from the machine and at a height of 1.6m at ~50Hz connection

The generation of noise emitted by the MH50V is 78 dB(A) on no-load running at 80% of max. spindle speed, measured at a distance of one meter from the machine and at a height of 1.6m.

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

INFORMATION

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

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

INFORMATION

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

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

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

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

Furthermore, it is possible that the admissible exposure level might be different from country to country due to national regulations.

This information about the noise emission should, however, allow the operator of the machine to more easily evaluate the hazards and risks.

CAUTION!

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

We generally recommend the use of noise and ear protection.

2.12 Tools and tool holding fixtures

CAUTION !

When using tools with larger diameters or at higher speeds!

The balancing of the tools has to amount to

- 0 - 6000 rpm - G 6.3
- from a speed of 6000 rpm - G 2.5

according to DIN / ISO 1940.

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 Unpacking the machine

Install the machine close to its final position before unpacking. If the packaging shows signs of having possibly been damaged during transport, take the appropriate precautions to prevent the machine being damaged when unpacking. If damage is discovered, the carrier and/or shipper must be notified immediately so the necessary steps can be taken to register a complaint.

Examine the complete machine carefully and check whether all materials, such as shipping documents, instructions and accessories have been delivered with the machine.

3.3 Installation and assembly

3.3.1 Installation site requirements

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

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

If this is not guaranteed with the normal installation site lighting, workplace lights (available as an option) must be used.

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

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

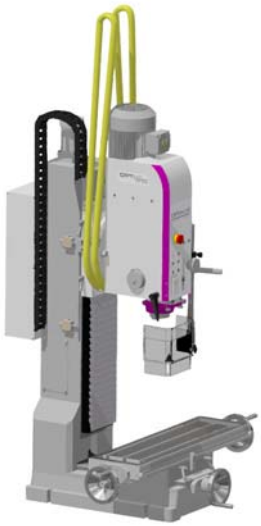
Organize the working area around the milling machine according to the local safety regulations.

The work area for operation, maintenance and repair must not be restricted.

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.
- ➜ Lock all clamping levers on the drilling-milling machine before you lift it.
- ➜ Make sure that no add-on pieces or varnished parts are damaged due to the load suspension.
- ➜ Take care with the centre of gravity of the machine.
  ☞ Dimensions, balance point on page 26

3.3.3 Assembly

- ➜ Check that the milling machine foundation is horizontal with a spirit level.
- ➜ Check that the foundation has sufficient load-bearing capacity and rigidity.

ATTENTION!

Inadequate rigidity of the foundation will cause interaction of vibrations between the milling machine and the foundation (resonant frequency of the components). If the

rigidity of the overall system is insufficient, critical speeds with annoying vibrations will be reached very quickly and lead to bad milling results.

➜ Place the milling machine on the provided foundation.

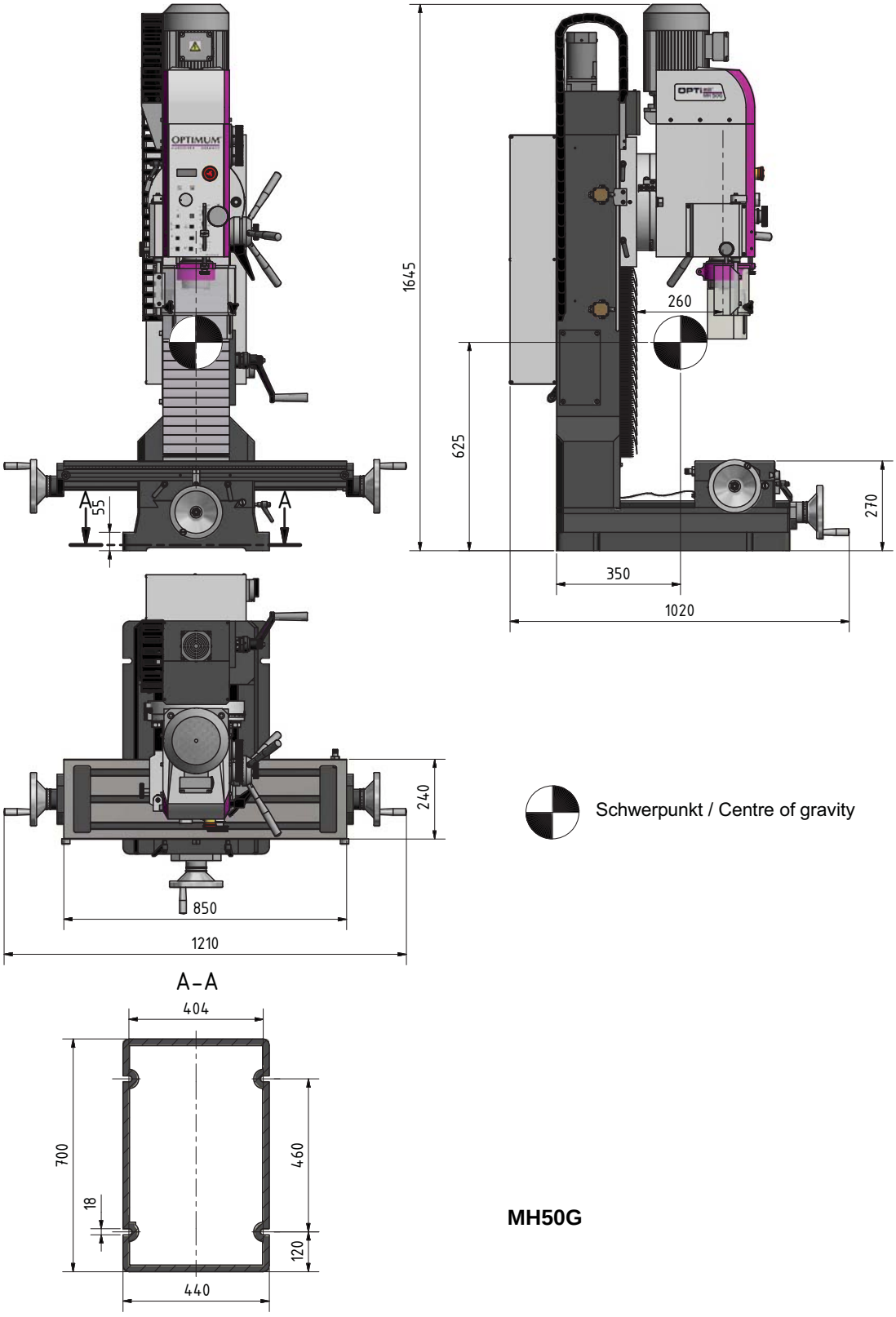
➜ Fix the machine base to the substructure through the holes pre-drilled for this purpose.

WARNING!

The nature of the foundation and type of fixings used to secure the machine base to the foundation must be capable of absorbing the loads caused by the milling machine. The foundation must be level. Check that the milling machine foundation is horizontal by using a spirit level.

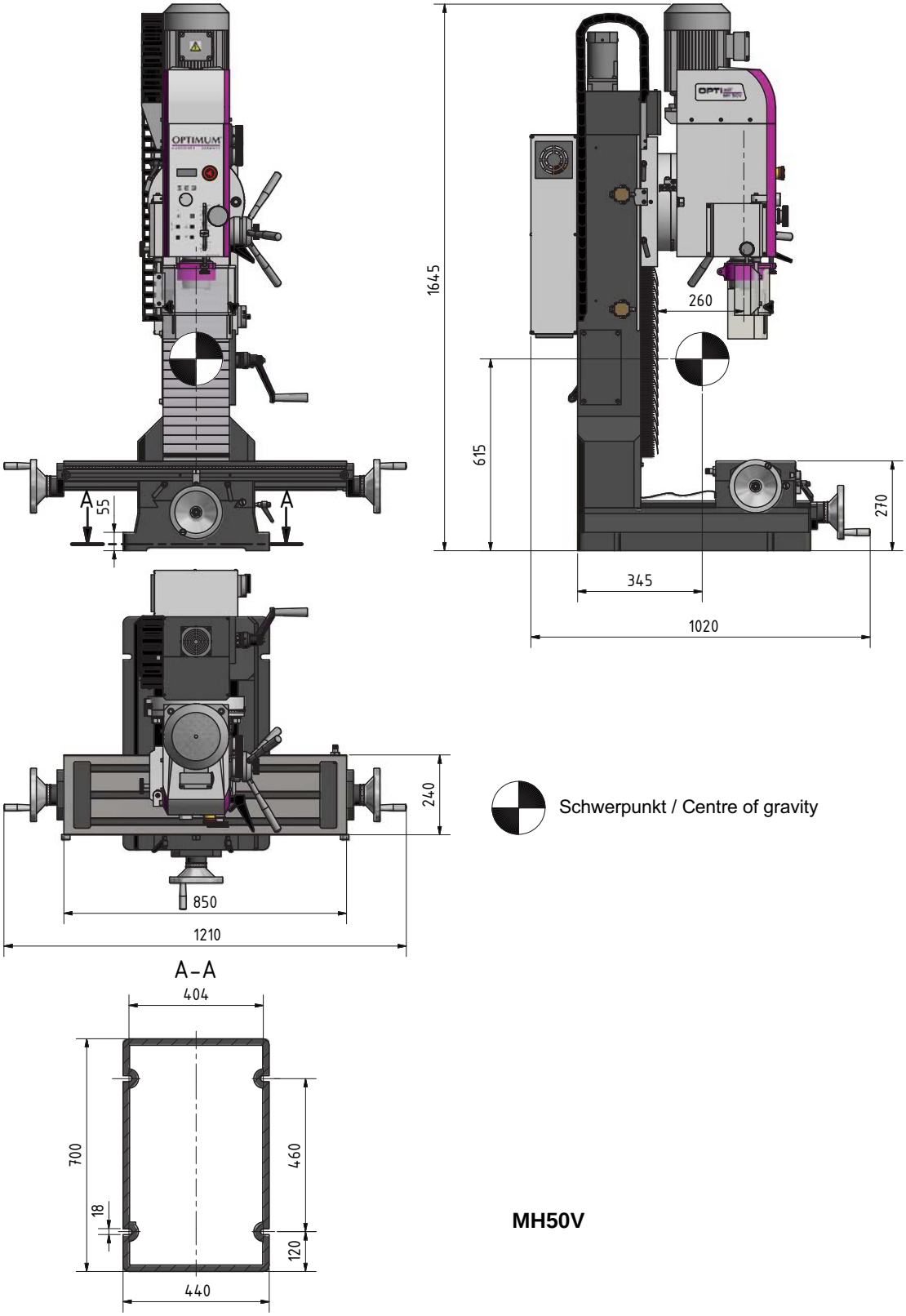
Fix the milling machine to its foundation at the recesses provided on the machine base for this purpose. We recommend that you use shear connector cartridges or heavy-duty anchors.

3.4 Dimensions, balance point



MH50G

MH50G_MH50V_GB_3.fm



Schwerpunkt / Centre of gravity

MH50V

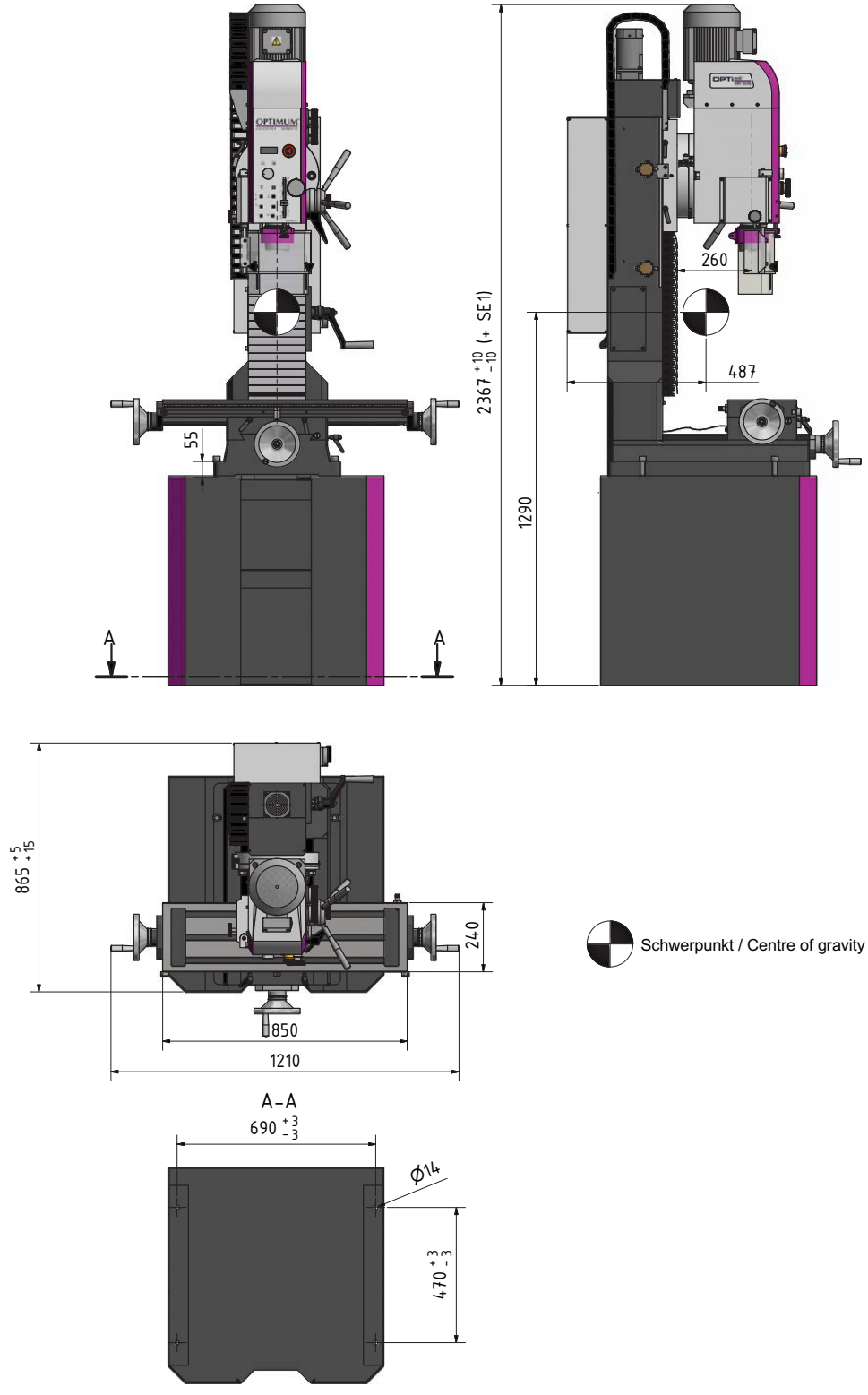
MH50G_MH50V_GB_3.fm

3.5 Mounting on the optionally available machine base

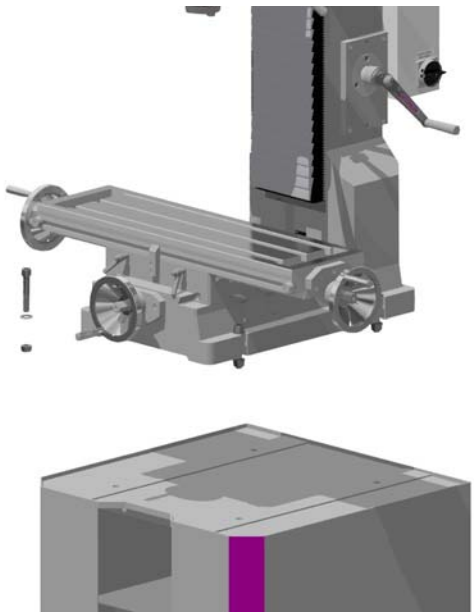
➜ First attach the optional machine base, item 3353009 firmly to the ground.

➜ Optionally, four vibration damping elements type SE1, article 3381012 can be used.

➜ Align the machine base with a machine spirit level.



MH50G_MH50V_GB_3.fm



➜Place the milling machine on the machine base and screw it to the base.

☞ Load suspension point on page 24

Required screws:

(not included)

4 x Hexagon socket head screws M16 x 90 with washers and nuts.

3.6 First commissioning

☞ Qualification on page 12

WARNING!

First commissioning may only take place after proper installation.

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

ATTENTION!

Before commissioning the machine, all bolts, fastenings and protections must be checked and retightened as necessary!

ATTENTION!

Before commissioning the machine, the level of the gearbox must be checked. During the transportation of the machine, oil can come up from the vent hole of the gearbox.

WARNING!

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

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

Only use tool holders in the intended admissible speed range.

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

3.7 Cleaning and lubrication

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

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

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

➜ Lubricate the milling machine in accordance with the lubrication schedule.
☞ Inspection and maintenance on page 43

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

➜ Check the oil level of the spindle gearbox.

INFORMATION

☞ **Lubricant on page 72**

The milling machine was varnished with a one component lacquer. This fact must be taken into account when selecting your cooling lubricant.

Optimum Maschinen Germany GmbH does not accept any liability for subsequent damages due to unsuitable cooling lubricants.

The flashpoint of the emulsion must be higher than 140°C.

When using non-water-miscible cooling lubricants (oil content > 15%) with a flashpoint, ignitable aerosol air mixtures might develop. There is a potential danger of explosion.

3.8 Electrical connection

3.8.1 MH50G and MH50V

CAUTION!

Must only be worked on by a qualified electrician or person working under the instructions and supervision of a qualified electrician.

ATTENTION!

Ensure that all 3 phases (L1, L2, L3) and the ground wire are connected correctly.

The neutral conductor (N) of its power supply is not connected.

Correct direction of rotation, observe phase sequence! ☞ **Direction of spindle rotation on page 35**

If necessary, two phase connectors at the three phase current switch (MH50G) or at the connection in the control cabinet must be exchanged. The guarantee will become null and void if the machine is connected incorrectly.

CAUTION!

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

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

❍ Main Fuse 16A.

3.8.2 MH50V

WARNING!

Danger to life caused by high leakage currents for an interrupted protective conductor.

The drive components conduct a high leakage current via the protective conductor. Touching conductive parts when the protective conductor is interrupted can result in death or serious injury.

➜ Observe the following notes on the connection for machines with frequency converters.

3.8.3 Regulated drives in connection with residual current devices

Speed-controlled drives are one of the standard equipment in machine and plant construction and perform various tasks. Compared to a simple motor, the electronic rectifiers or converters require some special features for the necessary safety measures for electrical safety. Depending on the application, the use of a fault current protection device, differential current monitoring or insulation monitoring can make more sense.

For electrical safety, DIN VDE 0100-410 (VDE 0100 part 410): 1997-01 "Erection of heavy current installations up to 1000V" is a basic standard. It describes both, the admissible net forms and the necessary protective measures against dangerous body currents. Based on this standard DIN EN 50178 (VDE 0160): 1998-04 "Equipping of heavy current systems with electronic equipment" specifies the protective measures to be applied to controlled drives in more detail. It calls for: "In the case of electronic equipment, the protection of persons against dangerous body currents must be carried out in such a way that a single fault does not cause any danger."

Regulated drives with residual current devices

The TN-S system is the most common network form for the operation of controlled drives. This is done, among other things, for EMV reasons and to avoid vagabonding currents. In accordance with DIN VDE 0100-410 (VDE 0100-410): 1997-01, fault current protective devices (ELCB) can be used as a protective measure against dangerous body currents. According to DIN VDE 0100-482 (VDE 0100 part 482): 2003-06 "Electrical installations of buildings", cables and wiring systems in fire-endangered plants must be protected by ELCBs with a rated differential current of 300 mA. According to IEC 60755, ELCBs differ in the type of fault currents they can detect. In conjunction with electronic devices currents with DC components may occur.

3.8.4 Protection from Dangerous Shock Currents, use of ELCBs

To achieve increased safety in all installation systems, and in power supply ranges for which the installation provisions stipulate or recommend the ELCB devices.

Measure for “Protection from Dangerous Shock Currents”, as regulated in DIN VDE 0100 Part 410. All measures are to be mentioned:

- Protection from indirect contact – as protection against fault by shutting down in the event of inadmissibly high contact voltage by short circuit shock on the operating resource.
- Protection from direct contact – as additional protection by shutting down in the event of contact with a live conductor. Dangerous shock currents are shut down within the shortest possible time, if the rated fault current of the circuit breaker is 30 mA (e.g. Domestic environment), for a personal protection system 10 mA (e.g Bathroom).
- Fire prevention – Prevention of the origination of electrically-ignited fires if the rated fault current of the circuit breaker is 300 mA. Operating premises at risk of fire to VdS 2033: 2002-02 300 mA (e.g. Factory halls).

3.8.5 Current in the protective earth conductor - Leakage current

With EMC filters in frequency converters, the leakage current is always greater than 3.5 mA due to physics. Some types of frequency converters also achieve a leakage current of up to 300mA.

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.

Preferably, machines with frequency converters are therefore to be permanently connected to a terminal box, otherwise an additional fixed earth connection is required, which is not routed over the plug, and must correspond to at least the cross-section of the cable in the plug.

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:

To avoid an operating fault, you need an AC/DC-sensitive ELCB. Be absolutely sure which leakage current security is necessary for dangerous body currents, as regulated in DIN VDE 0100 part 410, at your mains connection.

3.8.6 When the ELCB triggers

- Pulse current - sensitive ELCB type A
  ELCB type A independent of rated voltage, for triggering when changing fault currents and pulsing DC fault currents.

- AC/DC - sensitive ELCB type B
  ELCBs of series type B also accept the detection of smooth AC fault currents as well as the detection of fault current shapes of type A; they are therefore suitable for all the circuits mentioned. ELCBs of this series therefore detect all types of fault current according to the triggering characteristic B, i.e. both smooth DC fault currents and also all AC fault currents of all frequencies and mixed frequencies up to 1 MHz are detected and switched off reliably in the event of a fault.

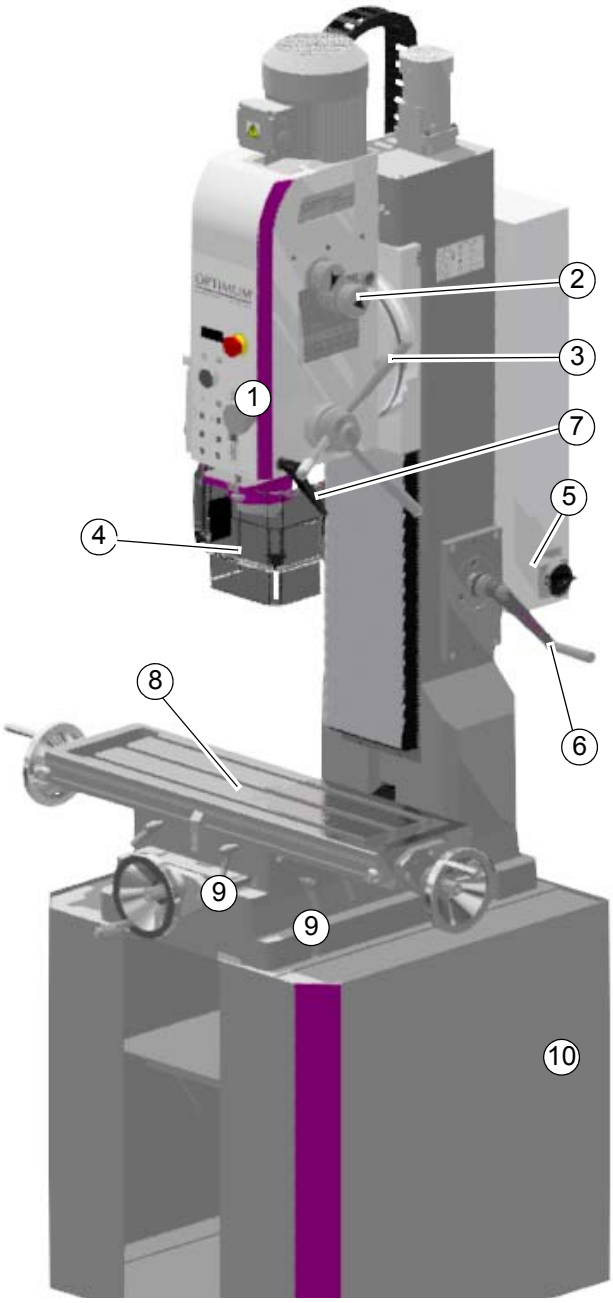
- Alternating current - sensitive ELCBs of type AC (only alternating current) are unsuitable for frequency converters. Alternating current - sensitive ELCBs of type AC are not customarily used and are no longer permitted in Germany.

Type B must be used with 3-phase converters.

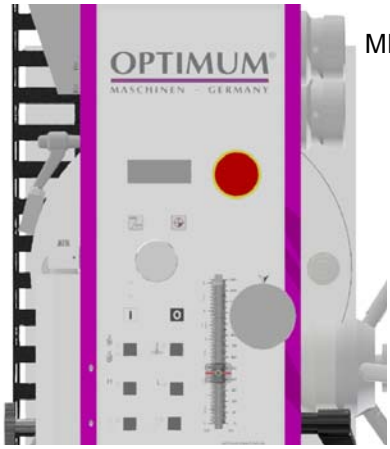
When using an external EMC filter, to avoid false error shutdowns, a time delay of at least 50 ms is required. The leakage current can exceed the threshold trigger value for an error shut-down if the phases are not switched on at the same time.

4 Operation

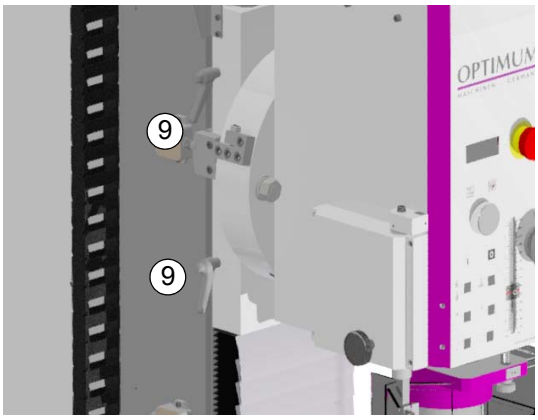
4.1 Control and indicating elements



MH50G

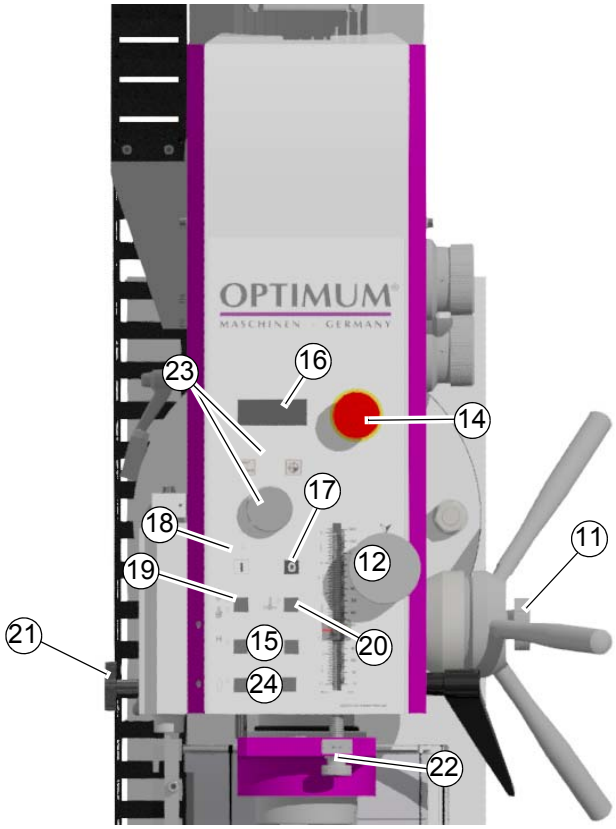


MH50V



Pos.	Designation	Item	Designation
1	Control panel ☞ Control panel on page 35	2	Gear switch
3	Spindle sleeve lever	4	Spindle protection
5	Main switch	6	Milling head height adjustment hand crank
7	Clamping lever for spindle sleeve	8	Cross table
9	Clamping lever	10	Machine base (Option)

4.1.1 Control panel



Pos.	Designation	Item	Designation
11	Activation of the fine adjustment	12	Fine adjustment of spindle sleeve
15	Drive motor stage selection (only MH50G)	14	Emergency stop button
17	Spindle rotation OFF	16	Depth display Speed display (only MH50V)
19	Rotational direction ☞ Direction of spindle rotation on page 37	18	Spindle rotation ON
21	Mechanical securing, quick clamping system ☞ Inserting or Removing Tool on page 40	20	Tapping ☞ Tapping on page 39
23	Push buttons • Drilling depth mm / inch • Zero point • Speed and function of rotary knob for setting the speed (only MH50V)	22	Mechanical drill depth stop
24	Rapid travel directional key milling head		

4.2 Safety

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

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

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

☞ For your own safety during operation on page 17

4.3 Switching the milling machine on

➜ Switch on the master switch.

➜ Unlock the emergency stop button.

➜ Set and close the spindle protection.

INFORMATION

The machine cannot be started, if the spindle protection is not closed and the locking pin of integrated drill drift is in drifting position.

4.4 Switching the milling machine off

➜ Switch off the master switch.

☞ Switching-off and securing the milling machine on page 17

CAUTION!

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

4.5 Resetting an emergency stop situation

➜ Unlock the emergency stop switch again.

➜ Switch on the spindle rotation again.

4.6 Power failure, Restoring readiness for operation

➜ Switch on the spindle rotation again.

4.7 Speed setting

A speed change at the MH50G is done by inserting of gear stages and stage selection of the drive motor.

A speed change at the MH50V is continuously adjustable within the gear stage engaged with the rotary knob on the control panel.

4.7.1 Speed table MH50G (~50Hz connection)

OPTIMUM MASCHINEN - GERMANY	A			B		
	A1	A2	A3	B1	B2	B3
L	225	360	680	540	850	1630
H	450	720	1360	1080	1700	3260

Img.4-1:

4.7.2 Speed table MH50G (~60Hz connection)

OPTIMUM MASCHINEN - GERMANY	A			B		
	A1	A2	A3	B1	B2	B3
L	270	432	716	648	1020	1956
H	540	864	1632	1296	2040	3912

Img.4-2:

4.7.3 Speed table MH50V

OPTIMUM MASCHINEN - GERMANY	A		B
	1	2	3
A	50 - 450	70 - 720	135 - 1360
B	110 - 1080	1070 - 1700	320 - 3260

Img.4-3:

4.7.4 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. The service life of the tool can be increased and the working result optimized by selecting the correct cutting speed.

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

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

4.7.5 Gear stage

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

4.8 Direction of spindle rotation

A change in the direction of rotation at the MH50G is done by pressing the push button.

A change in the direction of rotation at the MH50V is only possible if the spindle rotates even in its standard direction of rotation.

The standard direction of rotation is clockwise.

☞ Electrical connection on page 30

4.9 Feed

with the hand cranks on the milling table.

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

Conventional milling is always to be preferred on the MH50G and MH50V to synchronous milling.

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

This instruction manual assumes that the milling machine MH50G and MH50V has been obtained without recirculating ball screws.

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

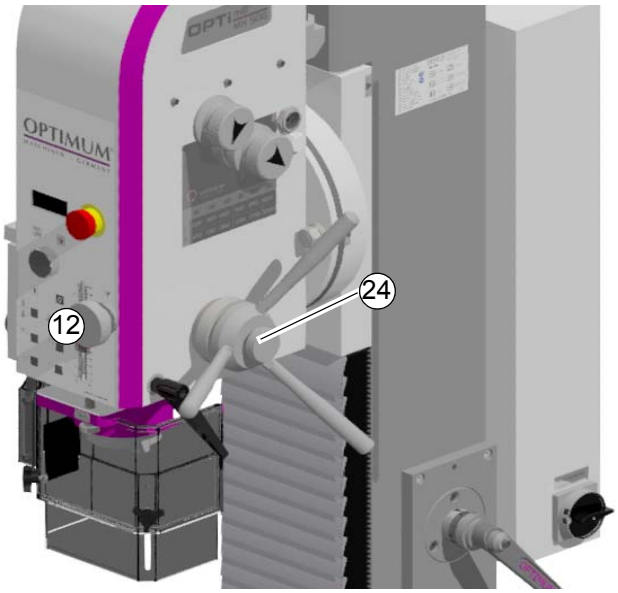
In conventional milling, the work piece moves with the hand cranks on the milling table opposite to the direction of rotation of the milling machine.

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

4.10 Spindle quill feed

With the fine feed (12).

➜ Turn the handle screw (24) to engage the coupling of the fine feed.



4.10.1 Setting the drilling or tapping depth - Setting the beep

In order to set the depth on the display.

➜ Press the tool selection button 

and the workpiece zero button  and then release the button  as first.

➜ The display will begin to flash.

➜ Use the rotary knob to set the required depth  and confirm by pressing.

Drilling:

When the set depth is reached, a warning tone is generated.

Tapping:

When the set depth is reached, a warning tone with spindle reverses direction of rotation is performed.

4.11 Tapping

➜ If necessary, adjust the mechanical drill stop.

➜ Set the drilling depth on the display to the desired depth.

➜ Deactivate fine feed spindle - where this has not yet happened.

➜ Set the lowest speed.

➜ Set and close the spindle protection.

➜ Operate the tapping (20) push button.

➜ The rotation of spindle (18) switches on.

Move the sleeve downward with the sleeve lever until the machine tap cams in the work piece.

The machine tap turns into the workpiece. When the set drilling depth is reached, the spindle reverses direction of rotation. The machine tap turns out of the workpiece.

4.12 Milling head rapid traverse

➜ Loosen the clamping levers (9) on the milling head.

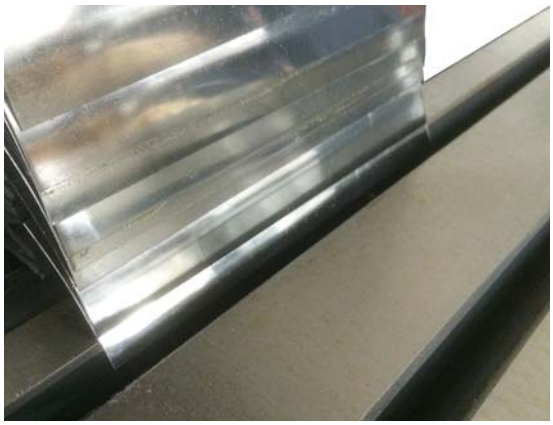
➜ Release the clamping on the hand crank (6) and then press a push button (24).

First move the milling head with the hand crank (6) from the end position, when the end position of the milling head has been reached

ATTENTION!

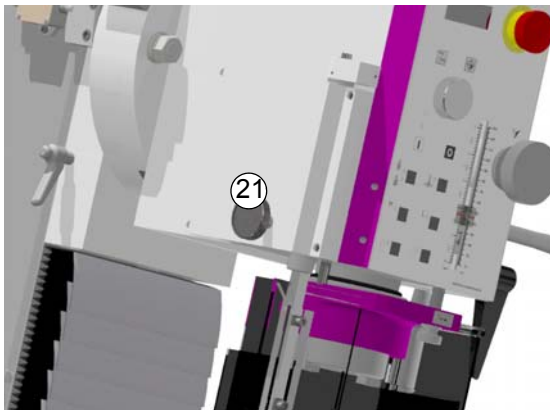
Possible damage to the slat cover when the milling head is moved with the hand crank.

Make sure that the slat cover is not damaged if the milling head is cranked further downwards by hand.



4.13 Inserting or Removing Tool

➜ Unlock or lock the mechanical securing (21) of the quick clamping system.

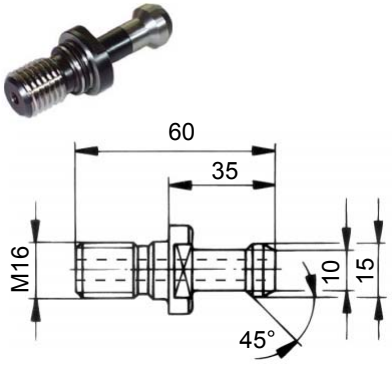


Img.4-4: Mechanical securing, quick clamping system

4.13.1 Inserting

The milling head is equipped with a collet chuck for BT40x45° pull studs.

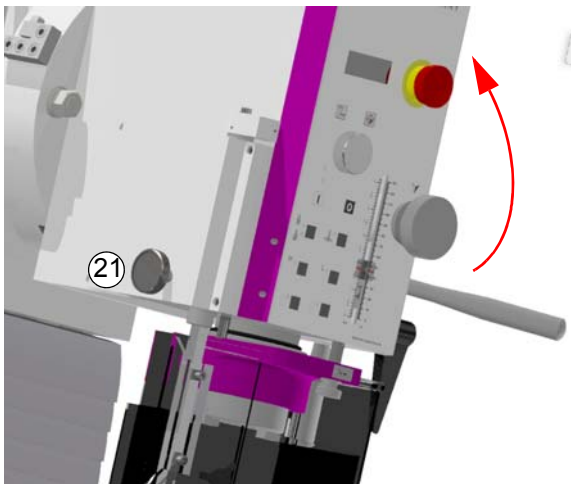
➜ Screw pull studs into the conical seat.
➜ Clean seat in the milling spindle.
➜ Clean cone of the tool.
➜ Mechanical securing of the quick clamping system (21) to be released.
➜ Push up the spindle level and place the tool into the spindle.
➜ Release the spindle lever again.
➜ Mechanical securing of the quick clamping system (21) to be locked.



Img.4-5: Pull stud

4.13.2 Removing

➜ Release mechanical securing of the quick clamping system (21).
➜ Firmly hold the tool.
➜ Push up the spindle lever.



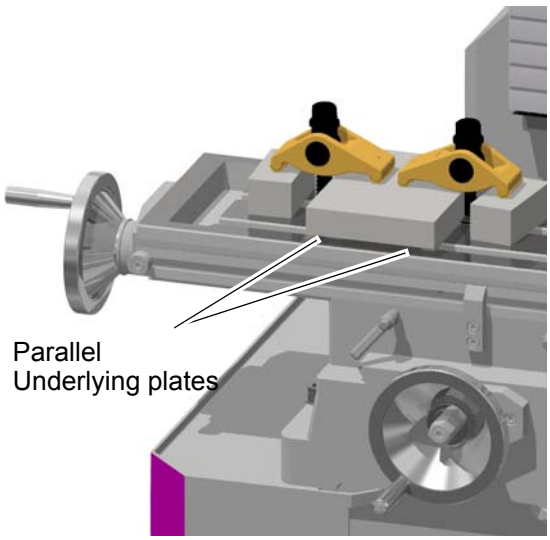
Img.4-6: Unfitting

4.14 Clamping the workpieces

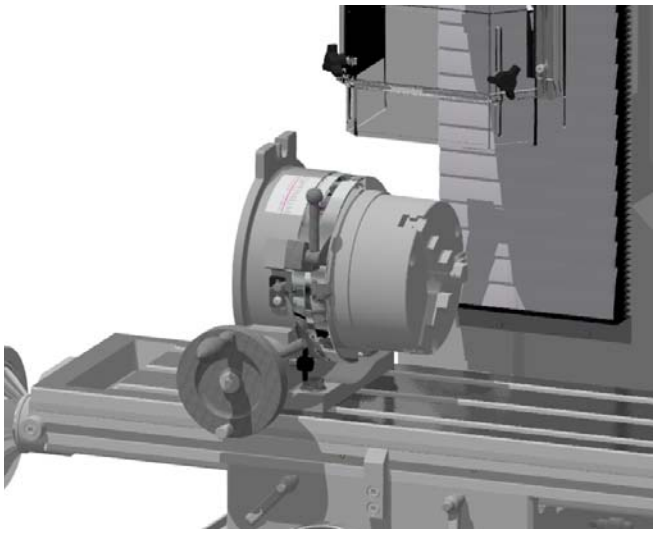
CAUTION!

Injuries can be caused by parts flying off.

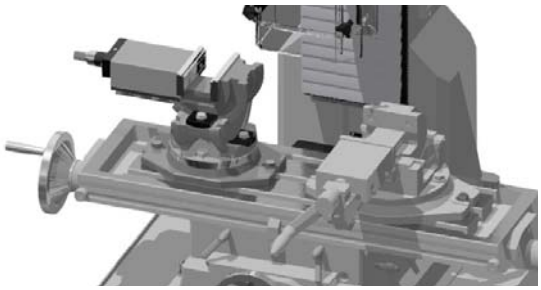
The workpiece must always be secured to the milling table in a machine vice, chuck or with another suitable clamping tool, such as a workholding device (clamping claws).



Workholding device 3352032
+ Parallel underlying plates 3354001



Dividing device 3356200 + Chuck flange 3356254
+ Chuck jaw 3356225



Triple axis chuck 3355500
+ Double axis chuck 3354170

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

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

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

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

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

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

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

4.15 Swivelling the milling head

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

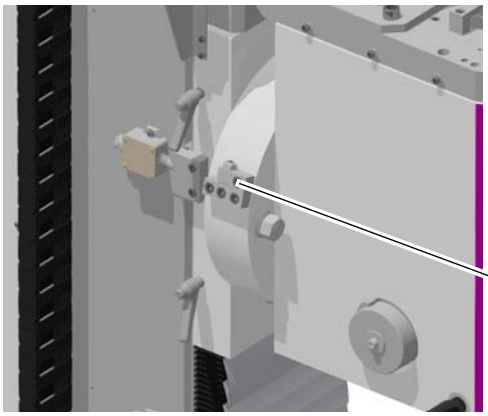
➜ Loosen 2 fastening screws on the milling head.
➜ Turn the drill-mill head clockwise to the desired position.
➜ Retighten the fastening screws.

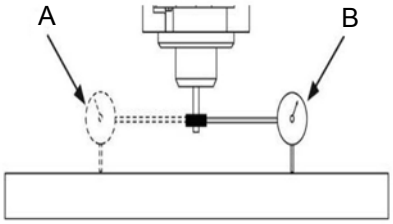
INFORMATION

The milling head should be aligned after resetting to the initial position with a dial indicator so that holes can be produced with the spindle sleeve at a right angle. Set the zero degree angle step using your set-up.

ATTENTION!

The drill-mill continues significantly further and also swivels in a different direction. By continuing to swivel, gear oil may seep from the ventilation hole.





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5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the milling machine.

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

- **operational safety,**
- **failure-free operation,**
- **a long working life of the milling machine and**
- **the quality of the products which you manufacture.**

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

5.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

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

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

5.1.1 Preparation

WARNING!

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

☞ Switching-off and securing the milling machine on page 17

Attach a warning sign.

5.1.2 Restarting

Before restarting, run a safety check.

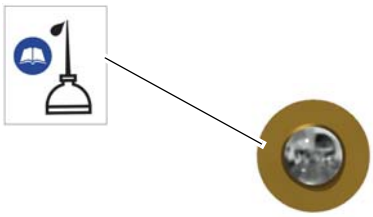
☞ Safety check on page 16

WARNING!

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

5.2 Inspection and maintenance

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

Interval	Where?	What?	How?
Start of work, after every maintenance or repair work	**Milling machine**	➜ ☞ Safety check on page 16	
Start of work, after every maintenance or repair work	**Dovetail guides**	Oiling	➜ Oil all guide rails.
Every week	**Cross table**	Oiling	➜ Oil all bare steel surfaces. Use acid-free oil.
Monthly	**Clamping bolts Milling head**	firmly tightened	➜ Ensure that the clamping bolts for swivelling the drill head are firmly tightened.
Monthly	**Oiler cup**	Oiling	➜ Lubricate all oiler cups with machine oil, do not use grease guns or the like. 
When necessary	**Spindle nut Milling head**	readjust Z axis	An larger amount of backlash in the milling head spindle can be reduced by adjusting the spindle nut. The spindle nuts are reset by reducing the thread flanks of the spindle nut with two take-up screws. After the reset, it is necessary to check if there is still smooth movement over the entire path, otherwise wear is considerably increased due to friction between the spindle nut and the spindle.
When necessary	**Adjustment gib Milling head**	readjust Z axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide rail. ➜ Check the settings. The corresponding guide rail must be more easily movable but ensure stable guidance.

Interval	Where?	What?	How?
	Spindle nut Cross table	readjust X axis	Increased play in the milling table spindles can be reduced by resetting the spindle nuts. The spindle nuts are reset by reducing the thread flanks of the spindle nut by means of a take-up screw. After the reset, it is necessary to check if there is still smooth movement over the entire path, otherwise wear is considerably increased due to friction between the spindle nut and the spindle.
	Spindle nut Cross table	readjust Y axis	
When necessary	**Adjustment gib Cross table**	readjust Y axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide rail. ➜ Check the settings. The corresponding guide rail must be more easily movable but ensure stable guidance.
When necessary	**Adjustment gib Cross table**	readjust X axis	➜ Turn the take-up screws of the gib clockwise. The gib is pushed further inward thus reducing the play in the guide rail. ➜ Check the settings. The corresponding guide rail must be more easily movable but ensure stable guidance.
according to operator's historic values in accordance with German DGUV (BGV A3)	**Electronics**	Electrical inspection	☞ Operator's obligations on page 13 ☞ Electronics on page 18

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

6 Ersatzteile - Spare parts

6.1 Ersatzteilbestellung - *Ordering spare parts*

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

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

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

6.2 Hotline Ersatzteile - Spare parts Hotline

+49 (0) 951-96555 -118

ersatzteile@stuermer-maschinen.de

6.3 Service Hotline

+49 (0) 951-96555 -100

service@stuermer-maschinen.de

6.4 Ersatzteilzeichnungen - Spare part drawings

A Fräskopf - Milling head 1 - 4

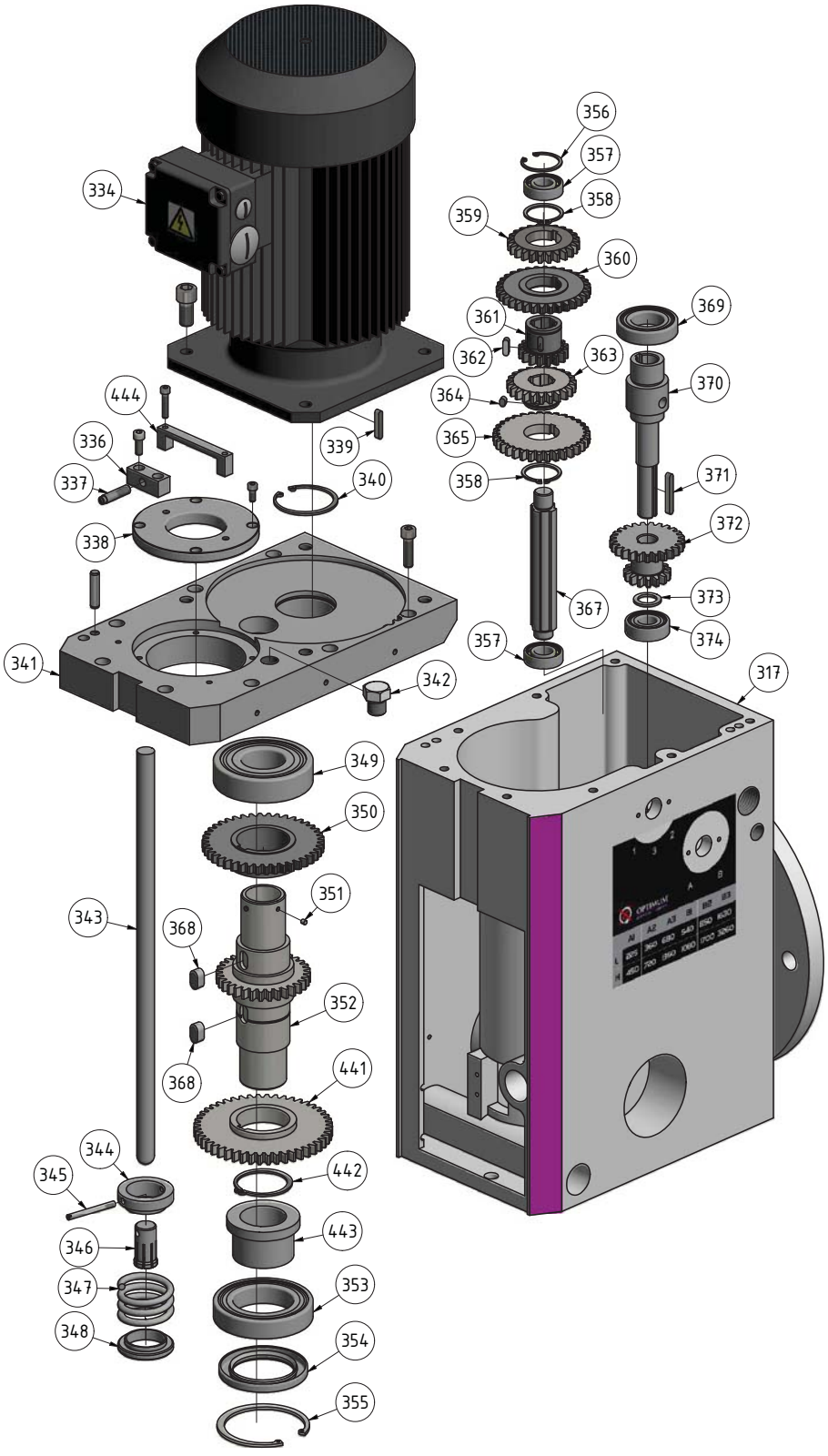


Abb.6-1: Fräskopf - Milling head 1 - 4

MH50G_MH50V_parts.fm

B Fräskopf - Milling head 2 - 4

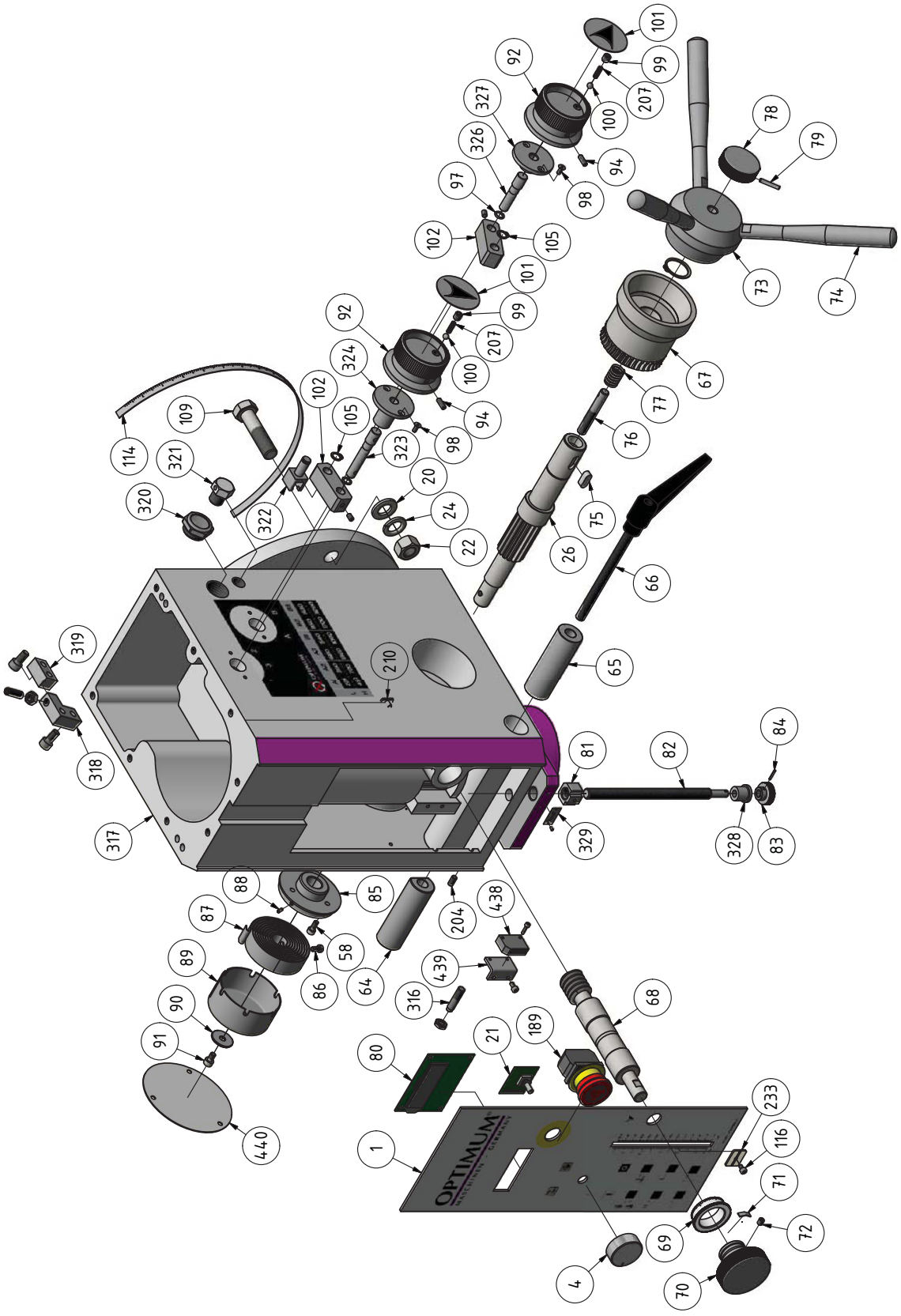


Abb.6-2: Fräskopf - Milling head 2 - 4

C Fräskopf - Milling head 3 - 4

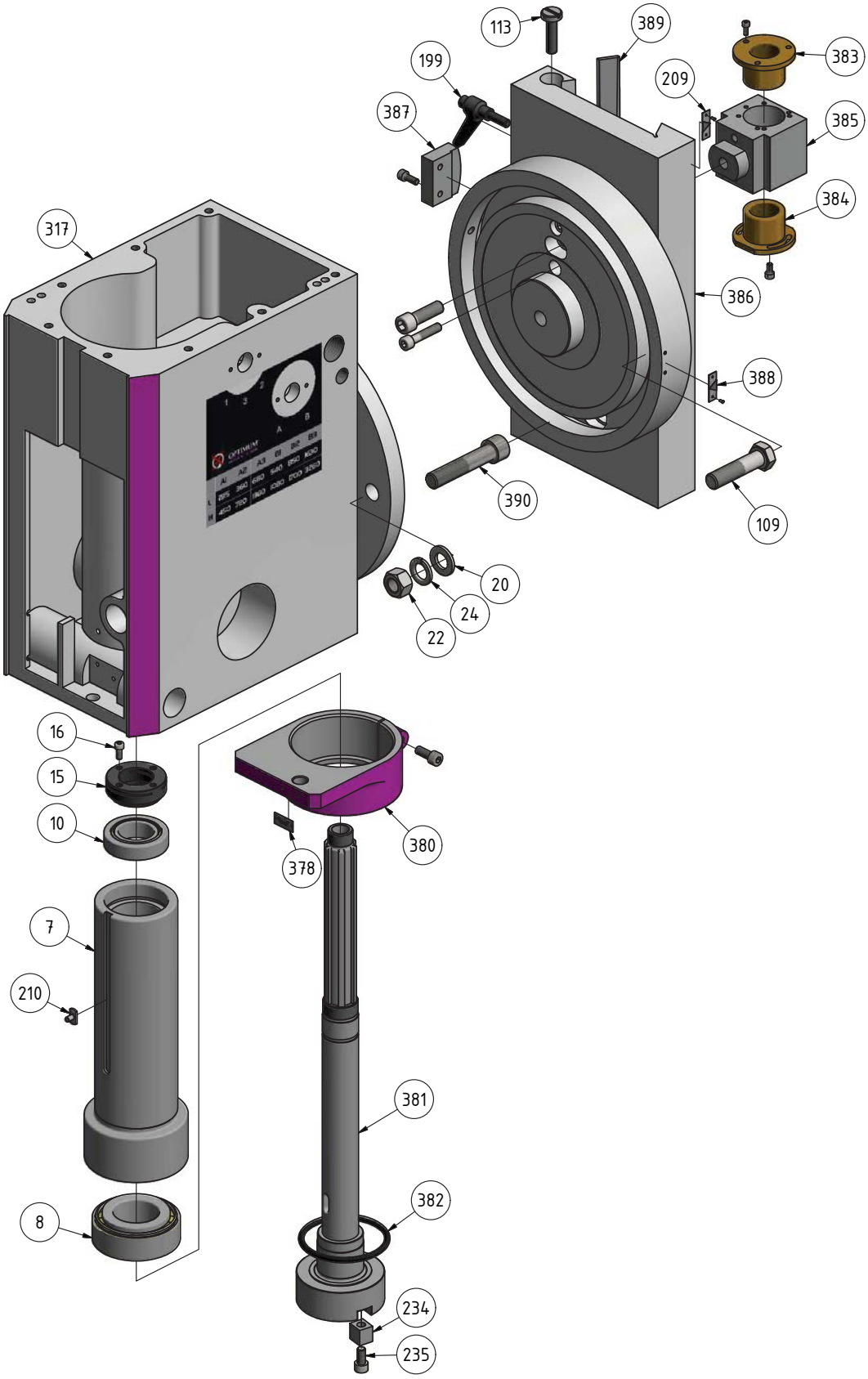


Abb.6-3: Fräskopf - Milling head 3 - 4

MH50G_MH50V_parts.fm

D Fräskopf - Milling head 4 - 4

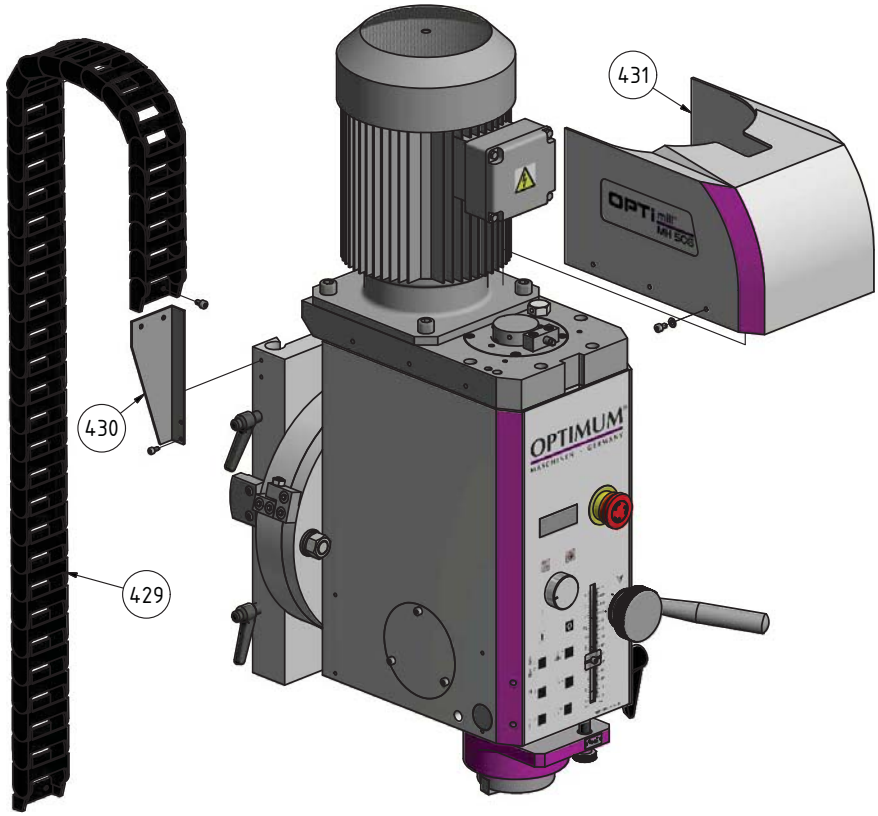


Abb. 6-4: Fräskopf - Milling head 4-4

E Säule - Column 1 - 2

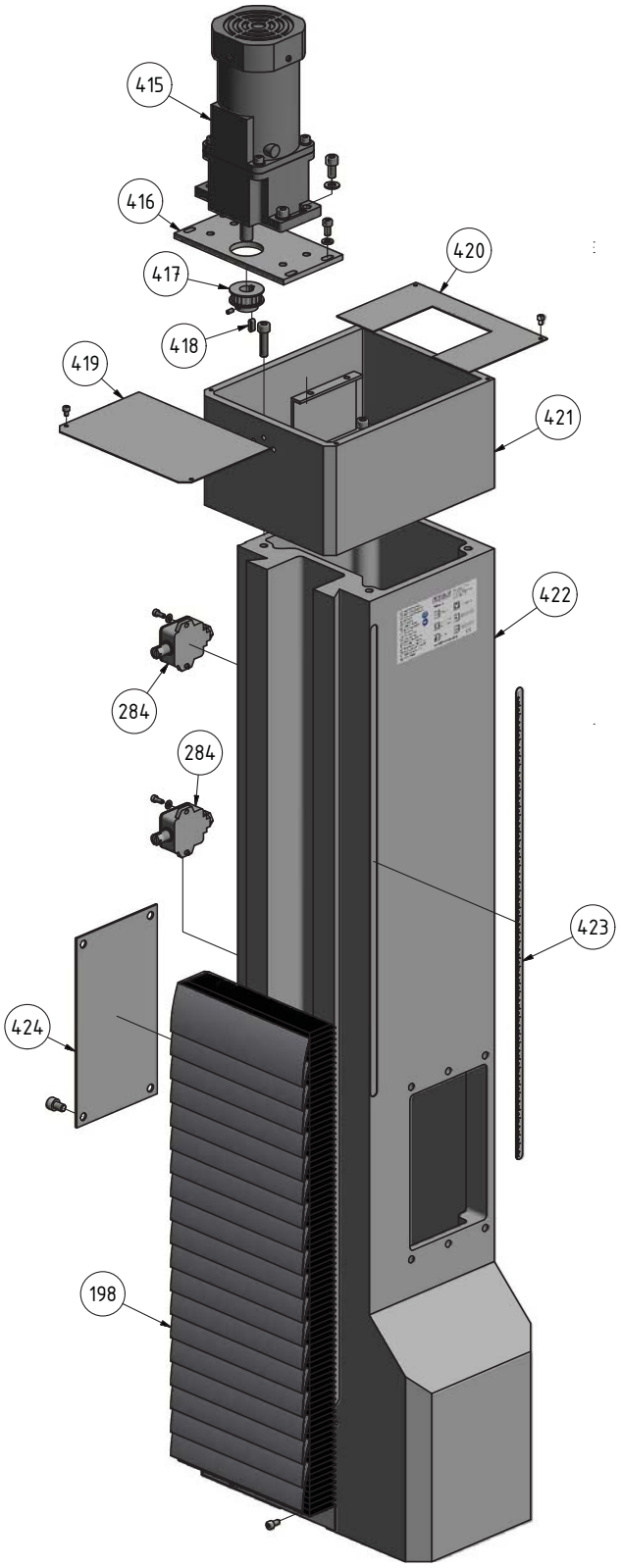


Abb.6-5: Säule - Column 1-2

MH50G_MH50V_parts.fm

F Säule - Column 2 - 2

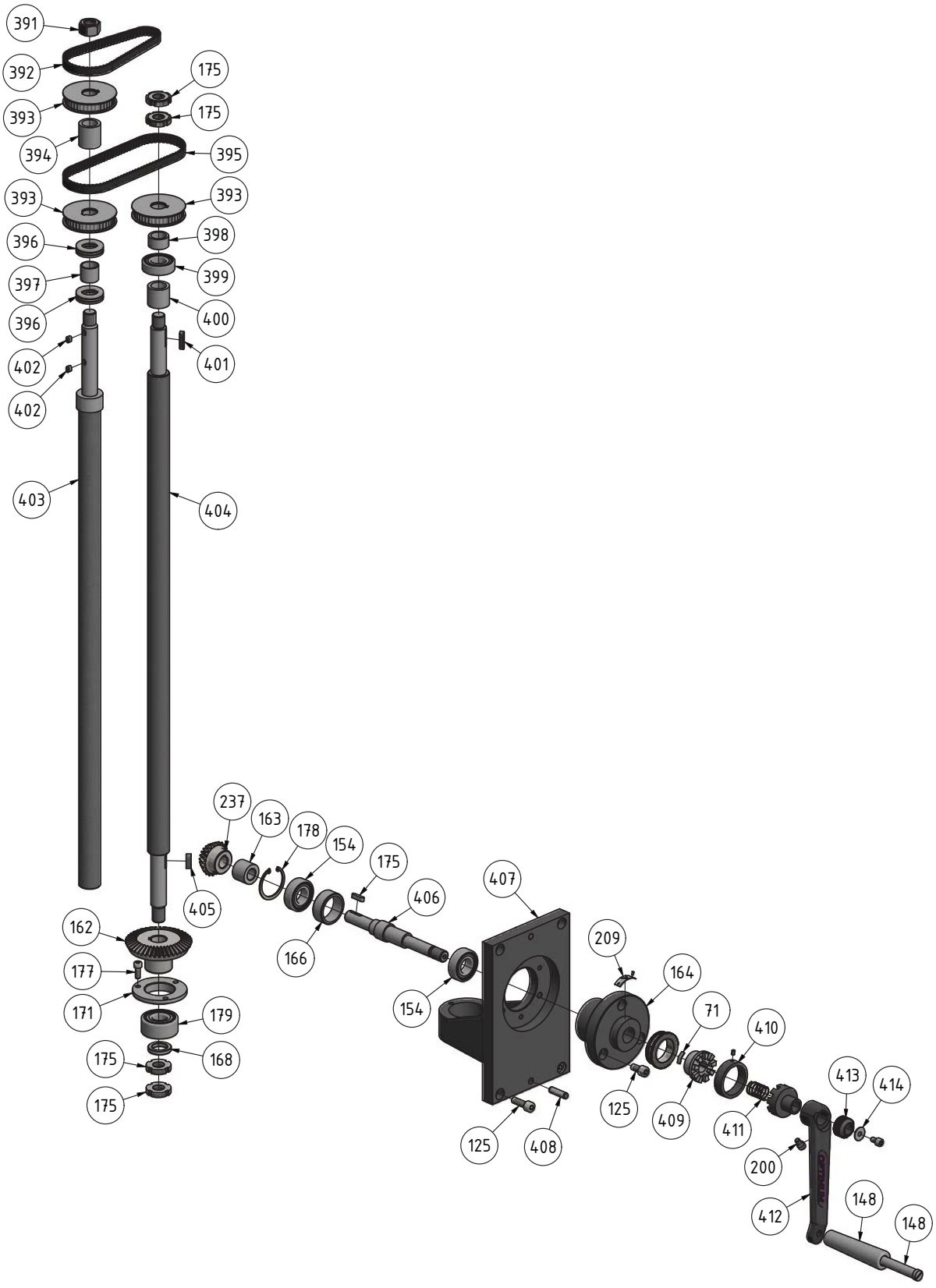


Abb. 6-6: Säule - Column 2-2

MH50G_MH50V_parts.fm

G Kreuztisch - Cross table 1 - 2

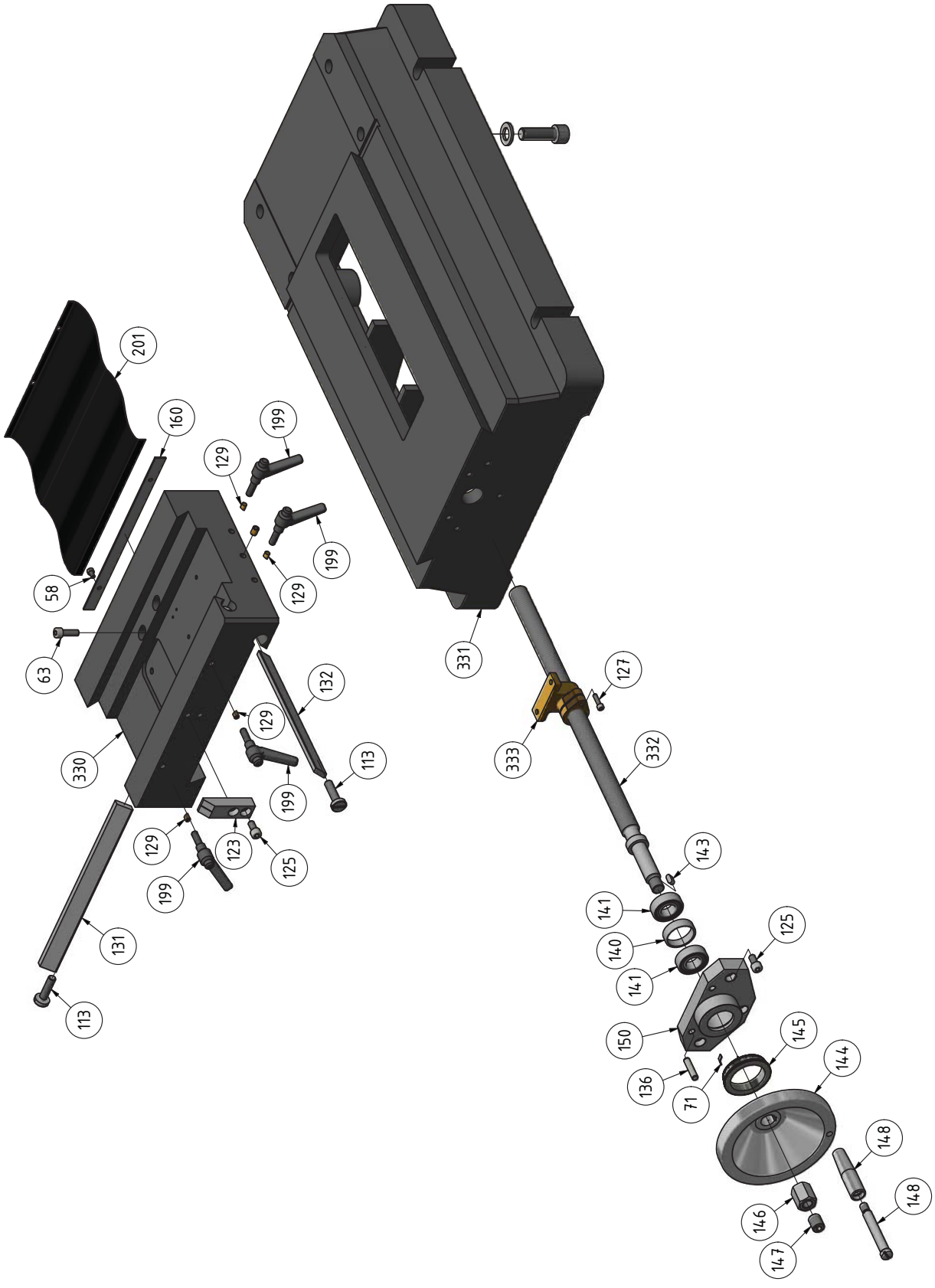


Abb.6-7: Kreuztisch - Cross table 1 - 2

H Kreuztisch - Cross table 2 - 2

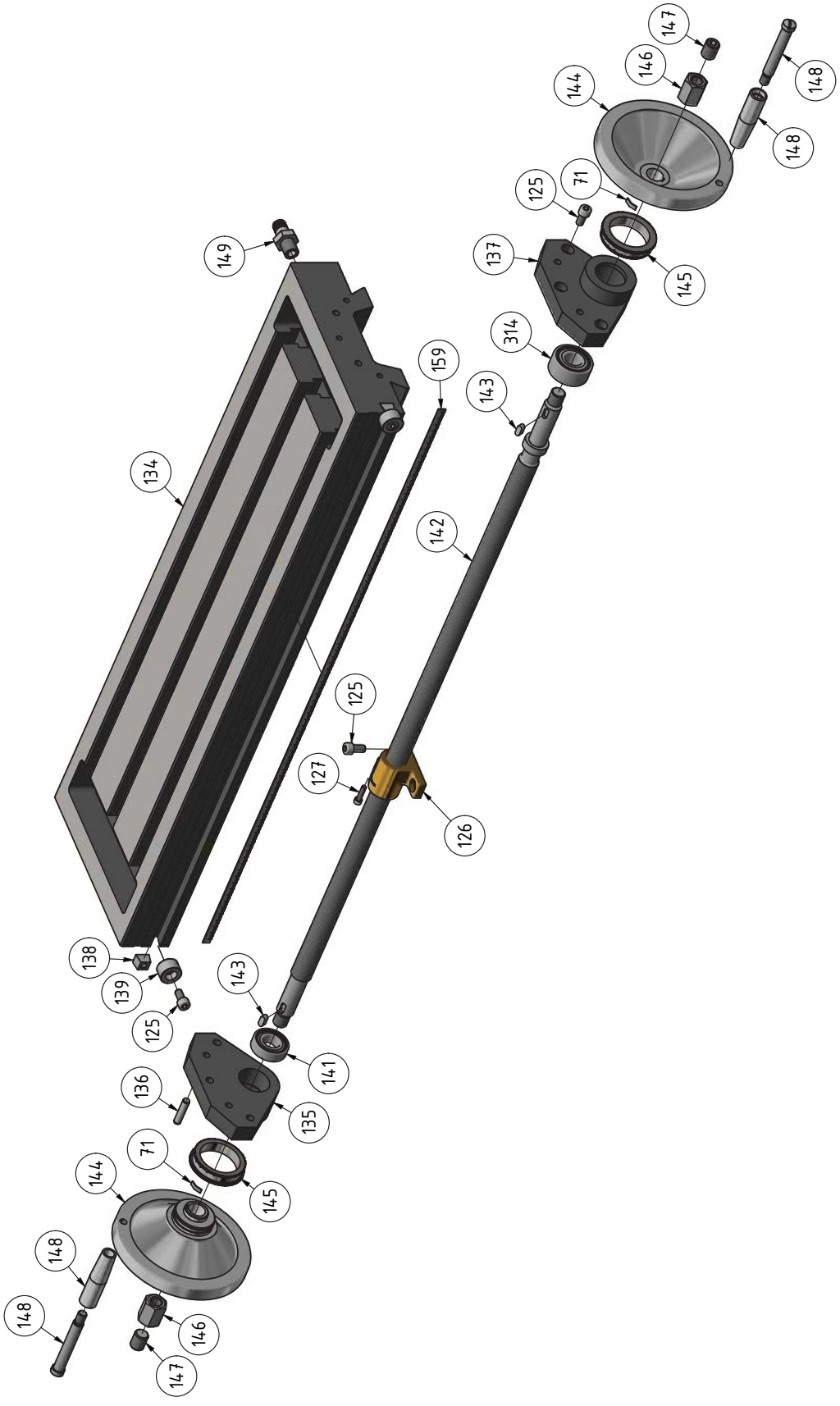


Abb. 6-8: Kreuztisch - Cross table 1 - 2

MH50G_MH50V_parts.fm

I Schutzeinrichtung - Protection device

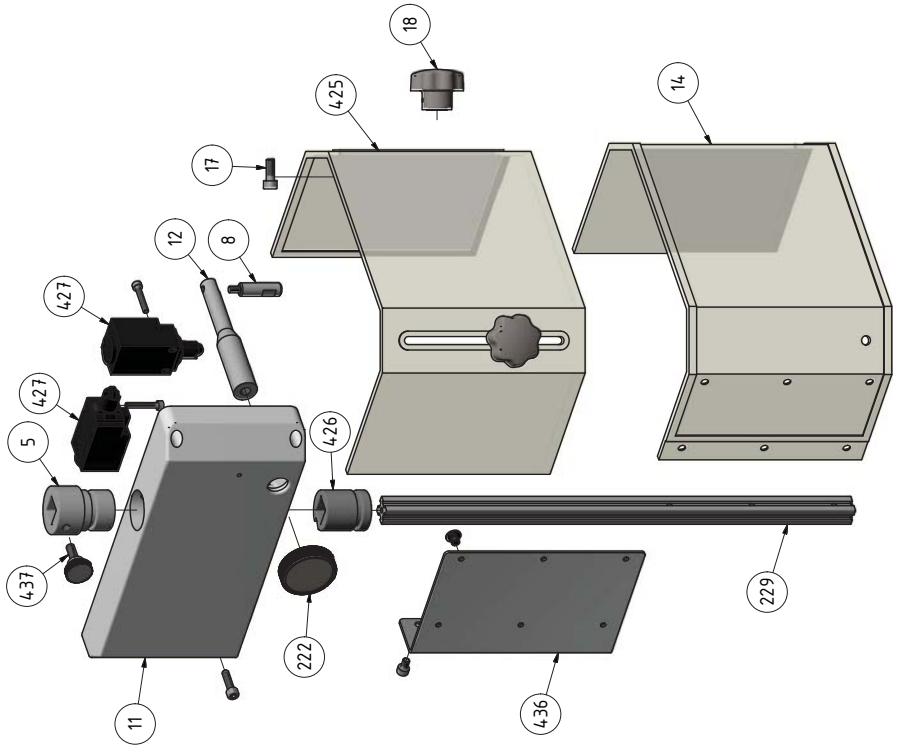


Abb.6-9: Schutzeinrichtung - Protection device

J Schaltschrank - Switch cabinet

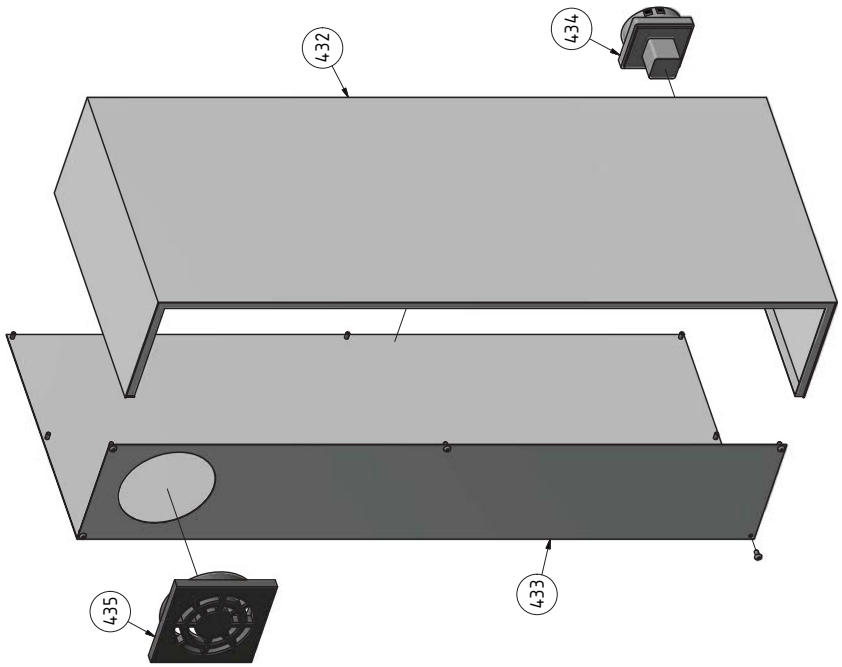


Abb.6-10: Schaltschrank - Switch cabinet

MH50G_MH50V_parts.fm

6.5 Schaltplan - Wiring diagram - MH50G

K

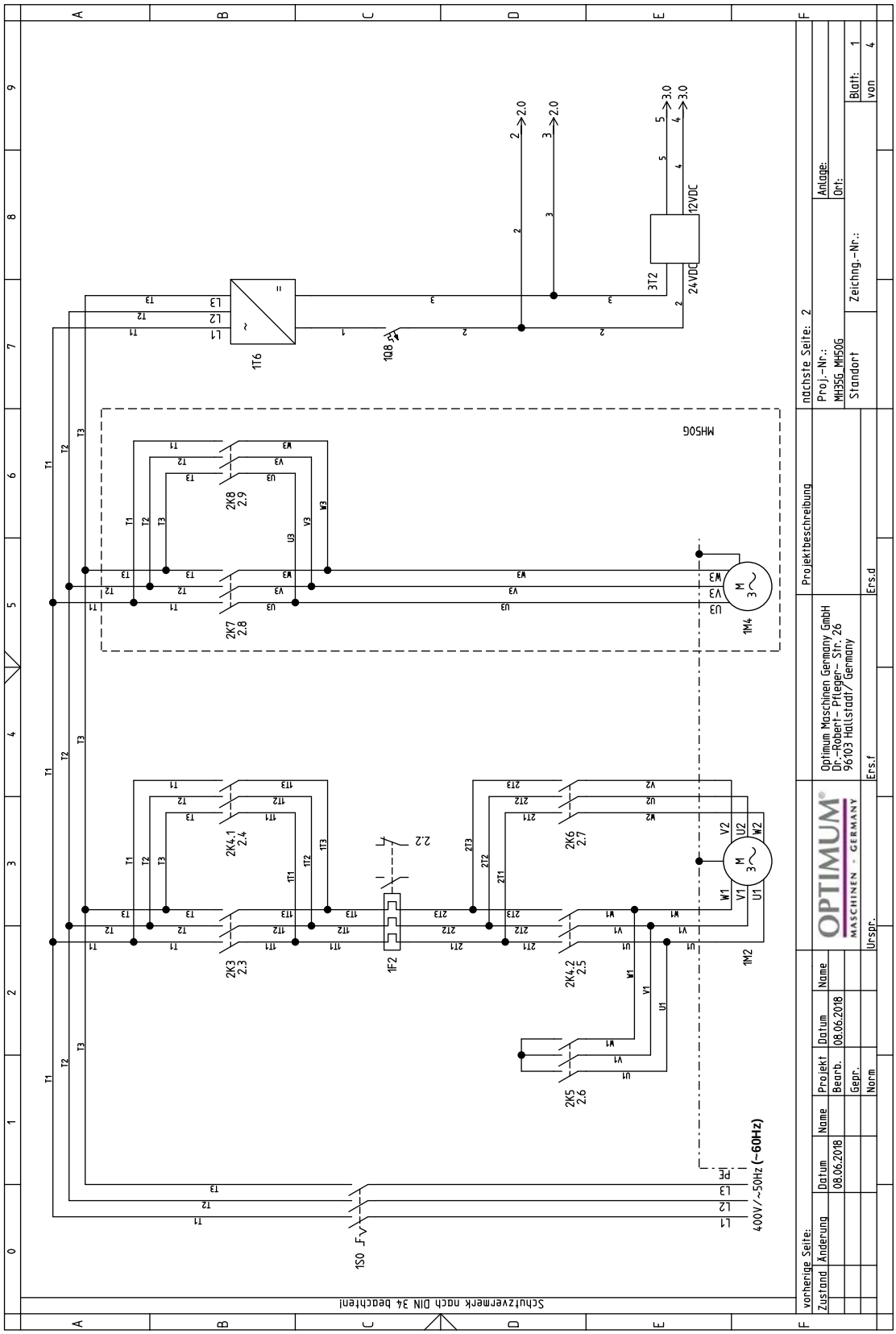


Abb. 6-11: Schaltplan - Wiring diagram MH50G 1-4

MH50G_MH50V_parts.fm

L

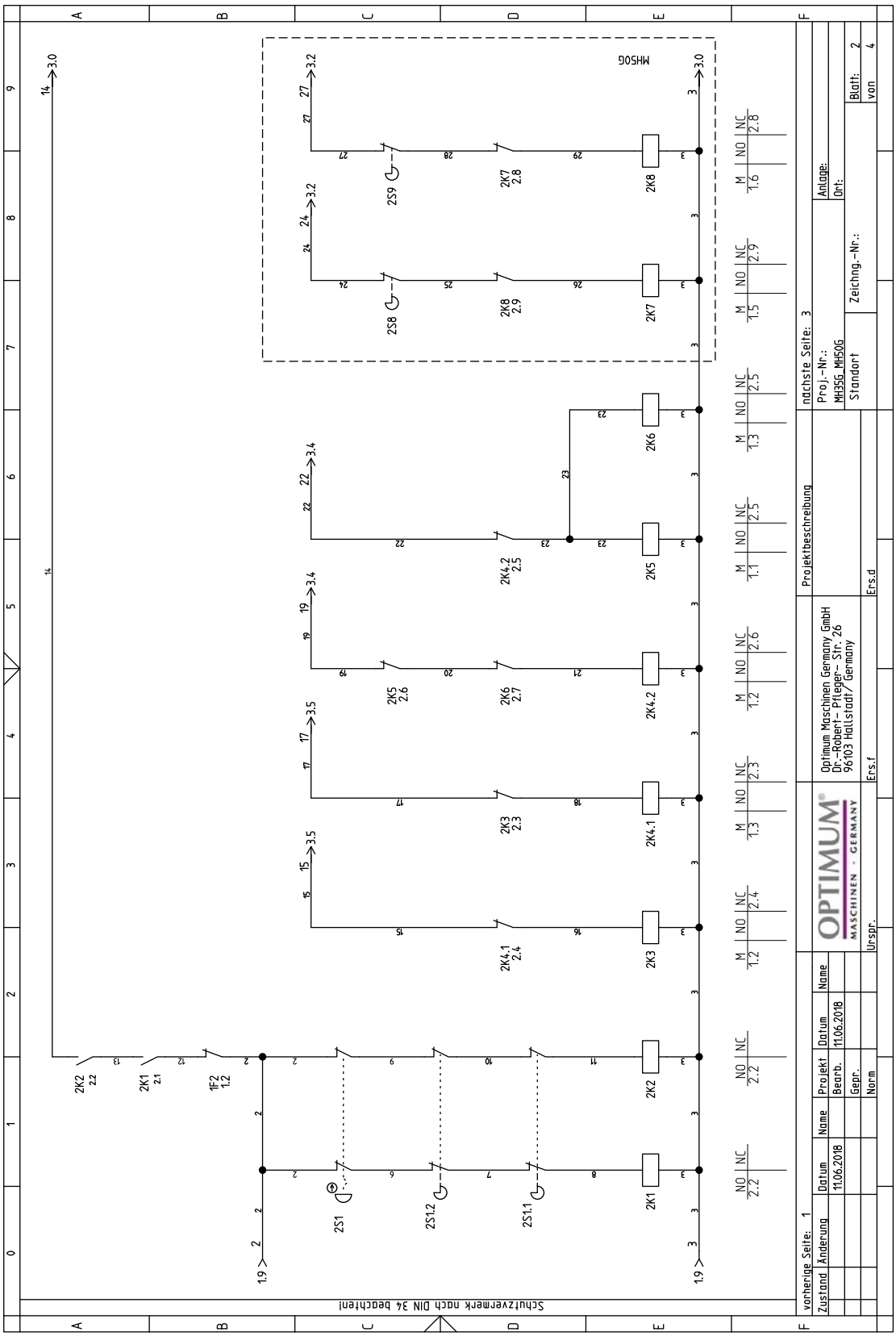


Abb.6-12: Schaltplan - Wiring diagram MH50G 2-4

M

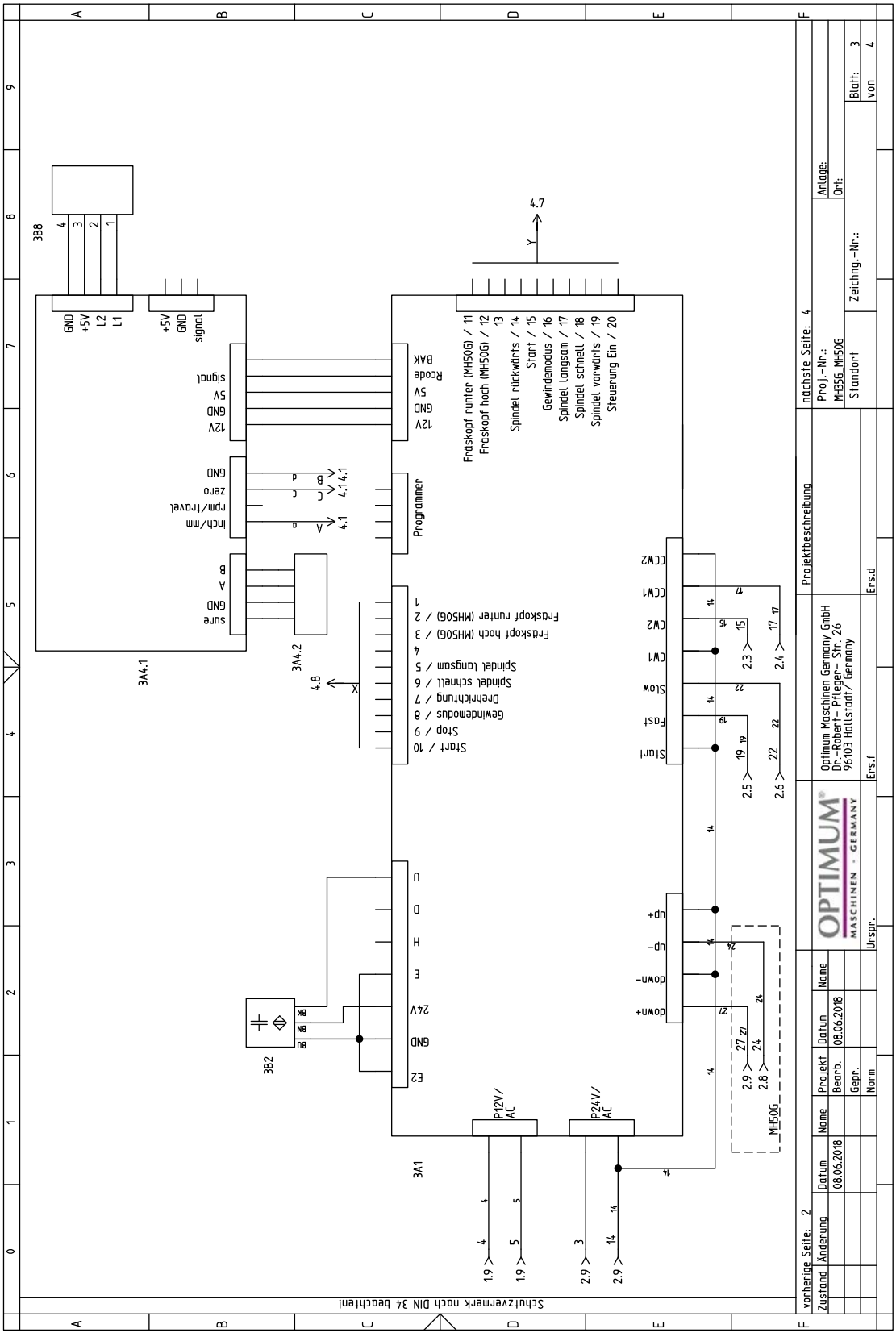


Abb. 6-13: Schaltplan - Wiring diagram MH50G 3-4

N

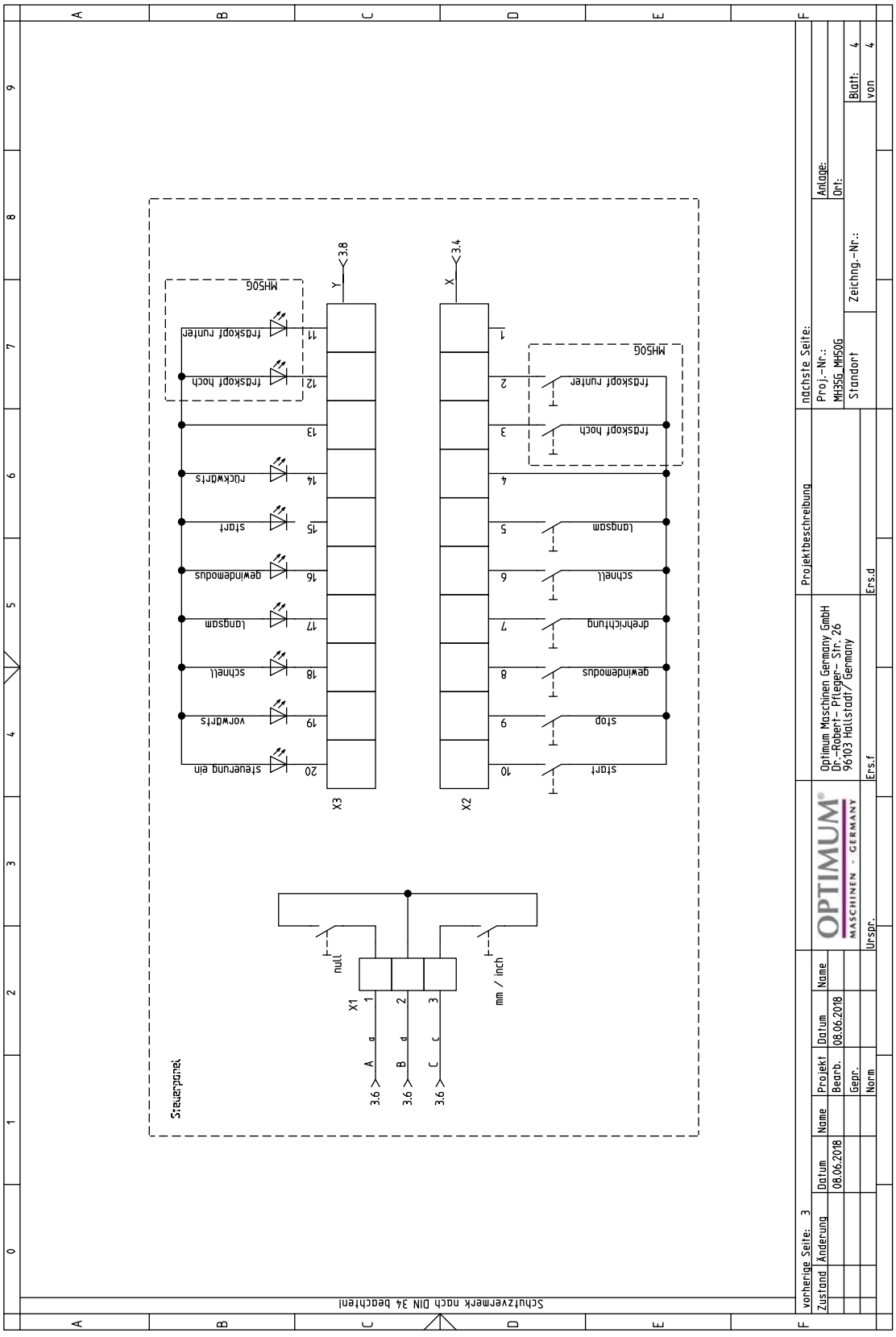
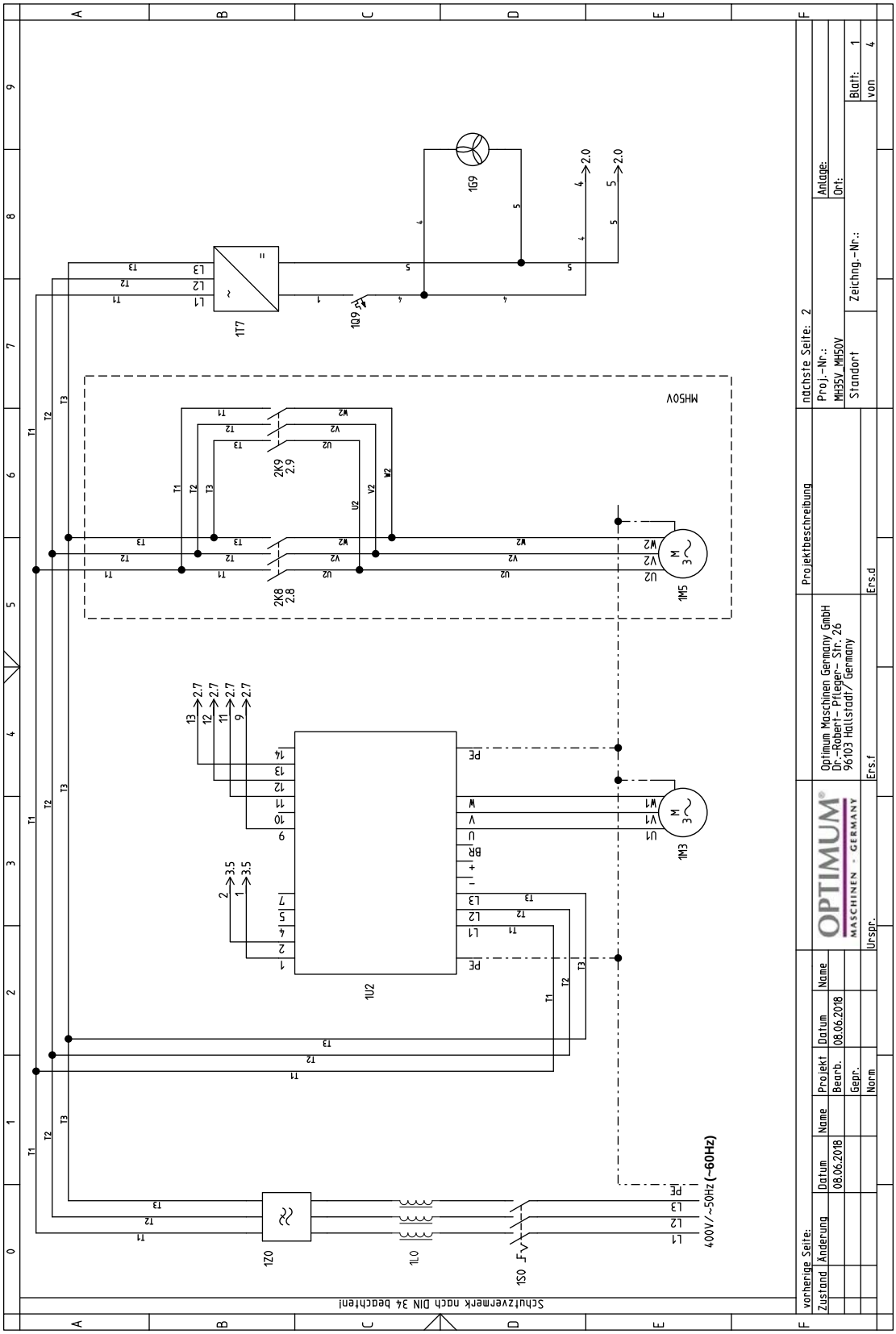


Abb.6-14: Schaltplan - Wiring diagram MH50G 4-4

6.6 Schaltplan - Wiring diagram - MH50V

O



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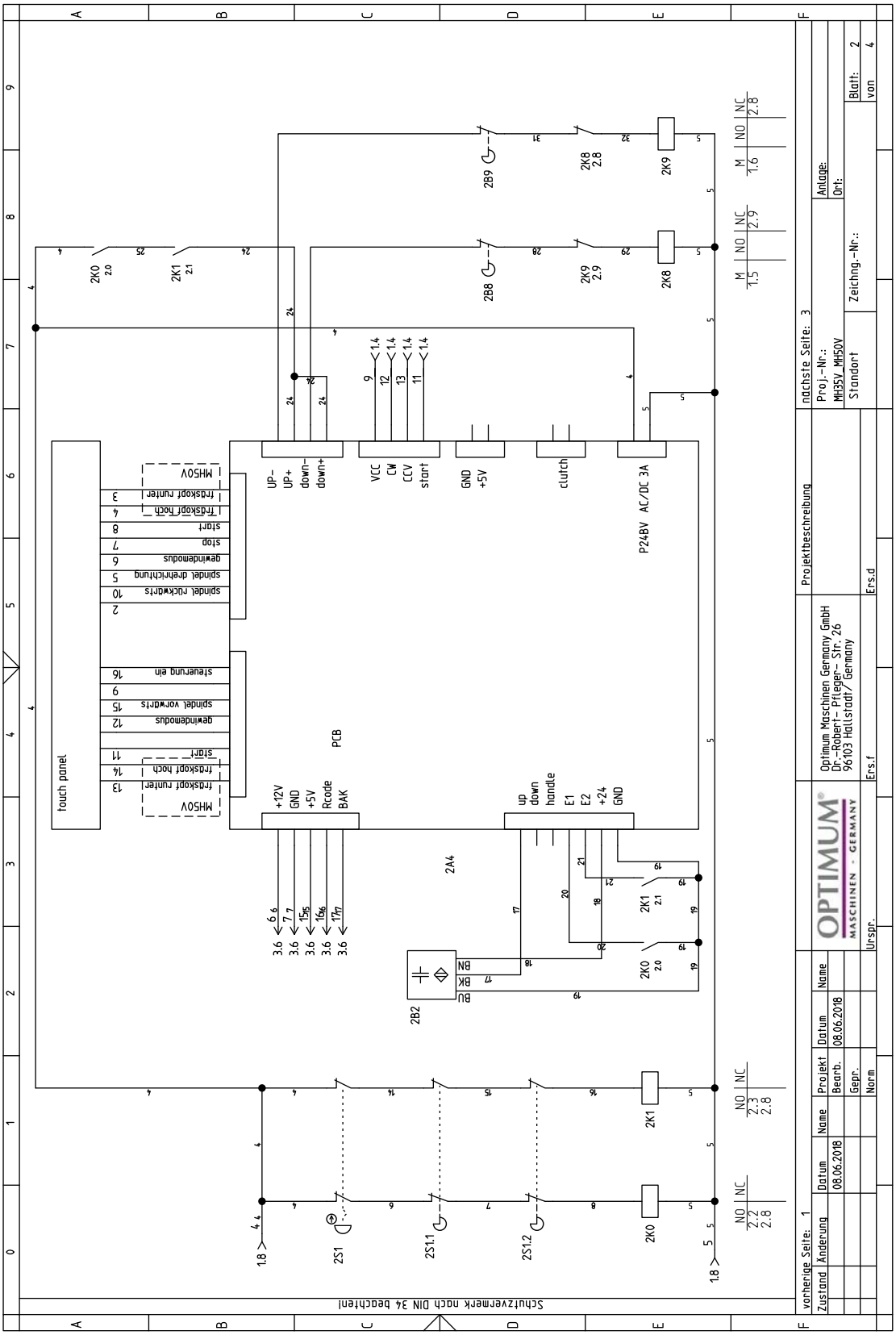
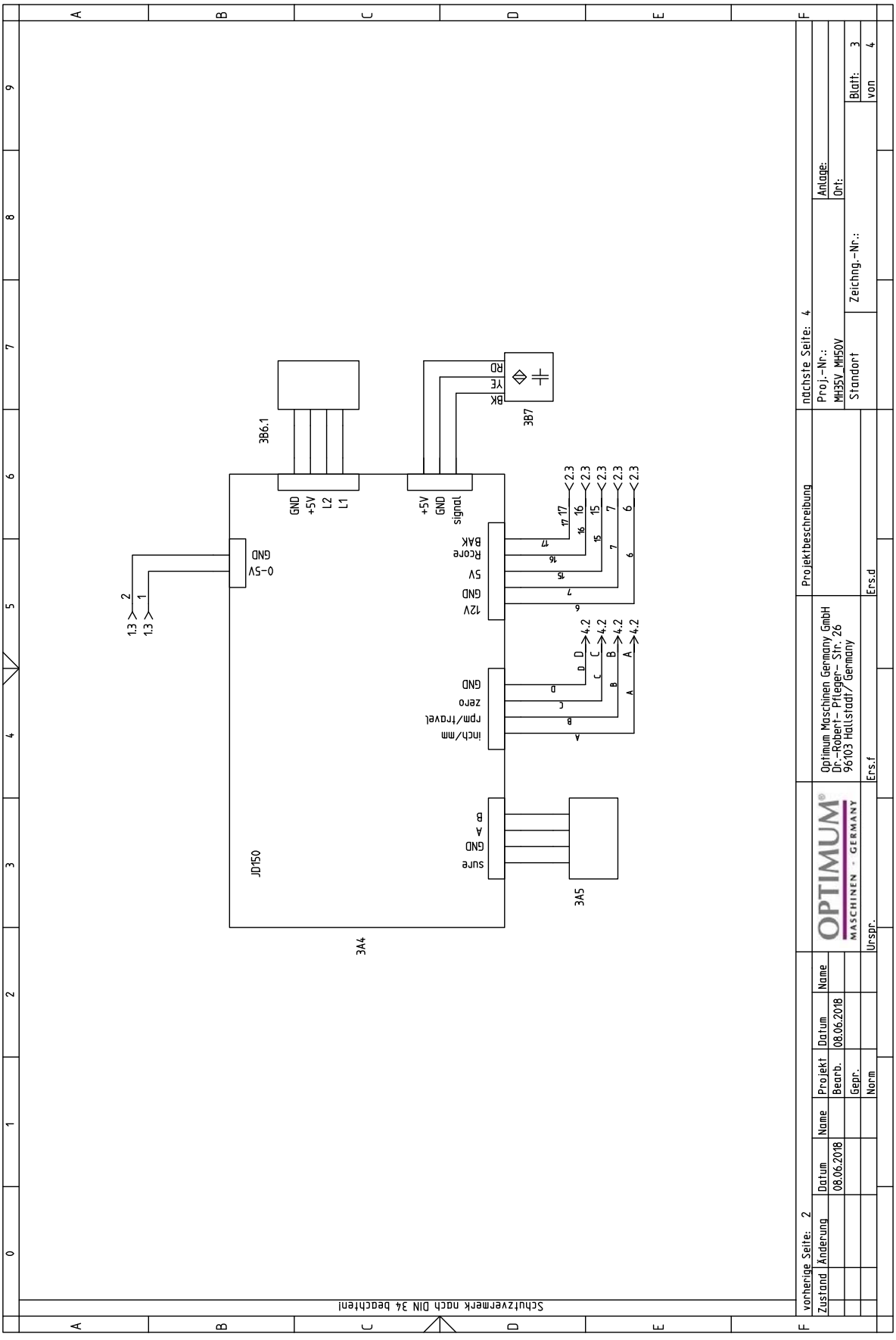
P

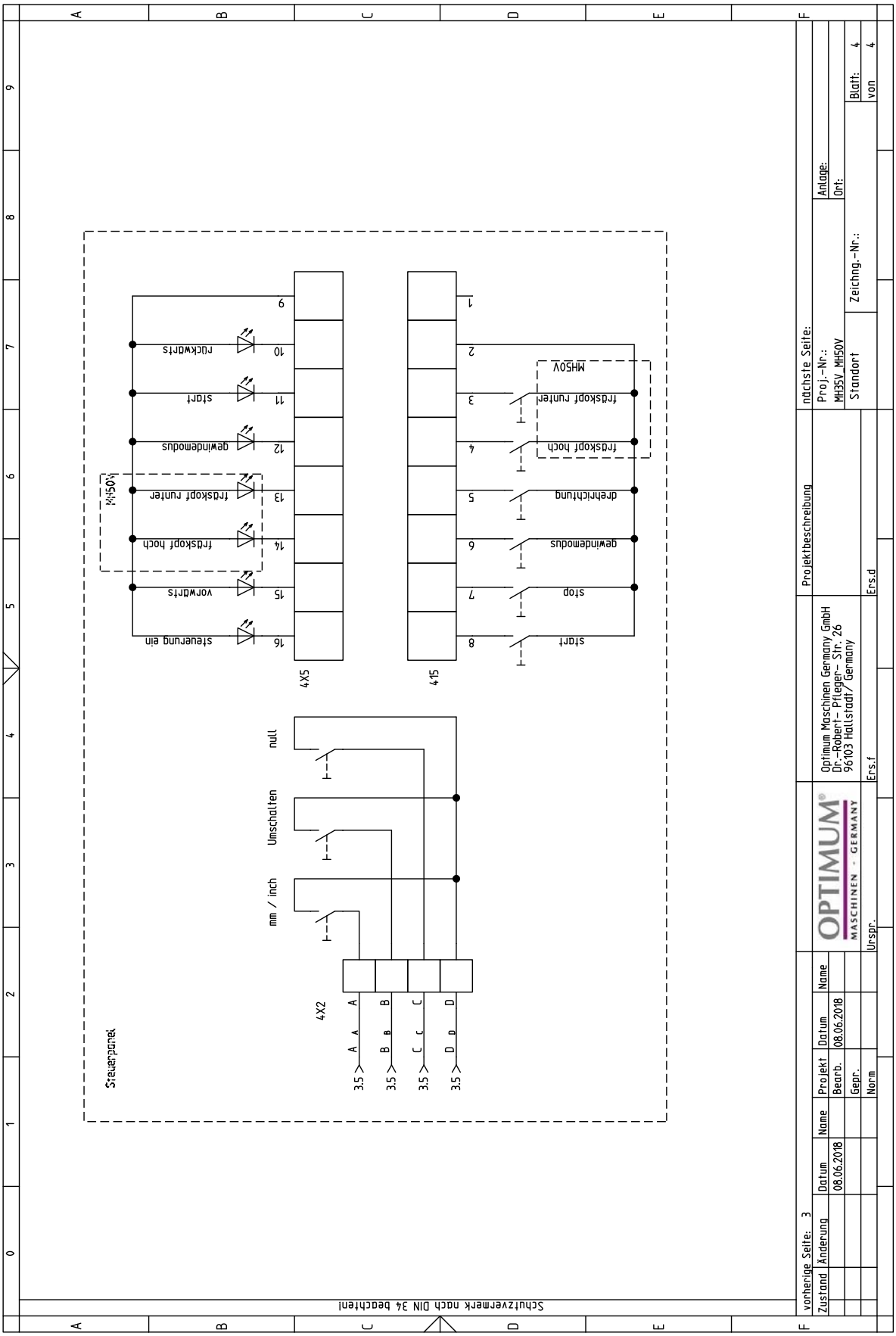

touch panel
PCB
MH50V
frdskopf unter
frdskopf hoch
start
stop
gewindemodus
spindel drehrichtung
spindel rückwärts
steuerung ein
spindel vorwärts
+12V
GND
+5V
Rcode
BAK
up
down
handle
E1
E2
+24
GND
UP-
UP+
down-
down+
VCC
CW
CCV
start
GND
+5V
clutch
P24BV AC/DC 3A
2S1
2S1.1
2S1.2
2B2
2B9
2B8
2K0
2K1
2K8
2K9
Schutzvermerk nach DIN 34 beachten!
Optimum Maschinen Germany GmbH
Dr.-Robert- Pflege- Str. 26
96103 Hallstadt/ Germany
Projektbeschreibung
nächste Seite: 3
vorherige Seite: 1
Proj.-Nr.:
MH35V_MH50V
Standort
Anlage:
Ort:
Zeichng.-Nr.:
Blatt: 2
von 4

Q



MH50G_MH50V_parts.fm

R



MH50G_MH50V_parts.fm

6.7 Ersatzteilliste - Spare parts list - MH50G | MH50V

Ersatzteileliste - Spare parts list					
Pos.	Bezeichnung	Designation	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Frontplatte	Front plate	1	MH50G	0333818001
1	Frontplatte	Front plate	1	MH50V	0333818501
2	Getriebeschild	Gear plate	1	MH50G	03338180L02
3	Getriebeschild	Gear plate	1	MH50V	
4	Einstellknopf	Mode knob	1		0333818004
5	Buchse	Bushing	1		0333818005
6	Magnet	Magnet	1		0333818006
7	Pinole	Pinole	1		0333818007
8	Kegelrollenlager	Taper roller bearing	1	33209_Q	04033209
10	Kegelrollenlager	Taper roller bearing	1	33007	04033007
11	Abdeckung	Cover	1		0333818011
12	Stange	Rod	1		0333818012
13	Buchse	Bushing	1		
14	Fräsfutterschutz	Mill chuck safety cover	1		0333818014
15	Klemmmutter	Clamping nut	1		0333818015
16	Sechskantschraube	Hexagon screw	2	M5 x 12	
17	Schraube	Screw	2		
18	Klemmschraube	Clamping screw	2		
19	Gewindestift	Set screw	2	M4 x 8	
20	Scheibe	Washer	11	A 16	
21	Potentiometer	Potentiometer	1		0333818021
22	Sechskantmutter	Hexagon nut	7	M16	
24	Federring	Lock washer	7	A16	
26	Schaftritzel	Pinion shaft	1		0333818026
58	Innensechskantschraube	Socket head screw	13	M5 x 12	
63	Innensechskantschraube	Socket head screw	27	M8 x 25	
64	Klemmbolzen	Clamping bolt	1		0333818064
65	Klemmbolzen	Clamping bolt	1		0333818065
66	Klemmhebel	Clamping lever	1		0333818066
67	Schneckenrad 35Z	Taper gear wheel 35	1		0333818067
68	Schneckenwelle	Worm shaft	1		0333818068
69	Skalenring	Scale ring	1		
70	Rändelscheibe	Knurling tool	1		
71	Federblech	Spring plate	4		
72	Gewindestift	Set screw	1	M6 x 8	
73	Nabe	Hub	1		0333818073
74	Griffhebel	Lever	3		0333818074
75	Paßfeder	Key	1	A 8 x 7 x 20	042P8720
76	Gewindestange	Threaded rod	1		0333818076
77	Druckfeder	Compression spring	1	2×14×30-3	0333818077

78	Rändelscheibe	Knurling tool	1		0333818078
79	Spannstift	Spring pin	1	3 × 25	
80	Digitalanzeige	Digital display	1		0333818080
81	Bohrtiefenanschlag	Drilling depth stop	1		0333818081
82	Gewindestange	Threaded rod	1		0333818082
83	Rändelscheibe	Knurling tool	1		0333818083
84	Spannstift	Spring pin	1	3 × 14	
85	Mitnehmerscheibe	Driving disk	1		0333818085
86	Sechskantschraube mit Schlitz	Hexagonal screw with slot	1	M5 x 10	
87	Rückholfeder	Return spring	1		0333818087
88	Schraube	Screw	2	M3 × 10	
89	Rückholfederabdeckung	Return spring housing	1		0333818089
90	Scheibe	Disk	1		
91	Innensechskantschraube	Socket head screw	1	M6 x 10	
92	Wahldrehschalter Getriebe	Choice rotary switch transmission	1		0333818092
94	Gewindestift	Set screw	1	M5 x 16	
97	O-Ring	O-ring	1	20 x 3.55 - N - NBR 70	
98	Schraube	Screw	3	M5 × 10	
99	Gewindestift	Set screw	1	M8 x 8	
100	Stahlkugel	Steel ball	1	6.5	042KU65
101	Positionsdeckel Wahldrehschalter	Position cover choice rotary switch	1		
102	Arm Schaltgabel	Arm shift fork	1		03338180102
105	Sicherungsring	Snap ring	1	10 × 1	042SR10W
109	Sechskantschraube	Hexagon screw	2	M16 x 65	
113	Stellschraube	Adjusting screw	6		03338180113
114	Winkelskala	Angle scale	1		
116	Innensechskantschraube	Socket head screw	1	4762-M4 × 8	
123	Marke Längenmessung Kreuztisch	Zero point - linear measurement cross table	1		03338180123
125	Innensechskantschraube	Socket head screw	28	M8 x 16	
126	Spindelmutter X-Achse	Spindle nut x-axis	1		03338180126
127	Innensechskantschraube	Socket head screw	2	M5 x 20	
129	Messingstift	Brass pin	6		
131	Keilleiste X-Achse	Taper gib x-axis	1		03338180131
132	Keilleiste Y-Achse	Taper gib y-axis	1		03338180132
134	Frästisch	Milling table	1		03338180134
135	Lagerbock X-Achse	Bearing block x-axis	1		03338180135
136	Zylinderstift	Cylindrical pin	6	8 h8 x 35	
137	Lagerbock X-Achse	Bearing block x-axis	1		03338180137
138	Nutenstein Endanschlag X-Achse	Slots stone end stop x-axis	2		
139	Hülse Endanschlag X-Achse	Bushing end stop x-axis	2		
140	Distanzring	Spacer ring	2		
141	Rillenkugellager	Grooved ball bearing	5	6004	0406004R
142	Spindel X-Achse	Spindle x-axis	1		03338180142
143	Paßfeder	Key	3	A 6 x 6 x 14	042P6614
144	Handrad	Handwheel	3		03338180144

145	Skalenring	Scale ring	3		03338180145
146	Mutter	Nut	3		03338180146
147	Gewindestift	Set screw	3	M16 x 20	
148	Griff komplett	Handle complete	4		03338180148
149	Einschraubanschluss Kühlmittelabfluss	Screwing in connection coolant drainage	1		
150	Lagerbock Y-Achse	Bearing block y-axis	1		03338180150
154	Rillenkugellager	Grooved ball bearing	4	6004-2Z	0406004R
159	Skala X-Achse	Scale x-axis	1		03338180159
160	Leiste	Plate	1		03338180160
162	Kegelzahnrad 42	Taper gear 42	1		03338180162
163	Distanzhülse	Spacer	1		03338180163
164	Flansch	Flange	1		03338180164
168	Scheibe	Disk	1		
171	Lagerdeckel	Bearing cover	1		03338180171
175	Nutmutter	Grooved nut	3	M16	03338180175
177	Innensechskantschraube	Socket head screw	8	M6 x 16	
178	Sicherungsring	Snap ring	2	42 x 1.75	042SR42W
179	Schrägkugellager	Skew-angle roller bearing	1	3204 A	0403204
189	Not Aus Schlagschalter	Emergency OFF push button	1		
198	Faltenbalg	Bellows	1		03338180198
199	Klemmhebel	Clamping lever	6		03338180199
200	Innensechskantschraube	Socket head screw	1	M10 x 16	
201	Gummiabdeckung	Rubber cover	1		03338180201
204	Gewindestift	Set screw	2	M6 x 25	
207	Druckfeder	Compression spring	1	0.8×5×25-3	
209	Marke Winkelskala	Zero point - scale	1		
210	Zentrierstück Pinole	Centerring piece pinole	1		03338180210
221	Halter	Support	1		
222	Knopf	Knob	1		03338180222
228	Innensechskantschraube	Socket head screw	1		
229	Stange	Rod	4		
232	Innensechskantschraube	Socket head screw	2		
233	Anzeiger Bohrtiefenanschlag	indicator drilling depth stop	1		
234	Mitnehmer Fräswerkzeug	Socket piece milling tool	2		
235	Innensechskantschraube	Socket head screw	2	M8 x 16	
237	Kegelzahnrad 21 Zähne	Taper gear wheel 21 teeths	1		03338180236
284	Endschalter	Endswitch	2		03338456284
314	Kugellager	Ball bearing	1		0403204
315	Halter	Holder	1		
316	Sensor obere Position	Top sensor	1		
317	Gehäuse	Housing	1		03338180317
318	Endanschlag	Limit stop	1		03338180318
319	Endanschlag	Limit stop	1		03338180319
320	Ölschauglas	Oil sight glass	1		
321	Ablassschraube	Plug screw	1		
322	Schaltgabel	Switch fork	1		03338180322

323	Welle	Shaft	1		
324	Flansch	Flange	1		03338180324
325	Schaltgabel	Switch fork	1		
326	Welle	Shaft	1		03338180326
327	Flansch	Flange	1		03338180327
328	Buchse	Bushing	1		03338180328
329	Anzeige	Indicator	1		
330	Führung	Guide	1		03338180330
331	Kreuztischführung	Cross table guidance	1		03338180331
332	Spindel	Spindle	1		03338180332
333	Spindelmutter	Spindle nut	1		03338180333
334	Motor	Motor	1		03338180334
335	Endanschlag	Limit stop	1		
336	Sensorhalter	Sensor holder	1		03338180336
337	Drehzahlsendor	Rotary speed sensor	1		
338	Flansch	Flange	1		03338180338
339	Passfeder	Fitting key	1	5x5x28	042P5530
340	Sicherungsring	Retaining ring	1	55x2	042SR55W
341	Motorplatte	Motor plate	1		03338180341
342	Einfüllschraube	Plug screw	1		
343	Stange	Rod	1		03338180343
344	Ring	Ring	1		03338180344
345	Gewindebolzen	Threaded bolt	1		
346	Schnapper	Catcher	1		03338180346
347	Feder	Spring	1		03338180347
348	Ring	Ring	1		03338180348
349	Kugellager	Ball bearing	1	6308-2RZ	0406308R
350	Zahnrad	Gear	1		03338180350
351	Magnet	Magnet	1		
352	Zahnwelle	Gear shaft	1		03338180352
353	Kugellager	Ball bearing	1	6011-2RZ	0406011R
354	Dichtung	Seal	1		
355	Sicherungsring	Retaining ring	1	80x2,5	
356	Sicherungsring	Retaining ring	2		
357	Kugellager	Ball bearing	2	6003-2RZ	0406003R
358	Sicherungsring	Retaining ring	2	32x1,5	042SR32W
359	Zahnrad	Gear	1		03338180359
360	Zahnrad	Gear	1		03338180360
361	Zahnrad	Gear	1		03338180361
362	Passfeder	Fitting key	1	5x5x16	042P5516
363	Zahnrad	Gear	1		03338180363
364	Passfeder	Fitting key	1	5x5x10	042P5510
365	Zahnrad	Gear	1		03338180365
366	Gehäuse	Housing	1		
367	Welle	Shaft	1		03338180367
368	Passfeder	Fitting key	1	10x8x22	

369	Kugellager	Ball bearing	1	6006-2RZ	0406006R
370	Welle	Shaft	1		03338180370
371	Passfeder	Fitting key	1	5x5x40	042P5540
372	Zahnrad	Gear	1		03338180372
373	Ring	Ring	1		
374	Kugellager	Ball bearing	1	6203-2RZ	0406203R
378	Skala	Scale	1		03338180378
380	Halter	Holder	1		03338180380
381	Fräsown	Mill spindle	1		03338180381
382	O-Ring	O-ring	1		
383	Spindelmutter A	Spindle nut A	1		03338180383
384	Spindelmutter B	Spindle nut B	1		03338180384
385	Gehäuse	Housing	1		03338180385
386	Drehlagerbock	Connect board	1		03338180386
387	Endanschlag	Limit stop	1		03338180387
388	Skala	Scale	1		03338180388
389	Keilleiste	Gib	1		03338180389
390	Innensechskantschraube	Socket head screw	1	M16x80	
391	Sechskantmutter	Hexagon nut	1	M16	
392	Zahnriemen	Belt gear	1		03338180392
393	Zahnscheibe	Gear washer	3		03338180393
394	Buchse	Bushing	1		03338180394
395	Zahnriemen	Gear washer	1		03338180395
396	Axiallager	Thurts bearing	2	51104	04051104
397	Buchse	Bushing	1		03338180397
398	Buchse	Bushing	1		
399	Kugellager	Ball bearing	1	6004-2Z	0406004R
400	Buchse	Bushing	1		03338180400
401	Passfeder	Fitting key	1	5x5x25	
402	Passfeder	Fitting key	2	5x5x10	042P5510
403	Spindel	Spindle	1		03338180403
404	Spindel	Spindle	1		03338180404
405	Passfeder	Fitting key	1	6x6x20	042P6620
406	Welle	Shaft	1		
407	Lagerbock	Bearing block	1		03338180407
408	Zylinderstift	Cylindrical pin	2	8x28	
409	Kupplung	Clutch	1		03338180409
410	Ring	Ring	1		
411	Feder	Spring	1		03338180411
412	Kurbel	Crank	1		03338180412
413	Buchse	Bushing	1		
414	Scheibe	Washer	1		
415	Motor Kopfverstellung	Motor mill head adjusting	1		03338180415
416	Motorplatte	Motor plate	1		03338180416
417	Zahnscheibe	Gear washer	1		03338180417
418	Passfeder	Fitting key	1	5x5x14	042P5516

419	Abdeckung	Cover	1		03338180419
420	Abdeckung	Cover	1		03338180420
421	Gehäuse	Housing	1		03338180421
422	Säule	Column	1		03338180422
423	Skala	Scale	1		03338180423
424	Abdeckung	Cover	1		
425	Fräsfutterschutz	Mill chuch safety	1		03338180425
426	Hülse	Sleeve	1		03338180426
427	Schalter	Switch	2		03338180427
429	Energiekette	Energy chain	1		03338180429
430	Halter	Holder	1		03338180430
431	Motorhaube	Motor cover	1		03338180431
432	Schaltkasten	Switch box	1	MH50G	03338180432
432	Schaltkasten	Switch box	1	MH50V	03338185432
433	Abdeckung	Cover	1	MH50G	03338180433
433	Abdeckung	Cover	1	MH50V	03338185433
434	Hauptschalter	Main switch	1		03338180434
435	Lüfter (nur MH50V)	Fan (only MH50V)	1		03338185435
436	Platte	Plate	1		03338185436
437	Klemmschraube	Clamping screw	1		
438	Lesekopf	Read head	1		03338185438
439	Halter	Holder	1		
440	Abdeckung	Cover	1		
441	Zahnrad	Gear	1		03338180441
442	Sicherungsring	Retaining ring	1	48	
443	Buchse	Bushing	1		03338185443
444	Endanschlag	Limit stop	1		03338185444

Teileliste elektrische Komponente, MH50G - Spare part electrical component, MH50G

Pos.	Bezeichnung	Designation	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1F2	Motorschutzschalter	Motor safety switch	1		
1M2	Spindelmotor	Spindle motor	1		
1M4	Motor Fräskopfverstellung	Motor mill head ajusting	1		
1S0	Hauptschalter	Maun switch	1		
1T6	Netzteil	Power pack	1	Delta DRP024	03462110G
2K1	Relais Sicherheitssteuerung	Safety cintrol relay	1	Omron 07Y17C	
2K2	Relais Sicherheitssteuerung	Safety cintrol relay	1	Omron 07Y17C	
2K3	Schütz Vorwärts	Contactor CW	1		
2K4.1	Schütz Rückwärts	Contactor CCW	1		
2K5	Schütz Dreiecklauf	Contactor triangle run	1		
2K4.2	Schütz Sternlauf	Contactor star running	1		
2K6	Schütz Sternlauf	Contactor star running	1		
2K7	Schütz Fräskopfverstellung	Contactor mill head adjusting	1		
2K8	Schütz Fräskopfverstellung	Contactor mill head adjusting	1		
1Q8	Sicherungsautomat	Automatical fuse	1	KEDU CKDB7 C6A	

2S8	Endschalter Fräskopfverstellung	End switch mill head adjusting	1	JW2A-1HIL	033361005023
2S9	Endschalter Fräskopfverstellung	End switch mill head adjusting	1	JW2A-1HIL	033361005023
3A1	Steuerkarte	Control board	1		
3A4.2	Encoder	Encoder	1		
3B2	Sensor obere Position	Top sensor	1		
3B8	Lesekopf	Read head	1		
2S1	Not-Halt-Schalter	Emergency stop button	1		
2S1.1	Sicherheitsschalter Fräsfutterschutz	Chuck cover safety switch	1		
2S1.2	Endschalter Werkzeugaustreiber	Tool changer end switch	1		
TB	Zubehör	Toolbox	1		03338180TB

Teileliste elektrische Komponente, MH50V - Spare part electrical component, MH50V

Pos.	Bezeichnung	Designation	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1G9	Ventilator	Fan	1		
1M3	Spindelmotor	Spindle motor	1		
1M5	Motor Fräskopfverstellung	Motor mill head ajusting	1		
1Q9	Sicherungsautomat	Autamatical fuse	1		
1S0	Hauptschalter	Main switch	1		
1T7	Netzteil	Power pack	1		
1L0	Drossel	Inductor	1		
1U2	Frequenzumrichter	Frequency conventer	1		
1Z0	Netzfilter	Line filter	1		
2A4	Steuerplatine	Control board	1		
2B2	Sensor obere Position	Top sensor	1		
2B8	Endschalter Fräskopfverstellung	End switch mill head adjusting	1		
2B9	Endschalter Fräskopfverstellung	End switch mill head adjusting	1		
2K8	Schütz Fräskopfverstellung	Contactor mill head adjusting	1		
2K9	Schütz Fräskopfverstellung	Contactor mill head adjusting	1		
2S1	Not-Halt-Schalter	Emergency stop button	1		
2S1.1	Sicherheitsschalter Fräsfutterschutz	Chuck cover safety switch	1		
2S1.2	Endschalter Werkzeugaustreiber	Tool changer end switch	1		
3A4	Steuerpanel	Control panel	1		
3B6.1	Lesekopf	Read head	1		
3B7	Drehzahlsensor	Speed sensor	1		
3A5	Encoder	encoder	1		

Schmierstoffe Lubricant Lubrifiant	Viskosität Viskosity Viscosité ISO VG DIN 51519 mm²/s (cSt)	Kennzeich-nung nach DIN 51502	ARAL	BP	Esso	Klüber Lubrication	Mobil	Shell	Texaco
Getriebeöl Gear oil Huile de réducteur	VG 680	CLP 680	Aral Degol BG 680	BP Energol GR-XP 680	SPARTAN EP 680	Klüberoil GEM 1-680	Mobilgear 636	Shell Omala 680	Meropa 680
	VG 460	CLP 460	Aral Degol BG 460	BP Energol GR-XP 460	SPARTAN EP 460	Klüberoil GEM 1-460	Mobilgear 634	Shell Omala 460	Meropa 460
	VG 320	CLP 320	Aral Degol BG 320	BP Energol GR-XP 320	SPARTAN EP 320	Klüberoil GEM 1-320	Mobilgear 632	Shell Omala 320	Meropa 320
	VG 220	CLP 220	Aral Degol BG 220	BP Energol GR-XP 220	SPARTAN EP 220	Klüberoil GEM 1-220	Mobilgear 630	Shell Omala 220	Meropa 220
	VG 150	CLP 150	Aral Degol BG 150	BP Energol GR-XP 150	SPARTAN EP 150	Klüberoil GEM 1-150	Mobilgear 629	Shell Omala 150	Meropa 150
	VG 100	CLP 100	Aral Degol BG 100	BP Energol GR-XP 100	SPARTAN EP 100	Klüberoil GEM 1-100	Mobilgear 627	Shell Omala 100	Meropa 100
	VG 68	CLP 68	Aral Degol BG 68	BP Energol GR-XP 68	SPARTAN EP 68	Klüberoil GEM 1-68	Mobilgear 626	Shell Omala 68	Meropa 68
	VG 46	CLP 46	Aral Degol BG 46	BP Bartran 46	NUTO H 46 (HLP 46)	Klüberoil GEM 1-46	Mobil DTE 25	Shell Tellus S 46	Anubia EP 46
	VG 32	CLP 32	Aral Degol BG 32	BP Bartran 32	NUTO H 32 (HLP 32)	Klübersynth GEM 4- 32 N	Mobil DTE 24	Shell Tellus S 32	Anubia EP 32
Hydrauliköl Hydraulic oil Huile hydraulique	VG 32	CLP 32	Aral Vitam GF 32	BP Energol HLP HM 32	NUTO H 32 (HLP 32)	LAMORA HLP 32	Mobil Nuto HLP 32	Shell Tellus S2 M 32	Rando HD HLP 32
	VG 46	CLP 46	Aral Vitam GF 46	BP Energol HLP HM 46	NUTO H 46 (HLP 46)	LAMORA HLP 46	Mobil Nuto HLP 46	Shell Tellus S2 M 46	Rando HD HLP 46
Getriebefett Gear grease Graisse de réducteur		G 00 H-20	Aral FDP 00 (Na-verseift) Aralub MFL 00 (Li-verseift)	BP Energrease PR-EP 00	FIBRAX EP 370 (Na-verseift)	MICRO-LUBE GB 00	Mobilux EP 004	Shell Alva-nia GL 00 (Li-verseift)	Marfak 00

oil-compare-list.fm

Spezialfette, wasserabweisend Special greases, water resistant Graisses spéciales, déperlant			Aral Aralub	Energrease PR 9143		ALTEMP Q NB 50 Klüberpaste ME 31-52	Mobilux EP 0 Mobil Greaserex 47		
Wälzlagerfett Bearing grease Graisse de roulement		K 3 K-20 (Li-verseift)	Aralub HL 3	BP Energrease LS 3	BEACON 3	CENTO-PLEX 3	Mobilux 3	Shell Alvania R 3 Alvania G 3	Multifak Premium 3
Öle für Gleitbahnen Oils for slideways Huiles pour glissières	VG 68	CGLP 68	Aral Deganit BWX 68	BP Maccurat D68	ESSO Febis K68	LAMORA D 68	Mobil Vactra Oil No.2	Shell Tonna S2 M 68	Way lubricant X 68
Öle für Hochfrequenzspindeln Oils for Built-in spindles Huiles pour broches à haute vitesse	VG 68		Deol BG 68	Emergol HLP-D68	Spartan EP 68		Drucköl KLP 68-C	Shell Omala 68	
Fett für Zentralschmierung (Fließfett) Grease for central lubrication Graisse pour lubrification centrale	NLGI Klasse 000 NLGI class 000		ARALUB BAB 000	Grease EP 000	Shell Gadus S4 V45AC	CENTO-PLEX GLP 500	Mobilux EP 023		Multifak 264 EP 000
Fett für Hochfrequenzspindeln Grease for Built-in spindles Graisse pour broches à haute vitesse	METAFLUX-Fett-Paste (Grease paste) Nr. 70-8508 METAFLUX-Moly-Spray Nr. 70-82 Techno Service GmbH ; Detmolder Strasse 515 ; D-33605 Bielefeld ; (++49) 0521- 924440 ; www.metaflux-ts.de								
Kühlschmiermittel Cooling lubricants Lubrifiants de refroidissement	Schneidöl Aquacut C1, 10 L Gebinde, Artikel Nr. 3530030 EG Sicherheitsdatenblatt http://www.optimum-daten.de/data-sheets/Optimum-Aquacut_C1-EC-datasheet_3530030_DE.pdf		Aral Emusol	BP Sevora	Esso Kutwell		Mobilcut	Shell Adrana	Chevron Soluble Oil B

7 Malfunctions

7.1 Milling machine malfunctions

Malfunction	Cause/ possible effects	Solution
Tool "burnt".	• Incorrect speed. • Chips are not coming out of the drilled hole. • Blunt tool. • Operating without cooling agent.	• Choose a different speed, excessive feed. • Withdraw the tool more frequently. • Sharpen or replace tool. • Use coolant.
Taper cannot be inserted in quill.	• Remove any dirt, grease or oil from the internal conical surface of the spindle sleeve or the taper.	• Clean surfaces well. Keep surfaces free from grease.
The taper cannot be pushed out.	• Optional MT4 taper is shrinked on the Morse taper.	• Let the machine run at highest speed for two minutes to warm it up and attempt to remove the taper again.
Motor does not start.	• Defective fuse. • Circuit breaker	• Have it checked by qualified personnel.
Rattle the spindle if the workpiece surface is rough.	• Upcut mill machining not possible under the current operating conditions. • Clamping lever of the movement axes not tightened. • Loose collet chuck, loose drill chuck, mechanical security tool clamping system not engaged. • Tool is blunt. • The workpiece is not fastened. • Excessive slack in bearing. • Spindle moves up and down.	• Perform conventional milling. • Tighten the clamping lever. • Check, enable mechanical security tool clamping system. • Sharpen or renew the tool. • Clamp the workpiece firmly. • Readjust the bearing slack or replace the bearing. • Readjust the bearing slack or replace the bearing.
Fine feed of the spindle sleeve does not work	• Fine feed is not correctly activated. • Coupling of the fine feed does not cam-in, is soiled, blurred, worn, defective	• ☞ Spindle quill feed on page 38 • Clean, replace.
Earth leakage circuit breaker trips	• Not correct type of RCCB in MH50V	• ☞ When the ELCB triggers on page 33
Rapid traverse in Z-axis does not work.	• End position of the axis reached. • Motor circuit breaker of drive has tripped.	• Manually move the milling head into the possible rapid traverse travel range. • Do not operate the drive in continuous operation (S6-60%)

8 Appendix

8.1 Copyright

8.2 Terminology/Glossary

Term	Explanation
Cross table	Supporting surface, clamping surface for the workpiece with traverse in X and Y directions
Taper mandrel	Tool housing taper, drill taper, drill chuck taper.
Workpiece	piece to be milled, drilled or machined.
Draw bar	Threaded rod to fix the taper mandrel in the quill.
Tool - quick clamping system	System with collet instead of a drawbar.
Drill chuck	Drill bit adapter
Collet	Holder for end mill
Drill-mill head	Upper part of the milling machine
Quill	Hollow shaft in which the milling spindle turns.
Milling spindle	Shaft activated by the motor
Drilling table	Supporting surface, clamping surface
Taper mandrel	Cone of the drill or of the drill chuck
Spindle sleeve lever	Manual operation for the drill feed
Quick action - drill chuck	Drill bit adapter can be fixed by hand.
Workpiece	Part to be drilled, part to be machined.
Tool	Milling cutter, drill bit, etc.
Emergency stop	Stops the operation of a machine.
Emergency switch-off	Interrupts the power supply to the machine.

8.3 Change information operating manual

Chapter	Short summary	new version number
all	Depth indication, mechanical safety quick-release system	1.0.1
parts	Electrical spare parts list, Wiring diagram	1.0.2
parts	Spare part drawings	1.0.3
3 ; 4.7.1	Interdepartmental transport+ speed tables	1.0.4

8.4 Liability claims/warranty

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

Liability or warranty claims are processed at OPTIMUM GmbH's discretion either directly or through one of its dealers.
Any defective products or components of such products will either be repaired or replaced by components which are free from defects. Title to replaced products or components is transferred to OPTIMUM Maschinen Germany GmbH.

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

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

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

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

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

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

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

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

8.5 Advice for disposal / Options of reuse:

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

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

8.6 Storage

ATTENTION!

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

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

Follow the instructions and information on the transport box:

- Fragile goods
  (Goods require careful handling)

- Protect against moisture and humid environment

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

- Maximum stacking height

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

Consult Optimum Maschinen Germany GmbH if the 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 electrical components are disposed of professionally and in accordance with the statutory provisions.

The machine contains electrical and electronic components and must not be disposed of as household waste. According to the European directive 2011/65/EG regarding disused electrical and electronic devices and the implementation in national law, disused electrical tools and electrical equipment must be stored separately and recycled in an environmentally friendly manner.

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

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

8.7.1 Decommissioning

CAUTION!

Disused equipment must be decommissioned in a professional manner in order to avoid later misuse and danger 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 unplug the connection cable and disconnect the connection cable.

8.7.3 Disassembly

➜ Remove the drive motor.

➜ Drain the oil from the gear box.

8.7.4 Packing and loading

➜ Place the machine on a pallet for removal.
☞ Installation and assembly on page 24

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 cooling lubricants

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 manufacturer of the lubricants. 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, municipal waste collection station or the shop where you have purchased 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 inform us of the following:

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

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

D-96103 Hallstadt, Germany

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email: info@optimum-maschinen.de

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: MH50G

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 60204-1:2014 - 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

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, 2019-12-11

MH50G_CE_en.fm

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: MH50V

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)

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

EN 61000-3-2:2015-03 - Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)

EN 61000-3-3:2014-03 - Electromagnetic compatibility (EMC) - Part 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 50 G/V Zubehör

- CNC OPTImill MH 50 V
  - OPTImill MH 50 G/V Ersatzteile
  - OPTImill MH 50 G/V Zubehör

- OPTImill Zubehör

Ihr Ersatzteil nicht in den Listen?
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- Drehmaschinen / CNC Drehmaschinen
- Drucklufttechnik / Kompressoren