



CHESTER MACHINE TOOLS LTD

CHAMPION 20VS MILL OPERATION MANUAL



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INTRODUCTION

Chester UK Limited is a specialist company that has been supplying the machine tool industry for over 15 years. The Chester UK Head Office comprises of a 30,500 sq.ft factory complete with offices and a showroom. Specialising in conventional machine tools, Chester has built a reputation for quality and reliability, which is highly regarded in the machine tool industry and the model engineering market.

There are several divisions within the company; Export, Education, Model Engineering & UK Sales, all with dedicated sales personnel who are trained to answer your questions.

When buying from Chester you can be assured of a complete back-up service with mechanical and electrical engineers that are available to give advice if required.

Stock is a large part of any business and Chester have always invested substantially in building a large quantity of machines and spares, ready to satisfy customer requirements. Chester UK has one of the largest stocks of conventional new machines and accessories within Great Britain. Please take time to visit our website: www.chestermachinetools.com

**Internationally Renowned For Unsurpassed
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Servicing The Industry Worldwide

The image displays a collection of national flags from 45 different countries, arranged in two vertical columns on either side of the central map. The countries represented are: Saudi Arabia, Kuwait, Oman, Qatar, Emirates, Jordan, Ethiopia, Sudan, Eire, France, Holland, Germany, Italy, Greece, Malta, Finland, Norway, Sweden, UK, Nigeria, Spain, Malaysia, Scotland, Wales, Fiji, New Zealand, Australia, Taiwan, Japan, Sri Lanka, China, Egypt, Pakistan, and Vietnam.

Table of Contents

1	Safety	
1.1	Safety warnings (warning notes).....	5
1.1.1	Classification of hazards.....	5
1.1.2	Other pictograms.....	6
1.2	Proper use.....	6
1.3	Possible dangers caused by the drilling-milling machine.....	7
1.4	Qualification of personnel.....	7
1.4.1	Target group.....	7
1.5	Safety devices.....	8
1.5.1	EMERGENCY STOP button.....	8
1.5.2	Protective cover.....	9
1.6	Safety check.....	9
1.7	Individual protection gear.....	10
1.8	Safety during operation.....	10
1.9	Disconnecting the drilling-milling machine and making it safe.....	11
1.9.1	Using lifting equipment.....	11
2	Technical data	
2.1	Power connection.....	12
2.2	Drilling-Milling capacity.....	12
2.3	Spindle holding fixture.....	12
2.4	Drill-Mill head.....	12
2.5	Cross table.....	12
2.6	Dimensions.....	12
2.7	Work area.....	12
2.8	Speeds.....	12
2.9	Environmental conditions.....	12
2.10	Operating material.....	12
2.11	Emissions.....	12
3	Assembly	
3.1	Extent of supply.....	13
3.2	Transport.....	13
3.3	Storage.....	13
3.4	Installation and assembly.....	14
3.4.1	Requirements of the installation site.....	14
3.4.2	Load suspension point.....	14
3.4.3	Installation.....	14
3.4.4	Installation drawing.....	15
3.5	First use.....	15
3.5.1	Cleaning and lubricating.....	15
3.6	Optional accessory.....	16
4	Operation	
4.1	Safety.....	18
4.2	Control and indicating elements.....	18
4.3	Starting the drilling-milling machine.....	19
4.4	Switching off the drilling-milling machine.....	19
4.5	Inserting a tool.....	19
4.5.1	Removing a tool.....	20
4.5.2	Use of collet chucks.....	20
4.5.3	Direct clamping into the work spindle.....	20
4.6	Clamping the workpieces.....	21
4.7	Changing the speed range.....	21
4.8	Selecting the speed.....	21
4.8.1	Standard values for cutting speeds.....	22
4.9	Manual spindle sleeve feed with the fine feed.....	23
4.10	Digital display for spindle sleeve travel.....	23
4.10.1	Technical data.....	23
4.10.2	Design.....	24

4.11	Manual spindle sleeve feed with the spindle sleeve lever.....	24
4.12	Swivelling the drill-mill head.....	24
	4.12.1 Offsetting the drill-mill head.....	25
4.13	Clamping levers.....	25
4.14	End stops.....	25
4.15	Installation on a lathe.....	26
5	Maintenance	
5.1	Safety.....	27
	5.1.1 Preparation.....	28
	5.1.2 Restarting.....	28
5.2	Inspection and maintenance.....	28
5.3	Repair.....	31
5.4	Spare parts drawings.....	32
	5.4.1 Spare parts list.....	34
5.5	Terminal connecting plan for control system.....	36
	5.5.1 Spare parts list of electrical system.....	36
6	Anomalies	
6.1	Anomalies in the drilling-milling machine.....	37

1

Safety

Glossary of symbols

☞	give additional indications
→	calls on you to act
○	Enumerations

This part of the operating manual

- explains the meaning and use of the warning references contained in the operating manual,
- explains how to use the drilling-milling machine properly,
- highlights the dangers that might arise for you or others if these instructions are not obeyed,
- tells you how to avoid dangers.

In addition to this operating manual please observe

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

European standards must be observed during installation, operation, maintenance and repair of the drilling-milling machine.

If European standards are not applied in the national legislation of the country of destination, the specific applicable regulations of each country must be observed.




Where necessary, the required measures must be taken to comply with the specific regulations of each country before the drilling-milling machine is first used.

ALWAYS KEEP THIS DOCUMENTATION CLOSE TO THE DRILLING-MILLING MACHINE.

1.1 Safety warnings (warning notes)

1.1.1 Classification of hazards

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

Pictogram	Alarm expression	Definition/Consequences
	DANGER!	Imminent danger that will cause serious injury or death to personnel.
	WARNING!	Risk: A danger that might cause serious injury or death to personnel.
	CAUTION!	Danger or unsafe procedure that might cause injury to personnel or damage to property.
	ATTENTION!	Situation that could cause damage to the drilling-milling machine and product and other types of damage. No risk of injury to personnel.
	INFORMATION	Application tips and other important or useful information and notes. No dangerous or harmful consequences for personnel or objects.

In the case of specific dangers, we replace the pictogram



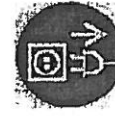
1.1.2 Other pictograms



Warning of automatic start-up!



Activation forbidden!



Pull the mains plug!



Use protective goggles!



Use protective gloves!



Use protective boots!



Wear a safety suit!



Use ear protection!



Protect the environment!



Read the operating manual before the machine is first used!



Contact address

1.2 Proper use



WARNING!

In the event of improper use, the drilling-milling machine

- will endanger personnel,
- will endanger the machine and other material property of the operator,
- may affect proper operation of the drilling-milling machine.

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

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

If the drilling-milling machine is used in any way other than as described above, modified without the authorisation of Chester Uk Ltd or operated with different process data, then it is being used improperly.

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

We would like to stress that any modifications to the construction, or technical or technological modifications that have not been authorised by Chester Uk Ltd will also render the guarantee null and void.

It is also part of proper use that

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

☞ "Technical data" on page 12



WARNING!

Very serious injury due to improper use.

It is forbidden to make any modifications or alterations to the operating values of the drilling-milling machine. These could endanger personnel and cause damage to the drilling-milling machine.

1.3 Possible dangers caused by the drilling-milling machine

The drilling-milling machine was built using the latest technological advances.

Nonetheless, there remains a residual risk, since the drilling-milling machine operates with

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

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

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



INFORMATION

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

- be duly qualified,
- follow this operating manual.

Disconnect the drilling-milling machine whenever cleaning or maintenance work is being carried out.



WARNING!

The drilling-milling machine may only be used with the safety devices activated.

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

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

As the machine operator, this will be your responsibility!

☞ "Safety devices" on page 8

1.4 Qualification of personnel

1.4.1 Target group

This manual is addressed to

- operators
- users
- maintenance staff.

The warning notes therefore refer to both operation and maintenance of the drilling-milling machine.



Always disconnect the drilling-milling machine plug from the mains. This will prevent it being used by unauthorised personnel.



INFORMATION

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

- be duly qualified,
- follow this operating manual.

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the drilling-milling machine and other material property,
- may affect proper operation of the drilling-milling machine.

1.5 Safety devices

Use the drilling-milling machine only with properly functioning safety devices.

Stop the drilling-milling machine immediately if there is a failure in the safety device or if it is not functioning for any reason.

It is your responsibility!

If a safety device has been activated or has failed, the drilling-milling machine must only be used when

- the cause of the failure has been removed,
- it has been verified that there is no resulting danger for personnel or objects



WARNING!

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

- damage as a result of components or parts of components flying off at high speed,
- contact with rotating parts,
- fatal electrocution.

The drilling-milling machine includes the following safety devices:

- A self-latching, lockable EMERGENCY STOP button
- a protective cover at the drill-mill head,

1.5.1 EMERGENCY STOP button

The EMERGENCY STOP button switch the drilling-milling machine off.

Open the cover of the EMERGENCY STOP button in order to switch the drilling-milling machine on again.

☞ "Starting the drilling-milling machine" on page 19

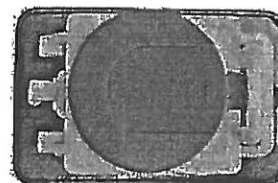


Fig. 1-1: EMERGENCY STOP button

1.5.2 Protective cover



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



WARNING!

Remove the protective cover only after the mains plug of the drilling-milling machine has been pulled.



1.6 Safety check

Check the drilling-milling machine at least once per shift. Inform the person responsible immediately of any damage, defect or change in operating function.

Check all safety devices

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



INFORMATION

Use the following table for organising checking.

General check		
Equipment	Check	OK
Protective covers	Fitted, firmly bolted and not damaged	
Labels, markings	Installed and legible	
Date:	Checked by (signature):	

Run test		
Equipment	Check	OK
EMERGENCY STOP button	When the EMERGENCY STOP button is activated, the drilling-milling machine should switch off automatically. A restart will not be possible until the EMERGENCY STOP button has been unlocked and the ON switch has been activated.	
Date:	Checked by (signature):	

1.7 Individual protection gear



For certain work, individual protection gear is required.

Protect your face and eyes: During all work, and specifically work during which your face and eyes are exposed to hazards, a safety helmet with a face guard should be worn.



Use protective gloves when handling pieces with sharp edges.



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



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

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



CAUTION!

Dirty or contaminated body protection gear can cause disease.
Clean it each time after it has been used and once a week.

1.8 Safety during operation



WARNING!

Before activating the drilling-milling machine, double check that this will not endanger other people and cause damage to equipment.

Avoid unsafe working practises:

Make sure your work does not endanger anyone.

- The instructions in this manual must be observed during assembly, handling, maintenance and repair.
- Use protective goggles.
- Turn off the drilling-milling machine before measuring the workpiece.
- Do not work on the drilling-milling machine if your concentration is reduced, for example, because you are taking medication.
- Observe the rules for preventing accidents issued by your association for the prevention of occupational accidents and safety in the workplace or other inspection authorities.
- Inform the inspector of any danger or failure.
- Stay at the drilling-milling machine until all rotating parts have come to a halt.
- Use prescribed protection gear. Make sure to wear a well-fitting work suit and, where necessary, a hairnet.
- Do not use protective gloves during drilling or milling work.
- Unplug the shockproof plug from the mains before changing the tool.
- Use suitable devices for removing drilling and milling chips.
- Make sure your work does not endanger anyone.
- Clamp the workpiece tightly before activating the drilling-milling machine.

In the description of work with and on the drilling-milling machine we highlight the dangers specific to that work.

1.9

Disconnecting the drilling-milling machine and making it safe



Pull the mains plug before beginning any maintenance or repair work.

Using lifting equipment



WARNING!

Use of unstable lifting equipment and load-suspension devices that break under load can cause very serious injuries or even death.

Check that the lifting equipment and load-suspension devices are of sufficient load capacity and are in perfect condition.

Observe the rules for preventing accidents issued by your association for the prevention of occupational accidents and safety in the workplace or other inspection authorities.

Hold the loads properly.

Never walk under suspended loads!

2.1 Technical data

The following information gives the dimensions and weight and is the manufacturer's authorised machine data.

2.1	Power connection	CHAMPION 20V
	Motor power consumption	750W/240V/50Hz
	Type	95ZYT
2.2	Drilling-Milling capacity	
	Drilling capacity in steel [mm]	Ø max. 16 (0.63")
	Milling capacity of end-mill cutter [mm]	Ø max. 20 (0.79")
	Milling capacity of inserted-tooth cutter [mm]	Ø max. 63 mm (2.48")
	Working radius [mm]	185 (7.28")
2.3	Spindle holding fixture	
	Spindle holding fixture	MT 2
	Sleeve travel [mm]	42 mm (1.65")
2.4	Drill-Mill head	
	Swivelling	+ / - 90°
	Gearbox stages	2
	Z-axis travel [mm]	380 (without bellow) (14.9")
2.5	Cross table	
	Table length [mm]	700 (27")
	Table width [mm]	180 (7")
	Y-axis travel [mm]	175 (without bellow) (6.9")
	X-axis travel [mm]	280 (11")
	T - slot / distance of slot [mm]	12 / 62 (0.47" / 2.44")
2.6	Dimensions	
	Height [mm]	860 (33.85")
	Depth [mm]	670 (26.38")
	Width [mm]	750 (29.5")
	Total weight [kg]	110
2.7	Work area	
	Height [mm]	2,000 (78.7")
	Depth [mm]	2,200 (86.6")
	Width [mm]	1800 (70.8")
2.8	Speeds	
	Gearbox stage slow [rpm]	50-1100
	Gearbox stage fast [rpm]	100-2200
2.9	Environmental conditions	
	Temperature	5-35 °C
	Humidity	25 - 80 %
2.10	Operating material	
	Gearbox blank steel parts	Mobilgrease OGL 007 or Mobilux EP 004 acid-free oil, e.g. weapon oil or motor oil.
2.11	Emissions	



The noise level (emission) of the drilling-milling machine is below 78 dB(A). If the drilling-milling machine is installed in an area where various machines are in operation, the acoustic influence (emission) on the user of the drilling-milling machine may exceed 85 dB(A) in the workplace.

INFORMATION

We recommend the use of soundproofing and ear protection. Remember that the duration of the noise pollution, the type and characteristics of the work area and operation of other machines influence the noise level in the workplace.

3 Assembly



INFORMATION

The drilling-milling machine comes pre-assembled.

3.1 Extent of supply

When the drilling-milling machine is delivered, check immediately that the machine has not been damaged during shipping and that all components are included. Also check that no fastening screws have come loose.

Compare the parts supplied with the information on the packaging list.

3.2 Transport



WARNING!

Machine parts falling off forklift trucks or other transport vehicles could cause very serious or even fatal injuries. Follow the instructions and information on the transport case:

- Centres of gravity
- Suspension points
- Weights
- Means of transport to be used
- Prescribed shipping position



WARNING!

Use of unstable lifting equipment and load-suspension devices that break under load can cause very serious injuries or even death.

Check that the lifting and load suspension gear has sufficient load capacity and that it is in perfect condition.

Observe the rules for preventing accidents.

Hold the loads properly.

Never walk under suspended loads!

3.3 Storage



ATTENTION!

Improper storage may cause important parts to be damaged or destroyed.

Store packed or unpacked parts only under the intended environmental conditions:

☞ "Environmental conditions" on page 12

3.4 Installation and assembly

3.4.1 Requirements of the installation site

The work area for operation, maintenance and repair work must not be hindered. The main plug of the drilling-milling machine must be freely accessible.

3.4.2 Load suspension point



WARNING!

Danger of crushing and overturning. Proceed with extreme caution when lifting, installing and assembling the machine.

- Secure the load-suspension device around the drill-mill head. Use a lifting sling for this purpose.
- Clamp all the clamping levers at the drilling-milling machine before lifting the drilling-milling machine.
- Make sure that no add-on pieces or varnished parts are damaged due to the load suspension.

3.4.3 Installation

- Check the horizontal orientation of the base of the drilling-milling machine with a spirit level.
- Check that the foundation has sufficient floor-load capacity and rigidity.
 - ☞ "Total weight [kg]" on page 12



ATTENTION!

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

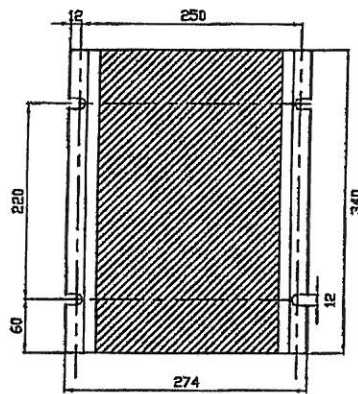
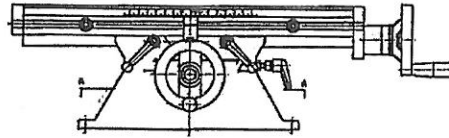
- Position the drilling-milling machine on the intended foundation.
- Attach the drilling-milling machine using the provided recesses in the machine base.



INFORMATION

The installation site must be designed in accordance with ergonomic workplace requirements.

3.4.4 Installation drawing



3.5 First use

3.5.1 Cleaning and lubricating

- Remove the anticorrosive agent applied to the drilling-milling machine for transport and storage purposes. We recommend the use of stove distillate.
- Do not use any solvents, thinners or other cleaning agents which could corrode the varnish on the drilling-milling machine. Follow the specifications and indications of the manufacturer of the cleaning agent.
- Lubricate all bright machine parts with non-corrosive lubricating oil.
- Grease the drilling-milling machine using the lubrication chart.
☞ "Inspection and maintenance" on page 28
- Check smooth running of all spindles. The spindle nuts can be readjusted.
- Check the fuse protection of your power supply against the technical data for the total connection value of the drilling-milling machine.

4 Operation

4.1 Safety

Use the drilling-milling machine only under the following conditions:

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



All anomalies should be eliminated immediately. Stop the drilling-milling machine immediately in the event of any abnormality in operation and make sure it cannot be started up accidentally or without authorisation.

Notify the person responsible immediately of any modification.

☞ "Safety during operation" on page 10

4.3 Starting the drilling-milling machine



ATTENTION!

Wait until the drilling-milling machine has come to a complete halt before inverting the turning direction using the change-over switch.



INFORMATION

The speed of spindle is a little smaller in left-handed motion than in right-handed motion.

- The rotating direction of the drilling-milling machine is selected using the change-over switch.
- Press the "ON" button.
The drilling-milling machine will be activated and turn in the pre-selected rotating direction. See "Changing the speed range" on page 21

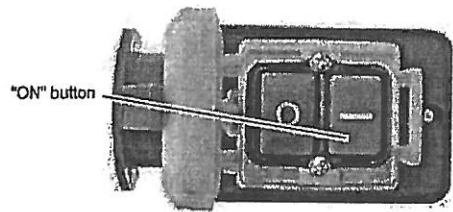


Fig.4-3: ON / OFF button

4.4 Switching off the drilling-milling machine

- Turn the change-over switch into the " 0 " position

4.5 Inserting a tool

CAUTION!

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

In the work spindle you may only use tool holding fixtures and clamping tools with morse taper MK2 and internal screw thread M10 for an interlocking fixture. Reducing bushes is not allowed.

The mill head is equipped with an MK 2 holding fixture and a draw-in rod M10.

- Remove the cover. There is no need to disassemble the motor cover completely.
- Clean the conical holding fixture in the mill head.
- Clean the taper of your tool.
- Insert the tool into the holding fixture.

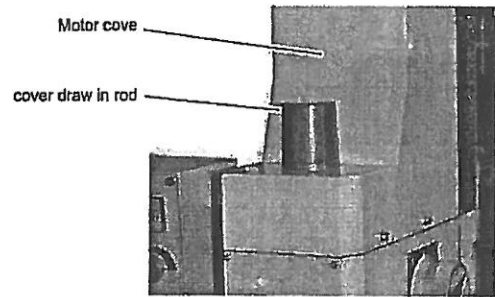


Fig.4-4: Drill-Mill head

- Screw the draw-in rod into the taper of your tool.
- Tighten the draw-in nut and fix the spindle. Use an wrench to hold the spindle.

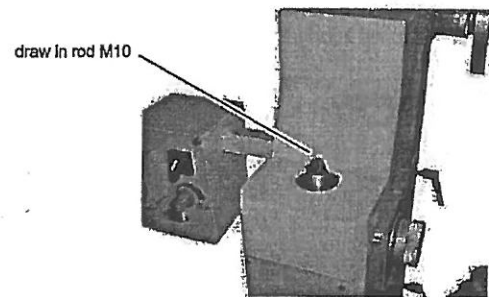


Fig.4-5: Drill-Mill head with motor cover

4.5.1 Removing a tool

- Hold the spindle with wrench and loosen the draw in rod. Turn the draw in rod further, so that the tool from the cone admission is squeezed out.

4.5.2 Use of collet chucks

When using collet chucks for the reception of milling tools, a higher operation tolerance is possible. The exchange of the collet chucks for a smaller or larger end mill cutter is performed simply and rapidly and the disassembly of the complete tool is not required. The work spindle is equipped with a surface for the hold-up with a fork wrench to unfasten the swivel nut of the collet chuck retainer. The collet chuck is pressed into the ring of the swivel nut and must hold there by itself. By fastening the swivel nut on the tool the milling cutter is clamped.

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

☞ "Optional accessory" on page 16

4.5.3 Direct clamping into the work spindle

Tools or collet chucks with a taper shank MT 2 may be clamped directly into the work spindle. For mounting these tools, proceed as described under ☞ "Inserting a tool" on page 19. Make sure that the tool is clamped with the draw-in rod.

☞ "Optional accessory" on page 16

4.6 Clamping the workpieces



CAUTION!

Injury by flying off parts.

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

4.7 Changing the speed range



ATTENTION!

Wait until the drilling-milling machine has come to a complete halt before changing the speed using the gear switch.

→ Turn the gear switch into the "H" position for a speed range of 200 - 3,000 rpm.

→ Turn the gear switch into the "L" position for a speed range of 100 - 1,500 rpm.

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

INFORMATION



The electronics controls the rotation speed slowly with a ramp to the set point. Therefore, wait briefly before you continue with feed motion while the milling or drilling.

4.8 Selecting the speed

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

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

For the correct cutting speed for your tool and for the material to be cut you may refer to the following standard values or a table reference book (e.g. Tabellenbuch Metall, Europa Lehrmittel ISBN 3808517220).

The required speed is calculated as follows:

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

n = speed in min⁻¹ (revolutions per minute)

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

π = 3,14

d = tool diameter m (meters)

4.8.1 Standard values for cutting speeds

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

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

The results are the following standard values for speeds in dependence of the milling cutter diameter, cutter type and material.

Tool diameter [mm] peripheral and side milling cutters	Steel 10 - 25 m/min	Grey cast iron 10 - 22 m/min	Age-hardened Al alloy 150 - 350 m/min
	Spindle speed [min ⁻¹]		
35	91 - 227	91 - 200	1365 - 3185
40	80 - 199	80 - 175	1195 - 2790
45	71 - 177	71 - 158	1062 - 2470
50	64 - 159	64 - 140	955 - 2230
55	58 - 145	58 - 127	870 - 2027
60	53 - 133	53 - 117	795 - 1860
65	49 - 122	49 - 108	735 - 1715

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



INFORMATION

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



INFORMATION

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



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

4.9

Manual spindle sleeve feed with the fine feed

- Turn the handle screw. The spindle sleeve lever will move towards the drill-mill head and will activate the clutch of the fine feed.
- Turn the spindle sleeve fine feed in order to move the spindle sleeve.

4.10 Digital display for spindle sleeve travel

4.10.1 Technical data

Measuring range	mm	0 - 999.99
	inch	0 - 39.371"
Reading precision	mm	0.01
	inch	0.0004"
Power supply (battery)		round cell 1,55V 145mAh (SR44) 11,6 x 5,4mm

4.10.2 Design

Fig.4-8: Digital display

- ON / O,
switches the display on and resets the reading of the display to "0".
- mm/in,
converts the measuring unit from *millimeters* to *inches* and viceversa.
- OFF,
switches the display off.
- ▲,
performs a value increase.
- ▼,
performs a value decrease.

4.11 Manual spindle sleeve feed with the spindle sleeve lever



ATTENTION!

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

- Loosen the handle screw (see Fig.4-7: „Handle screw“ on page 23) .
The spindle sleeve lever move away from the drill-mill head and disengages the clutch of the fine feed.

4.12 Swiveling the drill-mill head

The drill-mill head may be swivelled 90° to the right and to the left.



CAUTION!

The drill head may tilt to the right or to the left on its own after loosening a screw! Proceed with extreme caution when loosening the clamping joints.

- Loosen or unscrew the nut of the guide screw..
- Hold the drill-mill head. Loosen the clamping screw. Swivel the drill-mill head into the desired position.
- Retighten the guide and clamping screw.

4.12.1 Offsetting the drill-mill head

The upright of the drill-mill head may be offset to the right or to the left.

Use the offsetting possibility if the drill-mill head is swivelled to the left or to the right for machining purposes.

4.13 Clamping levers

The drilling-milling machine is equipped with two clamping levers for the Z-axis movement of the drill-mill head and with two clamping levers each for the X- and Y-axis movement of the cross table. The spindle sleeve is fitted with a clamping lever.



ATTENTION!

Use the clamping levers for locking the position of the axes during drilling or milling operations.

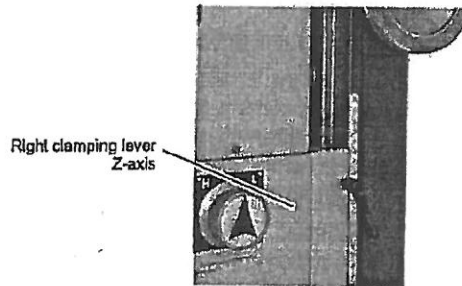


Fig.4-10: Right clamping lever Z-axis

4.14 End stops

The cross table is fitted with two adjustable end stops on the X-axis.

Use the end stops for limiting the travel alongside the X-axis in order to guarantee the exact repeatability when manufacturing various identical components.

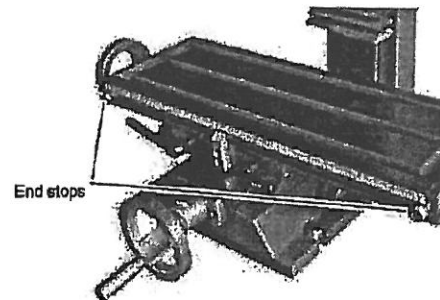


Fig.4-11: End stops of the X-axis

4.15 Installation on a lathe

The mill head with column can be mounted on the lathe DB 11 VS. For fastening, an adapter is required. The adapter needs to be fixed to the engine bed. It is not possible to fix it to the lathe slide. The adapter is dimensioned in a way that the middle of the lathe chuck should be reached with the center of the milling spindle (alignment headstock - lathe chuck).

☞ "Optional accessory" on page 16

Due to the manufacturing tolerances of castings and the manufacturing tolerances of two different machines it is, however, not possible to reach the exact center. The adapter may be too short or too long.

If required, the adapter is to be milled off or equipped with dummy sheets. When using sheets the complete surface is to be filled.

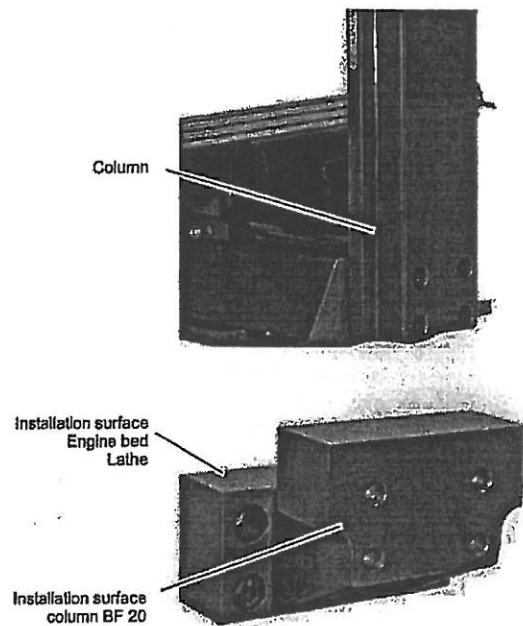


Fig.4-12: Adapter

In order to reduce the support expenditure of the column with milling head during the orientation we recommend you to disassemble the milling head off the column. Unscrew the locking screw (safety screw) position 266. Disassemble the milling head off the column by completely loosening the clamping screw and the leading screw and stripping off the milling head. ☞ "Swivelling the drill-mill head" on page 24

Control the orientation (90° angle horizontal and vertical) of the column with the reference planes on the engine bed of the lathe.



INFORMATION

In order to prevent you from having to reorient the milling head when altering later on, we recommend you to provide the column and the adapter as well as the adapter and the engine bed with alignment pins. If required, pin the column together with the cross table before disassembling the column. It would be best if you use hardened straight pins according to DIN 6325 in 8mm or 10mm and a fitting tolerance zone m6. (z.B. DIN 6325-8 m6 x 30). These alignment pins have a round cap on one side which facilitates pinning together the parts. When assembled the boring holes must necessarily be pilot-drilled about 0,2mm smaller and then be rubbed with a reamer also when already assembled. Therefore use a new twist drill with a diameter of 7,8mm for alignment pins of 8mm.

5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the drilling-milling machine.

The diagram below shows which of these headings each task falls under.

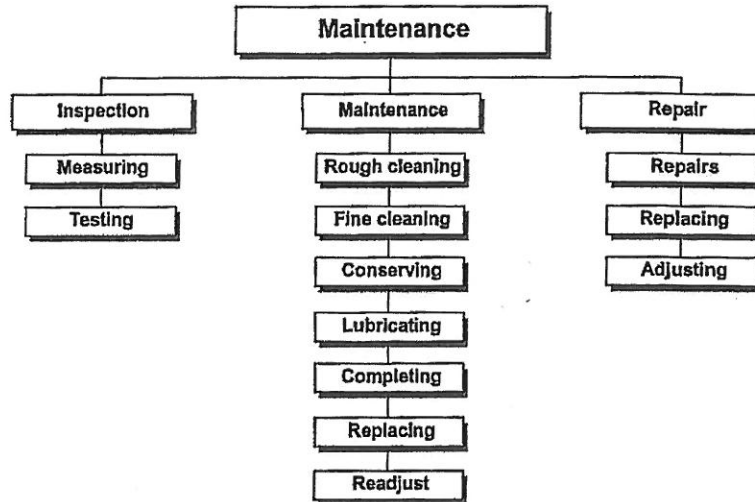


Fig.5-1: Maintenance – Definition according to DIN 31051



ATTENTION !

Properly-performed regular maintenance is an essential prerequisite for

- safe operation
- fault-free operation
- long service life of the drilling-milling machine and
- the quality of the products you manufacture.

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

5.1 Safety



WARNING!

The consequences of incorrect maintenance and repair work may include:

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

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

5.1.1 Preparation



WARNING!

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



☞ "Disconnecting the drilling-milling machine and making it safe" on page 11
Position a warning sign.

5.1.2 Restarting

Before restarting run a safety check.

☞ "Safety check" on page 9



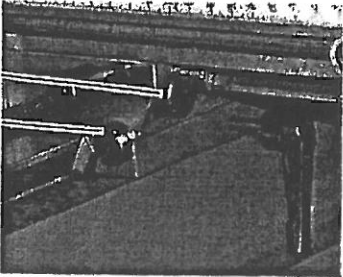
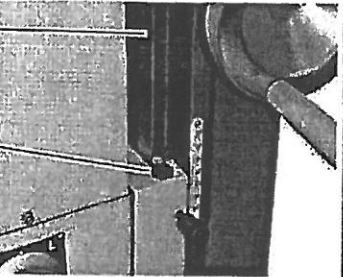
WARNING!

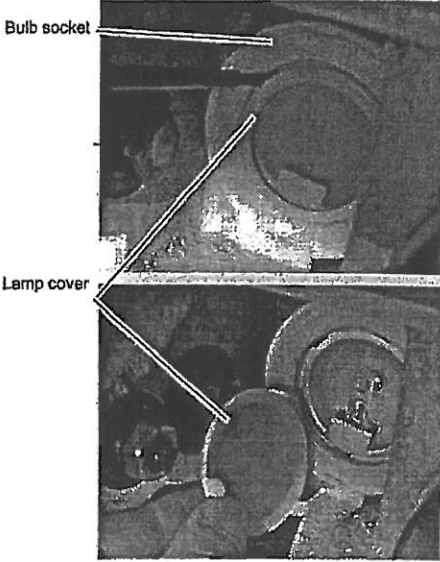
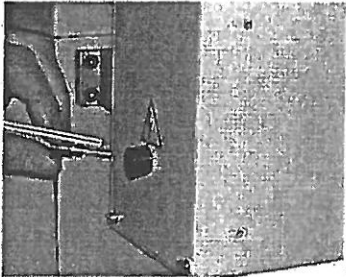
Before connecting the drilling-milling machine you must check that there is no danger for personnel and the drilling-milling machine is undamaged.

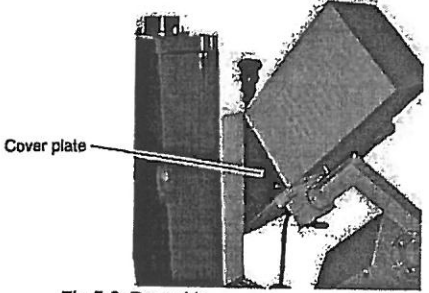
5.2 Inspection and maintenance

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

Interval	Where?	What?	How?
Start of work after each maintenance or repair operation	Drilling-Milling machine		→ ☞ "Safety check" on page 9
Start of work after each maintenance or repair operation	Dovetail slideways	Lubricate	→ Lubricate all slideways
weekly	Cross table	Lubricate	→ Lubricate all blank steelparts. Use acid-free oil, for example weapon oil or engine oil.
as required	Spindle nuts	Readjust	An increased clearance in the spindles of the cross table can be reduced by readjusting the spindle nuts. See spindle nuts on position 66 and 71 ☞ "Spare parts drawings" on page 32 The spindle nuts are re-adjusted by reducing the flank of screw thread of the spindle nut with an adjusting screw. By re-adjusting a smooth running move over the whole toolpath is to be assured, otherwise the wear by friction between spindle nut / spindle would increase considerably.

Interval	Where?	What?	How?
as required	Taper gib	Readjust X- and Y axis	<div data-bbox="970 465 1059 488" data-label="Caption">Cross table</div> <div data-bbox="826 517 1059 539" data-label="Caption">Adjusting screw taper gib X axis</div> <div data-bbox="826 562 1059 584" data-label="Caption">Adjusting screw taper gib Y axis</div>  <div data-bbox="932 734 1107 757" data-label="Caption">Fig. 5-2: Cross table</div> <p>→ Turn the adjusting screw of the respective taper gib in the clockwise direction. The taper gib is continued to push in and reduced by it the gap in the guide way.</p> <p>→ Control your attitude. The respective guide way must be still easily mobile from the adjustment, result in however a stable guidance.</p>
as required	Taper gib	Readjust Z axis	<div data-bbox="1007 1010 1059 1032" data-label="Caption">Column</div> <div data-bbox="826 1122 1059 1144" data-label="Caption">Adjusting screw taper gib Z axis</div>  <div data-bbox="932 1272 1107 1294" data-label="Caption">Fig. 5-3: Milling head</div> <p>→ As described under "readjust X and Y axis".</p>

Interval	Where?	What?	How?
as required	Machine lighting	Replacement of the halogen bulb	 <p data-bbox="995 344 1082 367">Bulb socket</p> <p data-bbox="995 607 1082 629">Lamp cover</p> <p data-bbox="954 898 1310 920">Fig.5-4: Replacement of the halogen bulb</p> <ul style="list-style-type: none"> → Turn the milling head into a horizontal position to the right, as swivel milling head under "Swiveling the drill-mill head" on page 24 described. Thus the lamp cover can be able to exchange more easily to lift out around the halogen bulb. → Put a small screwdriver into the gap between bulb socket and lamp cover. → The lamp cover can be lifted out by easy rotation at the screwdriver. → Pull the halogen lamp with a cloth and exchange the halogen lamp. → Type: Halogen pin base lamp, Osram 12V - 20W, base G4
as required		Replacement of the micro fuse - electronics	 <p data-bbox="995 1496 1082 1518">micro fuse</p> <p data-bbox="954 1671 1118 1693">Fig.5-5: Panel rear</p>

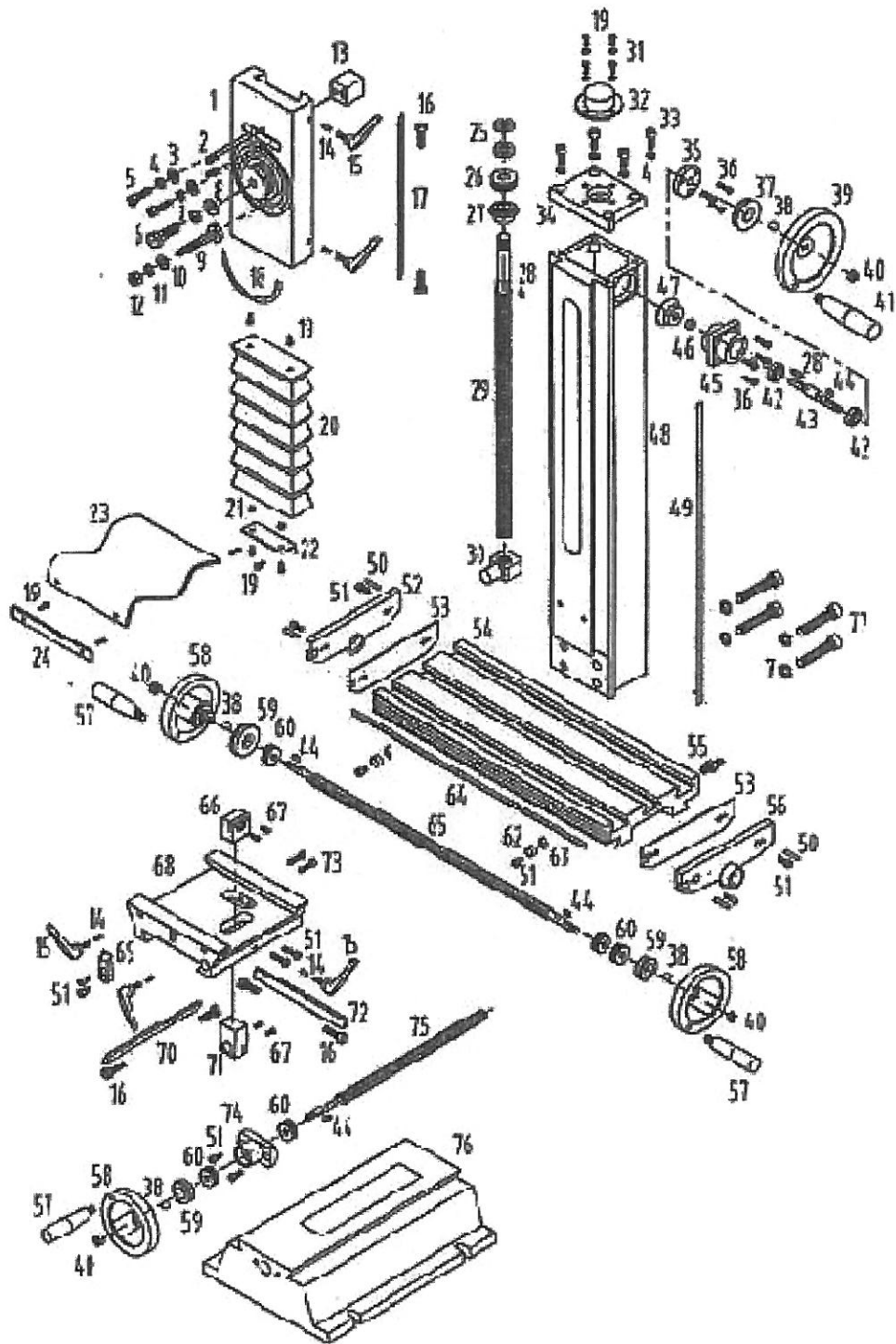
Interval	Where?	What?	How?
every six months	Geared drill-mill head	Grease	<ul style="list-style-type: none"> → Swivel the drill-mill head completely to the right (90°) as described under "Swiveling the drill-mill head" on page 24. → Check that the clamping screws are firmly tightened as described under "Swiveling the drill-mill head" on page 24 and that the drill-mill head cannot tilt on its own. → Detach the cover plate on the rear side. → Lubricate the gearwheels. Make sure that you do not lubricate the clutch of the spindle sleeve fine feed. <div style="text-align: right; margin-top: 10px;">  <p data-bbox="1005 902 1157 925">Fig.5-6: Rear side</p> </div>

5.3 Repair

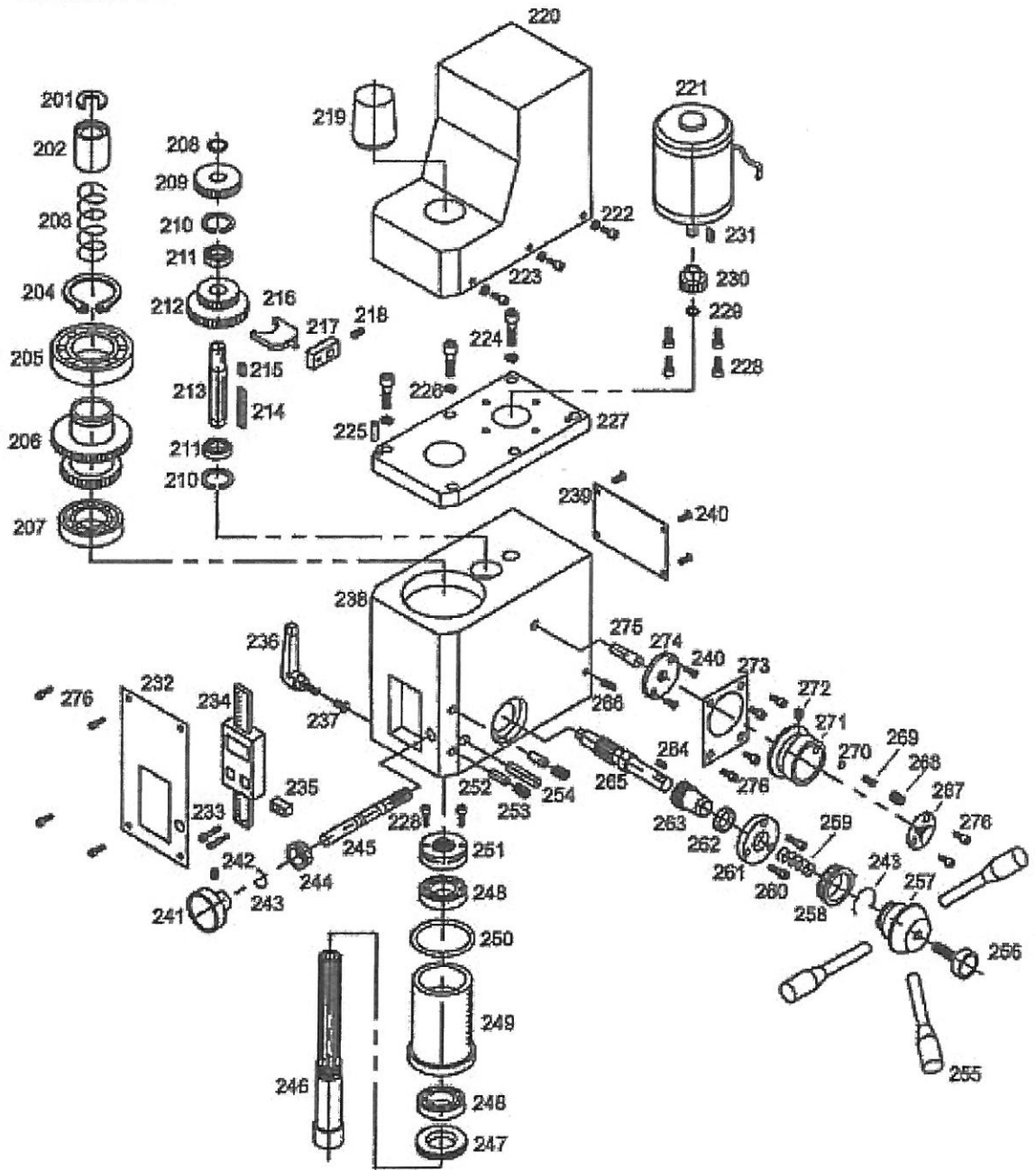
For any repair work, get assistance from an employee of Chester Uk Ltd technical service or send us the drilling-milling machine.

If the repairs are carried out by qualified technical staff, they must follow the indications given in this manual.

5.4 Spare parts drawings



Headstock



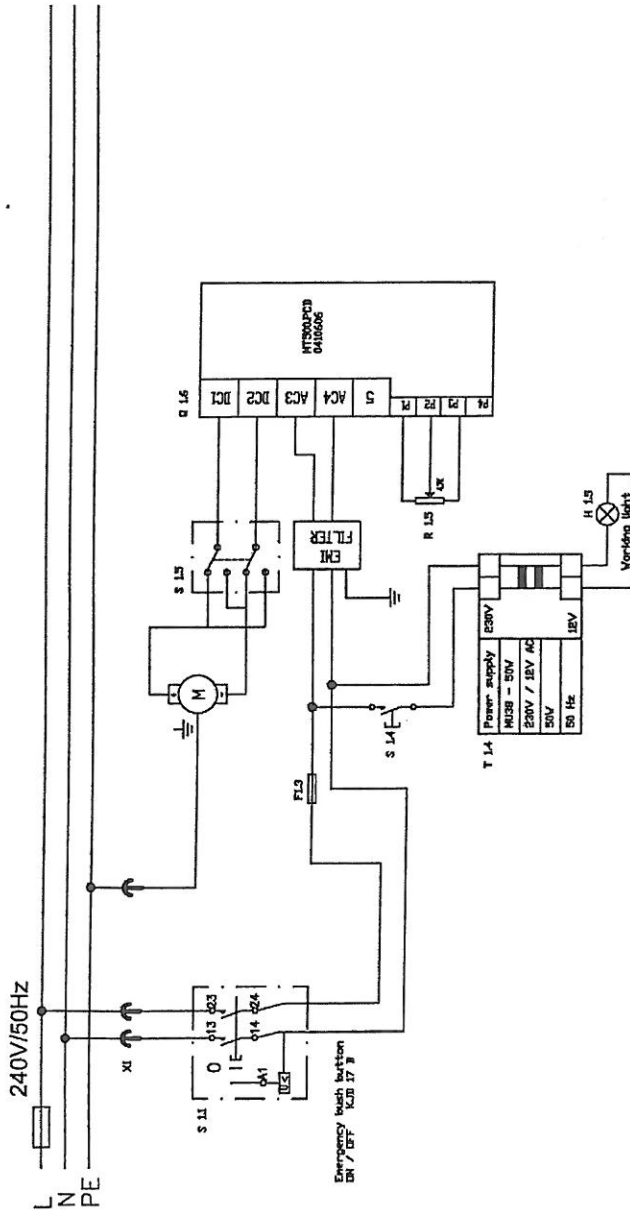
5.4.1 Spare parts list

Pos.	Name	Size	Qty.
1	Connect board		1
2	Socket head sat screw	M6x16	2
3	Washer		2
4	Spring washer	8	6
5	Hexagon head cap screw	M8x25	2
6	Hexagon nut	M12x40	1
7	Spring washer	12	5
8	Washer	12	1
9	Screw		1
10	Washer	10	1
11	Spring washer	10	1
12	Hexagon nut	M10	1
13	Connect collar		1
14	Brass pin		5
15	Adjust locating handle	DM6x16	5
16	Gib screw		1
17	Column screw		1
18	Angle plate		1
19	Hexagon head cap Screw	M5x10	12
20	Bellows		1
21	Hexagon nut	M5	2
22	Bellows bracket		1
23	Rubber splash guard		1
24	Plate		1
25	Nut	M16x1.5	2
26	Bearing	51203	1
27	Taper gear		1
28	Key	4x16	2
29	Lift lead screw		1
30	Lift lead screw nut		1
31	Washer	5	4
32	Nut collar		1
33	Hexagon head cap Screw	M8x20	4
34	Column cover		1
35	Bearing cover		1
36	Hexagon head cap Screw M5x12	M5x12	7
37	Lift dial		1
38	Spring piece		4
39	Wheel		1
40	Locking nut		4
41	Handl	M10x80	1
42	Bearing	6001-2RZ	2
43	Lift shaft		1
44	Key	4x12	2
45	Lift bearing base		1
46	Collar		1
47	Taper gear		1
48	Column		1
49	Lift plate		1
50	Taper pin	A5x25	1
51	Hexagon head cap Screw	M6x16	10
52	Table dial support(L)		1
53	Gasket		2
54	Cross table	standard table large table	1
56	Table dial support(R)		1
57	Handle M8x63	M8x63	3

Pos.	Name	Size	Qty.
58	Wheel		3
59	Dial		3
60	Bearing	51200	5
61	Hexagon head cap Screw	M6x10	2
62	Stopper		2
63	Wedgy nut		1
64	Table plate	standard table large table	1
65	Table lead screw	standard table large table	1
66	Table lead screw nut		1
67	Hexagon head cap Screw	M4x20	4
68	Saddle	standard table large table	1
69	Limit plate		1
70	Gib		1
71	Lead screw nut		1
72	Gib	standard table large table	1
73	Hexagon head cap Screw	M6x25	2
74	Saddle dial support		1
75	Lead screw		1
76	Base	standard table large table	1
77	Hexagon head cap Screw	M12x90	4
201	Position washer		1
202	Spring sleeve		1
203	Spring	2.5x28x110-3	1
204	Retainer ring	45	1
205	Bearing	6209-2RZ	1
206	Gear	(Z60/Z80)	1
207	Bearing	7007 AC	1
208	Retainer ring	15	1
209	Gear	(Z46)	1
210	Retainer ring	32	2
211	Bearing	6002-2RZ	2
212	Gear	(Z42/Z62)	1
213	Transmission shaft		1
214	Key	5x50	1
215	Key	C5x12	1
216	Fork		1
217	Fork arm		1
218	Screw	M5x8	1
219	Cover		1
220	Motor cover		1
221	Motor	83ZYT005	1
222	Hexagon head cap Screw	M4x8	6
223	Washer	4	6
224	Hexagon head cap Screw	M6x14	6
225	Pin	A5x25	2
226	Washer	6	6
227	Fixed cover		1
228	Hexagon head cap Screw	M5x12	6
229	C-retainer ring	10	1
230	Motor gear	(Z25)	1
231	Key	C4x16	1

P.O.S.	Name	Size	Qty.
232	Main plate		1
233	Hexagon head cap Screw	M3x16	2
234	Digital slide guage		1
235	Base		1
236	Adjust locking handle	DM8x20	1
237	Oriented pin		1
238	Headstock		1
239	Cover		1
240	Cross recessed head Screw	M4x8	6
241	Micro feed knob		1
242	Socket head set screw	M5x6	1
243	Spring piece		2
244	Micro feed dial		1
245	Worm shaft		1
246	Spindle		1
247	Nut		1
248	Bearing	7005AC/P5	2
249	Collar		1
250	O-ring	56x2.65	1
251	Clamp nut		1
252	Pin	B4x20	4
253	Socket head set screw M5x12	M5x12	4
254	Pin with thread	A6x30	1
255	Handle		3
256	Locking knob		1
257	Feed handle disc		1
258	Feed dial		1
259	Compression Spring	1.2x12x25-3	1
260	Hexagon head cap Screw	M4x10	3
261	Cover		1
262	Adjust collar		1
263	Helical gear		1
264	Key	4x12	1
265	Up-down gear shaft		1
266	Socket head set screw	M6x20	1
267	Plate		1
268	Socket head set screw	M8x8	1
269	Compression Spring	0.8x5x25-3	1
270	Steel ball	6,5	1
271	Locating knob	12x50	1
272	Socket head set screw	M5x16	1
273	Shifting plate		1
274	Locating base		1
275	Shifting shaft		1
276	Hexagon head cap Screw	M3x6	10

5.5 Terminal connecting plan for control system



5.5.1 Spare parts list of electrical system

Pos.	Name	Qty.
Q 1.6	Steuerplatine	1
T.1.4	Transformator 230V / 12V	1
H 1.5	Halogen-Stiftsockellampe 12V , 20 W, Sockel G4	1
F.1.4	Felnsicherung F 8A	1
S 1.4	Schalter Ein/Aus Halogenlampe	1

Pos.	Name	Qty.
M	Gleichstrommotor	1
M - 1	Motorikohle	2
S 1.5	Drehrichtungsschalter ZH-A	1
S1.1	NOT-AUS EIN / AUS KJD 17B	1
R 1.5	Potentiometer 4,7 K	1
X1	Schutzkontaktstecker	1

7.2 Anomalies in the drilling-milling machine

Problem	Cause / possible effects	Solution
Drilling-Milling machine does not start	<ul style="list-style-type: none"> Start sequence not followed Defective fuse 	<ul style="list-style-type: none"> ☞ "Starting the drilling-milling machine" on page 19 Have it checked by authorised personnel
Tool "blunt"	<ul style="list-style-type: none"> Incorrect speed The chips have not been removed from the bore hole. Tool blunt Operating without cooling agent 	<ul style="list-style-type: none"> Select another speed, feed too high Retract tool more often Sharpen and replace tool Use coolant
Impossible to insert holding taper into the spindle sleeve	<ul style="list-style-type: none"> Remove any dirt, grease or oil from the internal conical surface of the spindle sleeve or the holding taper. Morse taper does not correspond to MT 2 	<ul style="list-style-type: none"> Clean surfaces well Keep surfaces free of grease Use Morse taper MT 2
Motor does not start	<ul style="list-style-type: none"> Defective fuse 	<ul style="list-style-type: none"> Have it checked by authorised personnel
Working spindle rattling on rough workpiece surface	<ul style="list-style-type: none"> Climb milling machining not possible under the current operating conditions. Clamping levers of the movement axes not tightened Loose collet chuck, loose drill chuck, loose draw-in rod Tool blunt Workpiece loose Excessive slack in bearing Spined shaft worn or worn out Working spindle goes up and down 	<ul style="list-style-type: none"> Perform conventional milling machining. Tighten clamping levers Check, re-tighten Sharpen or replace tool Secure the workpiece properly Readjust bearing slack or replace bearing Replace pos. 46 & 51 of spare parts list 2 Readjust bearing clearance or replace bearing, pos. 48 of spare parts list 2.
Fine feed of spindle sleeve does not work	<ul style="list-style-type: none"> Fine feed is not correctly activated Clutch of fine feed does not engage, is dirty, smeared, worn or defective 	<ul style="list-style-type: none"> ☞ "Manual spindle sleeve feed with the fine feed" on page 23 Clean, replace

EC Declaration of Conformity

In accordance with EN ISO 17050-1:2004

We Chester UK Ltd
of Clwyd Close, Hawarden Industrial Park, Hawarden, Chester,
CH5 3PZ UK

in accordance with the following Directive(s):

2004/108/EC The Electromagnetic Compatibility Directive
2006/42/EC The Machinery Directive

hereby declare that:

Equipment Milling Machine
Model number CHAMPION 20V
Serial No. 1020496

is in conformity with the applicable requirements of the following documents

Ref. No.	Title	Edn/date
BS EN ISO 12100-1&2 +A1	Safety of machinery. Basic concepts, general principles for design	2003 2009
BS EN 60204-1 +A1	Safety of machinery. Electrical equipment of machines. General requirements	2006 2009
BS EN 13128 + A2	Safety of machine tools - Milling machines (including boring machines)	2001 2009
EN 61000-6-2	Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments	2005
EN 61000-6-4	Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments	2007

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications and is in accordance with the requirements of the Directive(s).

Signed by: 

Name: Michael O'Hare
Position: Managing Director

Document ref. No.
MIL-CHAMP-20VS

Done at: Chester

On: February 10, 2010

The technical documentation for the machinery is available from the manufacturer at the above address

ORIGINAL

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