

OPERATING MANUAL

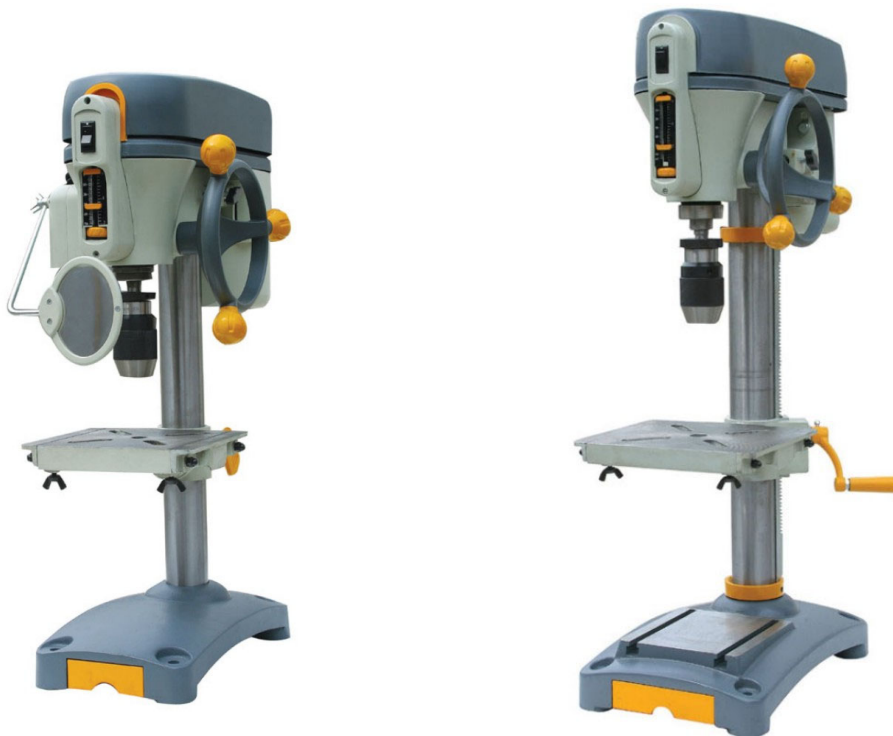
Version 1.1

Bench drilling machine

- B140 T
- B160 T

Infinitely variable bench drilling machine

- B140 T Vario
- B160 T Vario



Keep for future reference!




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1 Safety

Glossary of symbols

	gives further advice
	calls on you to get in action
	enumeration

This part of the operating manual

- does explain the meaning and how to use the warning references contained in this operating manual,
- does explain how to use the bench drilling machine,
- highlights the dangers that might arise for you and others if these instructions are not followed thoroughly,
- informs you on how to prevent dangers.

In addition to this operating manual, please note

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

European standards must be kept during installation, operation, maintenance and repair of the bench drilling machine.

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

If necessary, the required measures must be taken to comply with the specific regulations of each country before the bench drilling machine is used for the first time.

Always keep the operating manual close to the bench drilling machine for further reference.



INFORMATION




If you are not able to solve a problem using this manual, please do not hesitate to contact us for further professional advice:

OPTIMUM Maschinen GmbH
 Dr. Robert-Pfleger-Str. 26
 D- 96103 Hallstadt
 info@optimum-maschinen.de

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

ideogram	warning alert	definition / consequence
	DANGER!	Threatening danger that will cause serious injury or death to people.
	WARNING!	Risk: A danger that might cause serious injury or death to a person.
	CAUTION!	Danger or unsafe procedure that might cause injury to people or damage to property.
	ATTENTION!	Situation that could cause damage to the machine and to the product and other types of damages. No risk of injury to people.
	INFORMATION	Application advice and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of certain dangers, we replace the ideogram by



1.2 Further ideograms



Warning of automatic start-up!



Activation forbidden!



Pull the main plug!



Use safety glasses!



Use ear protection!



Use protective gloves!



Use protective boots!



Wear a safety suit!



Protect the environment!



Contact address

1.3 Proper use

Application

The bench drilling machine is designed and manufactured to produce holes in cold metal or other not health hazardous or not burnable material by using a rotating cutting tool with several chocking grooves.

The bench drilling machine is used with tools where the arrangement of cutting edges are building a couple of forces in the camming around the rotation axis.


A quick action drill chuck is being delivered for the tool holding fixture. The bench drilling machine is to be operated only with a quick action drill chuck.

Improper use! If the bench drilling machine is used in any way other than prescribed above, modified without authorization of Optimum Maschinen GmbH, then the bench drilling machine is being used improperly.

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

We would like to stress that any modifications to the construction, or technical or technological modifications that have not been authorized by Optimum Maschinen GmbH will also render the guarantee null and void.

It is also part of proper use that

- the maximum values of the bench drilling machine are complied with,  "Technical Data" on page 13
- the operating manual is constantly observed,
- inspection and maintenance instructions are observed.



WARNING!

Very serious injury.

It is forbidden to make any modifications or alternations to the operating values of the bench drilling machine! They could endanger employees and cause damage to the bench drilling machine.

1.4 Possible dangers caused by the bench drilling machine

The bench drilling machine is state of the art.

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

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

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

If the bench drilling machine is used and maintained by employees who are poorly qualified, then there might be a risk resulting from incorrect operation and unsuitable maintenance of the bench drilling machine.



INFORMATION

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

- be duly qualified,
- strictly follow this operating manual.

Due to improper use

- there is a risk for the employee,
- the machine and further property might be endangered,
- the function of the bench drilling machine could be affected.

Always disconnect the bench drilling machine if cleaning or maintenance work is being carried out.



WARNING!

The bench drilling machine may only be used with the safety devices activated. Disconnect the bench drilling machine immediately whenever you detect a failure in the safety device or when they are not mounted! ☞ “Safety devices“ on page 8

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

This is your responsibility being the operator!

1.5 Qualification of employees

1.5.1 Target group

This manual applies to

- the operators,
- the users,
- the maintenance staff.

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

Determine clearly and make a permanent decision in who will be responsible for the different activities on the machine (operation, maintenance and repair).

Vague and unclear assignment of responsibilities constitute a safety hazard!



Always disconnect the main plug of the bench drilling machine. This will prevent it from being used by unauthorized persons.

1.5.2 Authorized persons



WARNING!

Incorrect use and maintenance of the bench drilling machine constitute a danger for the staff, objects and the environment.

Only authorized persons may operate the bench drilling machine!

Persons authorized to operate and maintain should be trained technical staff and instructed by the ones who are working for the operator and for the manufacturer.

The operator must

Obligations
of the opera-
tor

- train the staff,
- instruct the staff in regular intervals (at least once a year) on
 - all safety standards that apply to the bench drilling machine,
 - the operation,
 - accredited technical guidelines,
- check the knowledge of the staff,
- document training / instructions,
- require the staff to confirm participation in training / instructions by means of a signature,
- check if the staff is aware of safety rules and dangers in the workplace so that they observe the operating manual.

The user must

Obligations
of the user

- have followed a training on the operation of the bench drilling machine,
- know the function and performance,
- before commissioning
 - have read and understood the operating manual,
 - be familiar with all safety devices and regulations.

Further
require-
ments to the
qualification

For working on the following machine parts, additional requirements are being applied:

- Electrical parts or operating agents: shall only be performed by an electrician or under the guidance and supervision of an electrician.
Before starting work on electrical parts or operating agents, following measures are to be performed in the following order.
 - disconnect all poles
 - secure against switching on
 - check dead circuit

1.6 User's position

The user must stand in front of the bench drilling machine.



INFORMATION

The main switch of the bench drilling machine must be easily accessible.

1.7 Safety devices

Operate the bench drilling machine only with properly functioning safety devices.

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

It is your responsibility!

If the safety device has been activated or has failed, the bench drilling machine must only be operated again when

- the cause of the failure has been removed,
- you have made sure that there is no existing danger for persons or objects.



WARNING!

If you bypass, remove or override a safety device in any other way, you are endangering yourself and other persons working on the bench drilling machine. The possible consequences are the following

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

The bench drilling machine includes the following safety devices:

- a fixed screwed-on protective cover for the pulleys,
- a drilling machine table with grooves to fasten the workpiece or a vice.

1.7.1 Drilling machine table

The drilling machine table is provided with holding fixtures for sliding blocks.



WARNING!

Risk of injury through spinning of parts. Fasten the workpiece safely on the drilling machine table.

1.7.2 Prohibition, warning and mandatory labels



INFORMATION

All warning labels must be legible.

Check them regularly.

1.8 Safety check

Check the bench drilling machine at least once per shift. Inform the person responsible immediately of any defect or change in the 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 work.

Check that the prohibition, warning and information labels as well as the markings on the bench drilling machine

- are legible (clean them, if necessary),
- are complete.

1.9 Personal protective equipment

For certain work, personal protective equipment is required, such as:

- safety helmet,
- protective glasses or face guard,
- protective gloves,

- safety shoes with steel caps,
- ear protection.

Before starting work, make sure that the prescribed personal protective equipment is available at the workplace.



CAUTION!

Dirty or eventually contaminated personal protective equipment might cause disease. Clean your personal protective equipment

- **after each use,**
- **regularly once a week.**

Personal protective equipment for special work



Protect your face and your eyes: Wear a safety helmet with a face guard for every work, especially for the kind of work where your face and eyes are exposed to hazards.



Use protective gloves when lifting or handling pieces with sharp edges.



Wear safety shoes when fitting, dismantling or transporting heavy components.

1.10 Safety during operation

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



WARNING!

Before activating the bench drilling machine, double check that this will

- **not endanger other people,**
- **not cause damage to equipment.**

Avoid unsafe working practice:

- Make sure that your work does not endanger anyone.
- The instructions of this manual must be observed strictly during assembly, operation, maintenance and repair.
- Do not work on the bench drilling machine if your concentration is reduced, for example, because you are taking medication.
- Observe the regulations for the prevention of accidents issued by your association for the prevention of accidents and safety in the workplace or other inspection authorities.
- Inform the inspector of any danger or failure.
- Use the prescribed personal protective equipment. Make sure to wear a well-fitting work suit and a hairnet, if necessary.
- Do not use protective gloves when drilling.

1.11 Safety during maintenance

Report and document changes

Inform the operating staff on time of any repair and maintenance work.

Report all safety-relevant changes or performance details of the bench drilling machine. Document all changes, have the operating manual changed accordingly and train the machine operators.

1.11.1 Switching-off and securing the bench drilling machine



Unplug the main switch before starting any maintenance or repair work. All machine components and hazardous voltages are disconnected.

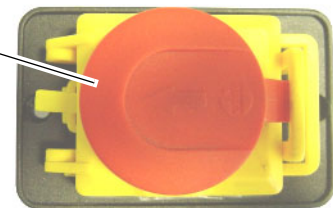


Attach a warning sign on the machine.



WARNING!
When reconnecting the electrical power supply, make sure that the ON/OFF switch of the bench drilling machine is turned to the position "OFF".

ON / OFF switch with EMERGENCY-STOP function



Illustr. 1-1: EMERGENCY-STOP button

1.11.2 Use of lifting equipment



WARNING!

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

Check the lifting and load-suspension gear on

- sufficient load capacity,
- perfect condition.

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



Fasten the loads properly.

Do not walk under lifted loads!

1.11.3 Mechanical maintenance work

Remove all protection and safety devices before starting maintenance work and re-install them once the work has been completed, such as:

- covers,
- safety indications and warning signs,
- earth (ground) cables.

If you remove protection or safety devices, refit them immediately after completing the work.

Check if they are working properly!

1.12 Accident report

Inform your superiors and Optimum Maschinen GmbH immediately in case of accidents, possible sources of danger and any action which almost lead to an accident "near misses".

"Near misses" may have many possible causes.


The sooner they are notified, the faster these causes can be eliminated.



INFORMATION

In the description of execution of work with and on the bench drilling machine we highlight the dangers specific to that kind of work.

1.13 Electric

 "Maintenance" on page 25

Have the machine and / or the electrical equipment checked regularly, at least every six months.

Eliminate immediately 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 case of an emergency.

Disconnect the bench drilling machine immediately if there is a malfunction in the power supply!

2 Technical Data

The following data which give dimensions and weight are the manufacturer's authorized machine data.

2.1 Power connection	B140 T	B140 T Vario	B160 T	B160 T Vario
engine input capacity	230 V / 50 Hz / 350 W		230 V / 50 Hz / 400 W	230 V / 50 Hz / 500 W
2.2 Drilling capacity	B140 T	B140 T Vario	B160 T	B160 T Vario
drilling capacity in steel [mm]	14		16	
throat depth [mm]	102		126	
2.3 Spindle holding fixture	B140 T	B140 T Vario	B160 T	B160 T Vario
spindle sleeve lever [mm]	50		60	
spindle holding fixture	B16		MK 2	
2.4 Drilling machine table	B140 T	B140 T Vario	B160 T	B160 T Vario
sleuable on the spindle axis	45°		45°	
turnable on the spindle axis	360°		360°	
dimension of the table [mm]	195 x 170		240 x 200	
dimension of the extended table [mm]	280 x 170		330 x 200	
slot width for clamping on the drilling machine table [mm]	14		14	
groove dimension on the stand [mm]	-		10	
2.5 Dimensions	B140 T	B140 T Vario	B160 T	B160 T Vario
height [mm]	730		850	
depth [mm]	410		520	
width [mm]	240		300	
total weight [kg]	30		43	
spindle diameter [mm]	50		60	
max. distance between the spindle / drilling machine table	300		400	
2.6 Working area	B140 T	B140 T Vario	B160 T	B160 T Vario
height [mm]	2000		2000	
depth [mm]	1800		1900	
width [mm]	1200		1200	
2.7 Revolutions	B140 T	B140 T Vario	B160 T	B160 T Vario
spindle revolutions [min ⁻¹]	580 850 1220 1650 2650	stepless 300 ~ 3000 180 ~ 1800	425 560 645 730 790 860 1275 1350 1600 1710 2060 2545	stepless 300 ~ 3000 180 ~ 1800
2.8 Environmental conditions	B140 T	B140 T Vario	B160 T	B160 T Vario
temperature	5-35 °C			
humidity	25 - 80%			
2.9 Emissions	B140 T	B140 T Vario	B160 T	B160 T Vario
The emission of the bench drilling machine is below 78 dB(A). If the bench drilling machine is installed in an area where various machines are in operation, the acoustic influence (immis-sion) on the operator of the bench drilling machine may exceed 85 dB(A).				
INFORMATION				
We recommend the use of soundproofing and ear protection. Please note that the duration of the acoustic noise expose, the kind and nature of the working area as well as other machines may influence the noise level in the workplace.				



3 Assembly



INFORMATION

The bench drilling machine is disassembled ready for packaging.

The bench drilling machine is to be assembled before commissioning.

3.1 Transport



WARNING!

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

- centres of gravity
- suspension points
- weights
- means of transport to be used
- prescribed shipping position



WARNING!

Use of unstable lifting and load suspension gear that breaks under load can cause very serious injuries or even death.

Check that the lifting and load suspension gear

- has sufficient load capacity,
- is 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!

3.2 Delivery volume

When the bench drilling machine is being delivered, please check immediately that it has not been damaged during transportation and that all components are complete. For this purpose, take all parts off the box and compare them to the following list.

- drilling head
- stand
- tripod
- toothed rack with guiding rings (only B160T)
- drilling machine table and support for drilling machine table (support for table pre-assembled)
- quick clamp drill chuck
 - for B140 T, 1 - 13 mm
 - for B160 T, 1 - 16 mm
- clamping lever drilling machine table
- handle for drilling machine table (only B160 T)
- drawer for drills (drill drift, hexagon socket screw key)
- operating manual

3.3 Storage



ATTENTION!

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

Store packed or unpacked parts only under the following ambient conditions: “Environmental conditions“ on page 13

Consult Optimum Maschinen GmbH if the bench drilling machine and accessories have to be stored for a period of over three months or under different external conditions than those given here.

3.4 Installation and assembly

3.4.1 Requirements of the installation site

Organize the workplace around the bench drilling machine in accordance with local safety regulations. Operation, maintenance and repair in the work area must not be hindered.



INFORMATION

The main plug of the bench drilling machine must be easily accessible.

3.4.2 Assembly



WARNING!

Danger of crushing when grouping, assembling and mounting the machine components.

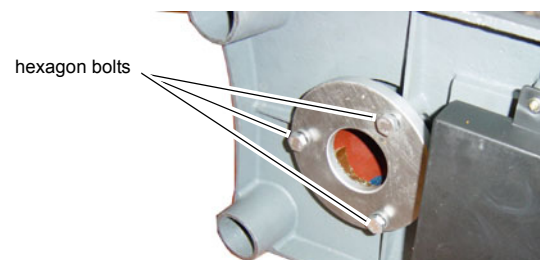
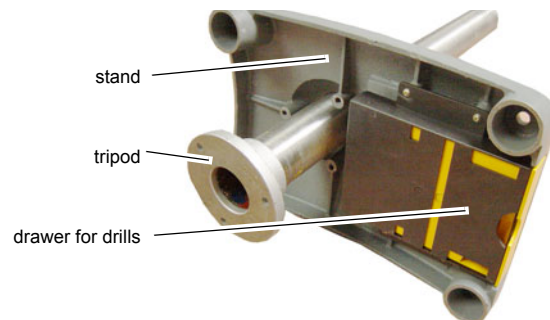
Assembly of stand and tripod



INFORMATION

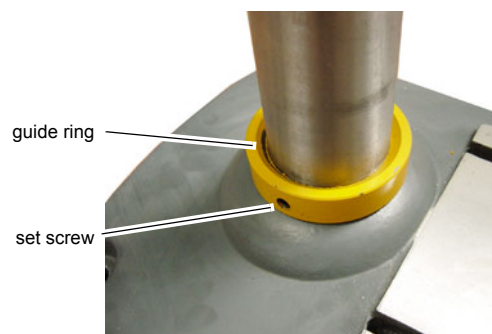
You need a hexagon spanner 14mm and a hexagon socket screw key 5mm to assemble the bench drilling machine. You will find the required hexagon socket screw key in the drawer for drills in the stand.

- Pass the tripod through the stand.
- Tighten the tripod with the three hexagon bolts.
(hexagon bolts, spring washer, attaching enclosed disk).



Illustr. 3-1: Assembly tripod

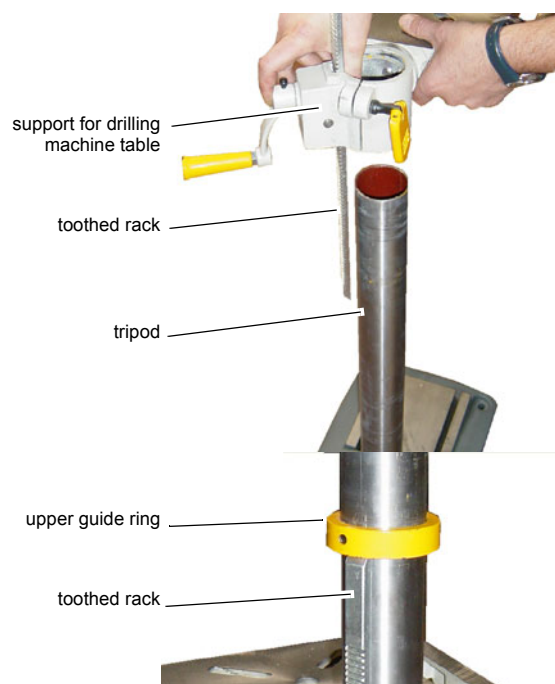
- The following assembly instructions refer to the bench drilling machine B160T.
- Mount the lower guide ring of the toothed rack.
- Fasten the guide ring with the set screw.



Illustr. 3-2: Assembly guide ring

Assembly of the drilling machine table

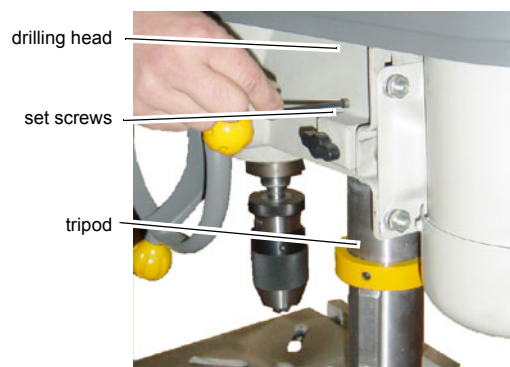
- Introduce the spiral wheel into the support for the drilling machine table.
- Adjust the toothed rack within the drilling machine table in a way that the teeth of the toothed rack cam into the spiral wheel of the support for the drilling machine table.
- Push the complete table with the toothed rack onto the tripod. The larger part without toothing of the toothed rack must be upside.
- Mount and tighten the upper guide ring of the toothed rack. Make sure that the drilling machine table is easily movable around the tripod.
- Mount the clamping lever to fix the drilling machine table.



Illustr. 3-3: Assembly drilling machine table

Assembly of the drilling head

- Put the drilling head on the tripod and turn it until it aligns with the stand.
- Make sure that the drilling head is completely fixed onto the tripod.
- Tighten the drilling head with the two set screws.
- Mount the handwheel for the spindle sleeve feed.



Illustr. 3-4: OPTI B26 Pro Vario

Assembly of the quick clamping drill chuck

☞ “Mounting of the quick action drill chuck“ on page 22

3.4.3 Installation

Check the horizontal orientation of the base of the bench drilling machine with a spirit level.

Attach the bench drilling machine to the base using the holes in the stand.

The place where the bench drilling machine is installed must comply with ergonomic workplace requirements.



ATTENTION!

Tighten the setscrews on the bench drilling machine only until it is firmly secured and can neither move during operation nor be turned over.

If the setscrews are too tight and the base is uneven, the stand of the bench drilling machine may break.

3.5 First use



WARNING!

Staff and equipment may be endangered if the bench drilling machine is first used by unexpert staff.

We do not take responsibility for damage caused by incorrect commissioning.

Power supply

Connect the main plug of the bench drilling machine to the power supply. Check the fuse protection of your power supply to the technical data for the power consumption of the engine.

4 Handling

4.1 Safety



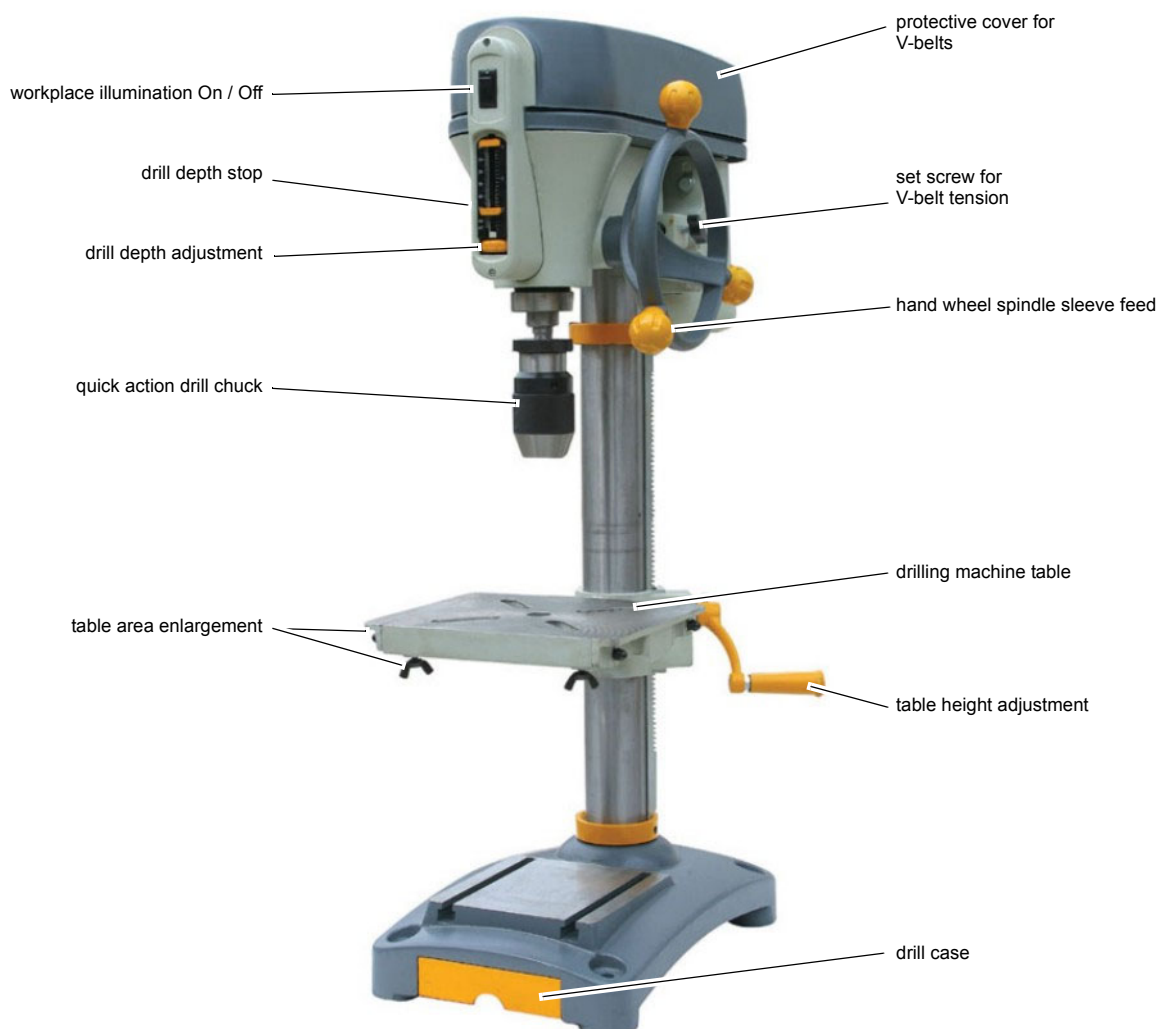
Use the bench drilling machine only under the following conditions:

- The bench drilling machine is in proper working order.
- The bench drilling machine is used as prescribed.
- The instruction manual has been followed.
- All safety devices are installed and activated.

All malfunctions should be eliminated immediately. Stop the machine immediately at an event of any malfunction in operation and make sure it cannot be started up accidentally or without authorization.

Notify the person responsible immediately of any modification.

4.2 Control and indicating elements



Illustr.4-1: Bench drilling machine B160 T

4.2.1 Speed adjustment on the VARIO bench drilling machines

On the Vario bench drilling machines, the speed of the spindle sleeve is being adjusted with the potentiometer. Adjust the range of speed required by means of the following speed tables.

- ☞ “Speed table B140 T Vario“ on page 21
- ☞ “Speed table B160 T Vario“ on page 21

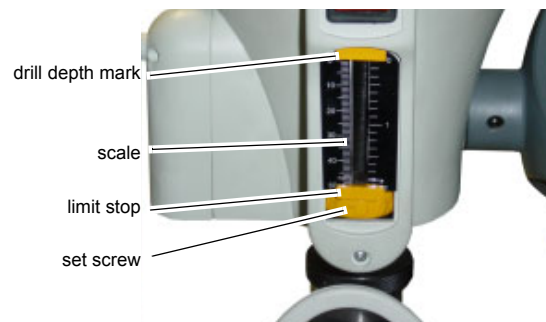


Illustr. 4-2: potentiometer

4.2.2 Drill depth stop

When drilling several holes of the same depth, you can use the drill depth stop.

- Adjust the drill depth mark with the set screw to the required drill depth.
- The spindle can now only be lowered to the adjusted value.

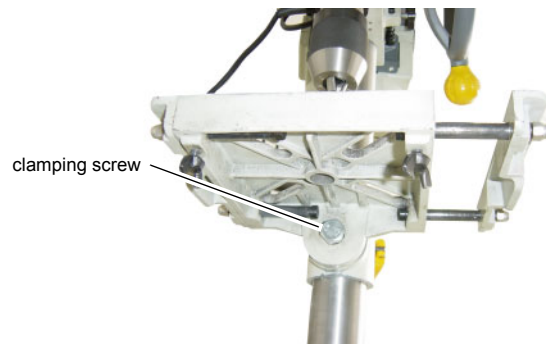


Illustr. 4-3: scale drill depth stop

4.2.3 Inclination of the drilling machine table

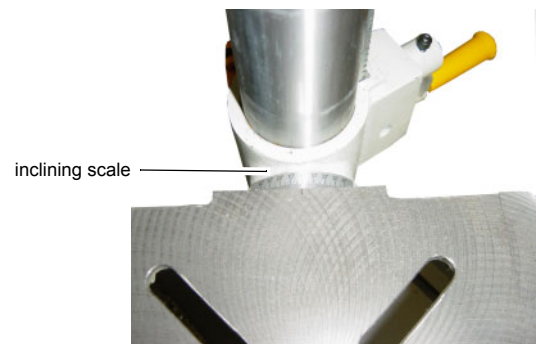
The drilling machine table can be inclined to the right or to the left.

- Loosen the fastening screws to incline the drilling machine table.



Illustr. 4-4: fastening screw

- Use the inclining scale to adjust the drilling machine table.
- Re-tighten the clamping screws firmly.



Illustr. 4-5: inclining scale

4.3 Speed alternation



WARNING!

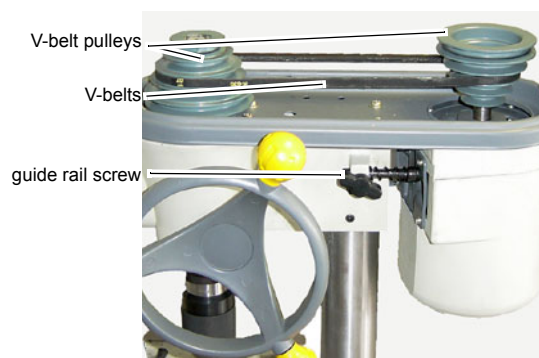
Only open the cover hood when the bench drilling machine is disconnected from the electrical power supply.

Close and screw the covering hood after each modification of the position of the V-belts.



Adjust the required speed respectively the speed range of the drilling spindle by modifying the position of the V-belt on the V-belt pulley.

- Disconnect the machine from the electrical power supply.
- Detach the screws on the protective cover of the V-belts.



Illustr. 4-6: V-belt pulleys

- Open the protective cover.
- Unscrew the guide rail screws each left and right of the drilling head and push the engine in direction of the quick action drill chuck.
 - B140T, guide rail screw only on the right
 - B160T, guide rail screw on the left and on the right



ATTENTION!

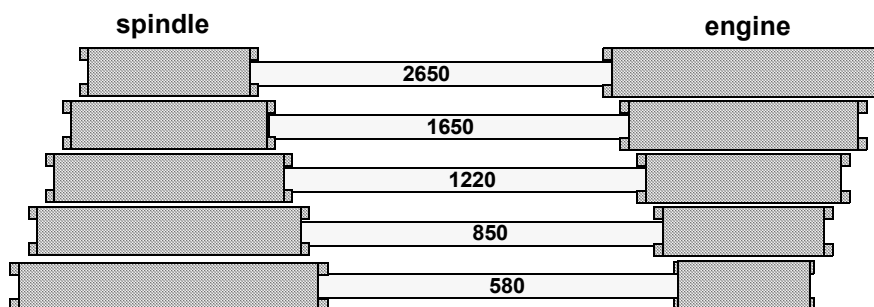
Make sure that the tension of the V-belts is correct.

If the tension of the V-belts is too high or too low, it may lead to damages.

The V-belts are well tightened if they could be squeezed approximately 1 cm.

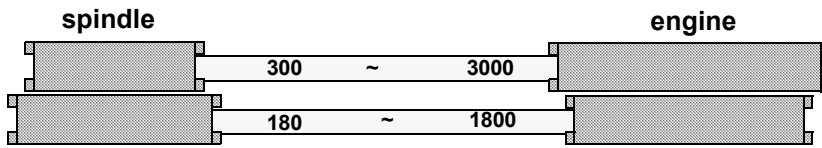
4.4 Speed table

4.4.1 Speed table B140 T



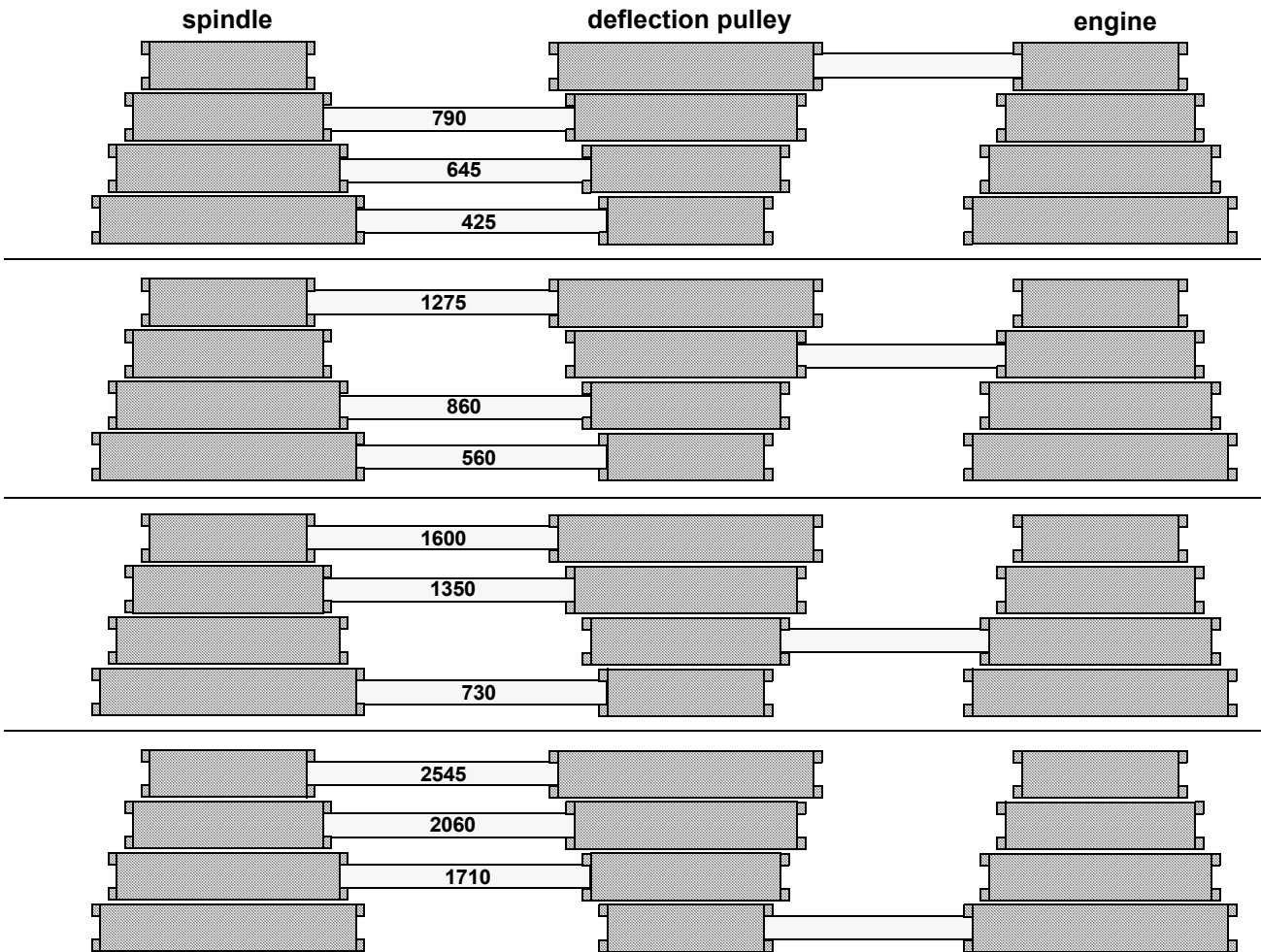
Illustr. 4-7: B140 T

4.4.2 Speed table B140 T Vario



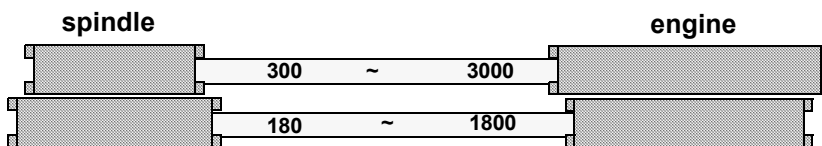
Illustr.4-8: B140 T VARIO

4.4.3 Speed table B160 T



Illustr.4-9: B160 T

4.4.4 Speed table B160 T Vario



Illustr.4-10: B160 T Vario

4.4.5 Application table

Reference speed values [min^{-1}] :

bit Ø [mm]	grey cast iron	special steel	steel St 37	aluminium	bronze
3	2550	1600	2230	9500	8000
4	1900	1200	1680	7200	6000
5	1530	955	1340	5700	4800
6	1270	800	1100	4800	4000
7	1090	680	960	4100	3400
8	960	600	840	3600	3000
9	850	530	740	3200	2650
10	765	480	670	2860	2400
11	700	435	610	2600	2170
12	640	400	560	2400	2000
13	590	370	515	2200	1840
14	545	340	480	2000	1700
16	480	300	420	1800	1500
18	425	265	370	1600	1300
20	380	240	335	1400	1200
22	350	220	305	1300	1100
25	305	190	270	1150	950

4.5 Quick action drill chuck

The bench drilling machine is equipped with a quick action drill chuck.

In order to chuck a drill, hold the upper part of the quick action drill chuck and turn the lower part.



ATTENTION!

Make sure that the chucked tool is positioned firmly and correctly.

4.5.1 Mounting of the quick action drill chuck

The quick action drill chuck is being secured against twist in the drill spindle by a form-fitting connection (taper only B160T).

A frictionally engaged connection holds and centres the quick action drill chuck with a morse taper in the drill spindle.

- Check respectively clean the conical seat in the drill spindle and on the morse taper of the tool or of the quick action drill chuck.
- Push the morse taper into the drill spindle.

4.5.2 Disassembly of the quick action drill chuck

B160 T



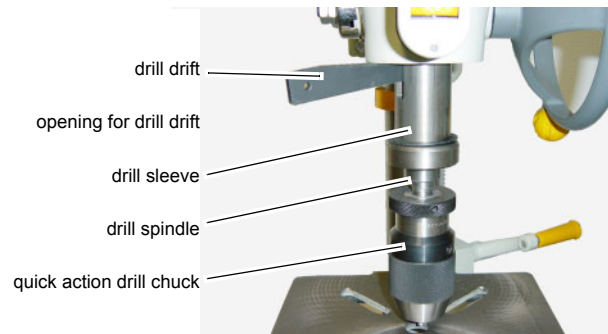
The quick action drill chuck and the morse taper are released from the drill spindle by a drill drift.

WARNING!



Disassemble the quick action drill chuck only when the bench drilling machine is disconnected from the electrical power supply.

- Disconnect the bench drilling machine from the electrical power supply.
- Turn the drill spindle downwards.
- Turn the drill spindle such that the openings on the drill sleeve and on the drill spindle are superimposed.
- Loosen the morse taper of the quick action drill chuck by means of a drill drift.



Illustr. 4-11: Disassembly drill chuck B160 T

B140 T

The quick action drill chuck and the morse taper are released from the drill spindle with a rubber mallet.

4.6 Cooling

The friction generated during rotation can cause the edge of the tool to become very hot.

The tool should be cooled during the drilling process. Cooling the tool with a suitable cooling lubricant ensures better working results and a longer edge life of the tools. This is best realized by a separate cooling equipment. If there is no cooling equipment included in the delivery volume, you can cool by means of a spray gun or a washing bottle.



ATTENTION!

Danger of injury due to brushes getting caught or pulled in. Use a spray gun or a washing bottle for cooling.



INFORMATION

Use a water-soluble and non-pollutant drilling emulsion which can be obtained from authorized distributors.

Make sure that the cooling agent is being collected.

Respect the environment when disposing any lubricants and cooling agents.

Follow the manufacturer's disposal instructions.



4.7 Before starting the working process

Before you start working, select the required speed. It is depending on the drilling diameter and on the material used.

☞ "Speed alternation" on page 20



WARNING!

For drilling jobs, it is necessary to clamp the workpiece firmly to prevent the bit catching on the piece. Example of suitable clamping devices include a machine vice or clamping jaws.

Put a wooden or plastic board beneath the workpiece to avoid drilling through to the work table, vice, etc.

If necessary, enlarge the support area of the drilling machine table.

Use the drill depth stop when you want to have various bore holes with the same depth.



Illustr. 4-12: enlarge table area

Use a dust remover unit while working with wood. Sawdust can be health hazardous. Also use a suitable protective mask for any work which generates dust.

4.8 During the working process

The spindle sleeve feed is being performed by the hand wheel. Make sure that the feed is being at a regular pace and not too fast.

The reset of the spindle sleeve is being performed by a track recoil spring.



WARNING!

Danger of clothing and / or long hair getting caught.

- **Make sure to wear a well-fitting work suit during drilling work.**
- **Do not use gloves.**
- **If necessary, wear a hairnet.**

Thin bits break easily.

In case of deep drilling, remove the bit from time to time, to remove drilling chips from the bore hole. Some drops of oil reduce friction and ensure a longer edge life of the bit.



CAUTION!

Danger of crushing! Do not place your hand between the drill head and the spindle sleeve.

5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the bench drilling machine.



ATTENTION !

Properly performed regular maintenance is an essential prerequisite for

- **safe operation,**
- **faulty-free operation,**
- **long service life of the bench drilling machine,**
- **the quality of the products you manufacture.**

Installation and equipment from other manufacturers must be in optimum condition.

5.1 Safety



WARNING!

The consequences of incorrect maintenance and repair work may include:

- **very serious injury to employees working on the bench drilling machine**
- **damage to the bench drilling machine.**

Only qualified staff should carry out maintenance and repair work on the bench drilling machine.

5.1.1 Preparation



WARNING!

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



☞ “Switching-off and securing the bench drilling machine“ on page 11

Position a warning sign.

5.1.2 Restarting

Before restarting run a safety check.

☞ “Safety check“ on page 9






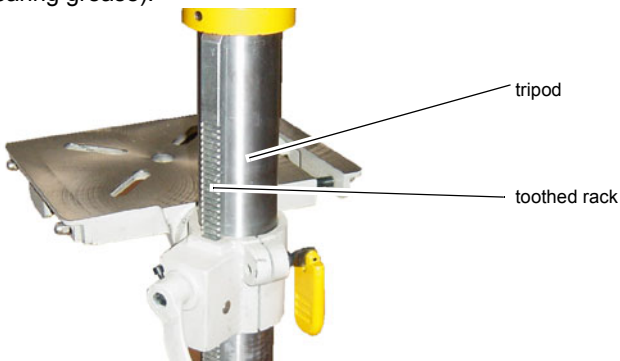
WARNING!

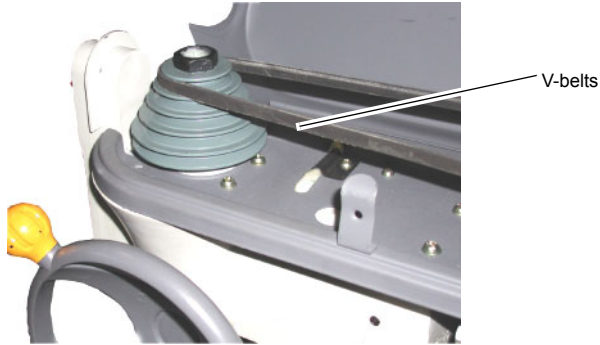
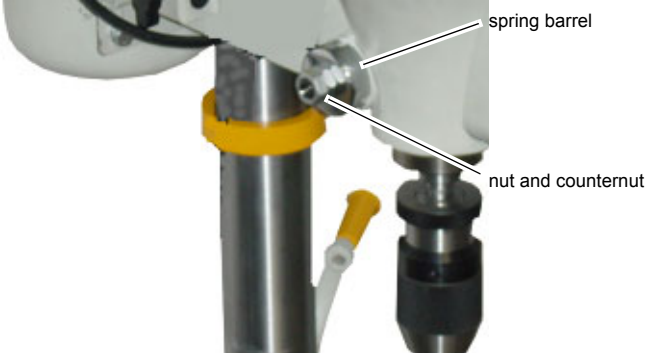
Before activating the bench drilling machine, double check that this will not

- **endanger other people,**
- **damage the bench drilling machine.**

5.2 Inspection and maintenance

The type and extent of wear depends to a large extent on individual usage and service conditions.

Interval	Where?	What?	How?
start of shift after each maintenance or repair operation	bench drilling machine		 "Safety check" on page 9
every week	guide rail screws	check	<ul style="list-style-type: none"> • Check if the guide rail screws for the V-belt tension on the left and right side of the drilling head are well fastened. • Check if the V-belts are well tightened. Checking the tension of the V-belts,  "Speed alternation" on page 20.  <p>guide rail screws on the right</p> <p>Illustr.5-1: drilling head on the right</p>
every month	tripod and rack	lubricate	<ul style="list-style-type: none"> • Lubricate the tripod regularly with commercial oil. • Lubricate the rack regularly with commercial grease (e.g. friction bearing grease).  <p>tripod</p> <p>toothed rack</p> <p>Illustr.5-2: tripod</p>

Interval	Where?	What?	How?
every six months	V-belts on the drilling head	visual inspection	<ul style="list-style-type: none"> Check the V-belt on the drilling head that it is not being porous or used.  <p>Illustr. 5-3: V-belts</p>
every six months	electric	check	<p>Check the electrical equipment / parts of the bench drilling machine.</p> <p>🔧 “Qualification of employees“ on page 7</p>
as required	spindle sleeve	adjust stretch return spring	<ul style="list-style-type: none"> Detach the two nuts about 1/4 turn anticlockwise on the spring barrel. Do not remove the nuts completely from the barrel! Hold the spring barrel with one hand and pull out slightly with the other hand. Turn the spring barrel around its own axis until the indentation engages into the following notch.  <p>Illustr. 5-4: stretch return spring</p> <p>INFORMATION</p> <p>Turn the barrel clockwise when the tension is being increased, turn it anticlockwise when the tension is being reduced.</p> <p>Make sure that the notch on the spring barrel is correctly engaged and then fasten the nut.</p> <p>The second nut is being jammed with the first nut.</p>

5.3 Repair

For any repair work, request the assistance of an employee of Optimum Maschinen GmbH's technical service or send us the bench drilling machine.

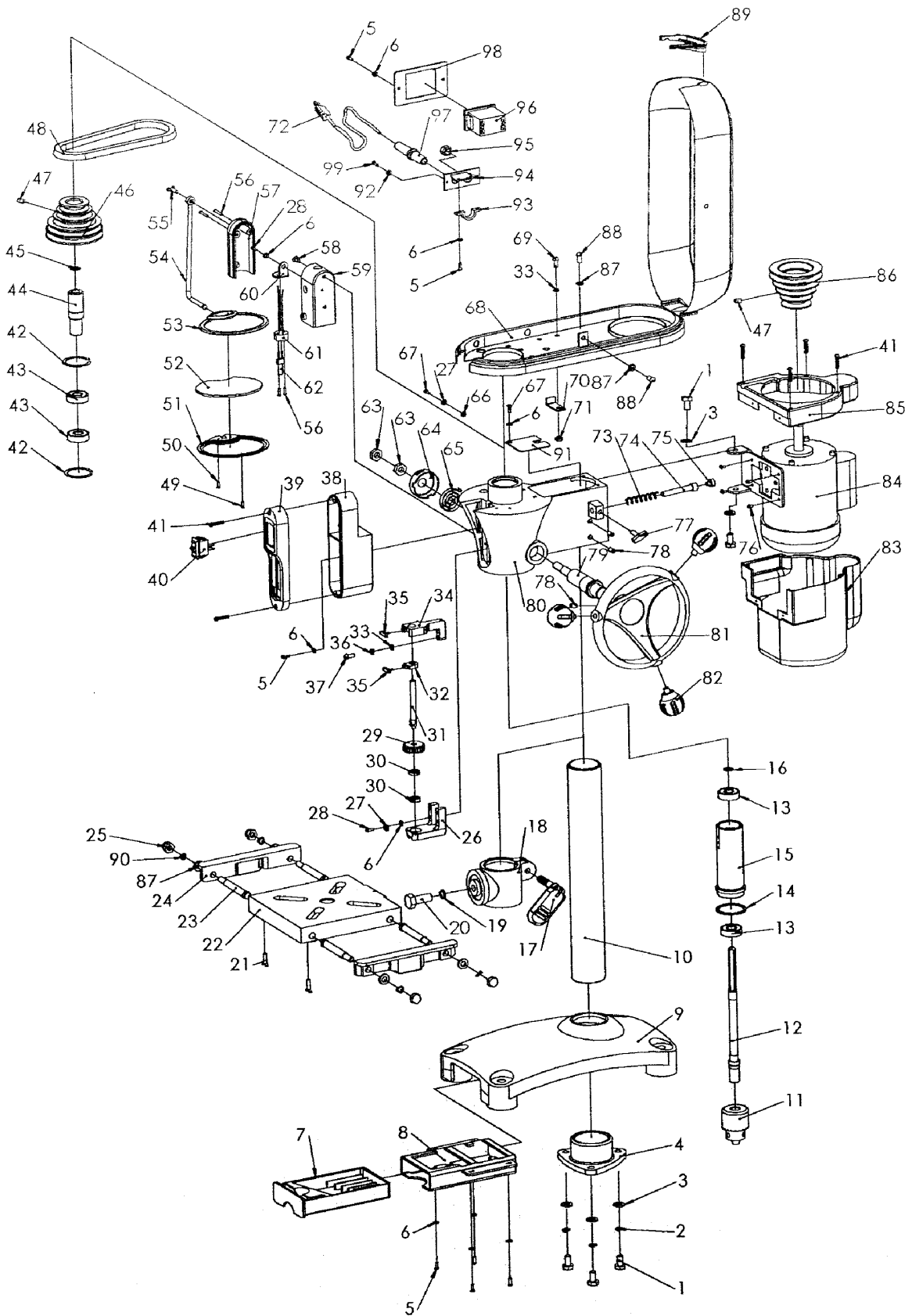
If the repairs are carried out by qualified technical staff, they must follow the indications given in this manual.

Optimum Maschinen GmbH does not take responsibility nor does it guarantee against damage and operating malfunctions resulting from failure to observe this operating manual.

For repairs only use

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

5.4 Spare parts drawing B140 T / B140 T Vario



Illustr. 5-5: exploded view

5.4.1 Spare parts list B140T (Vario)

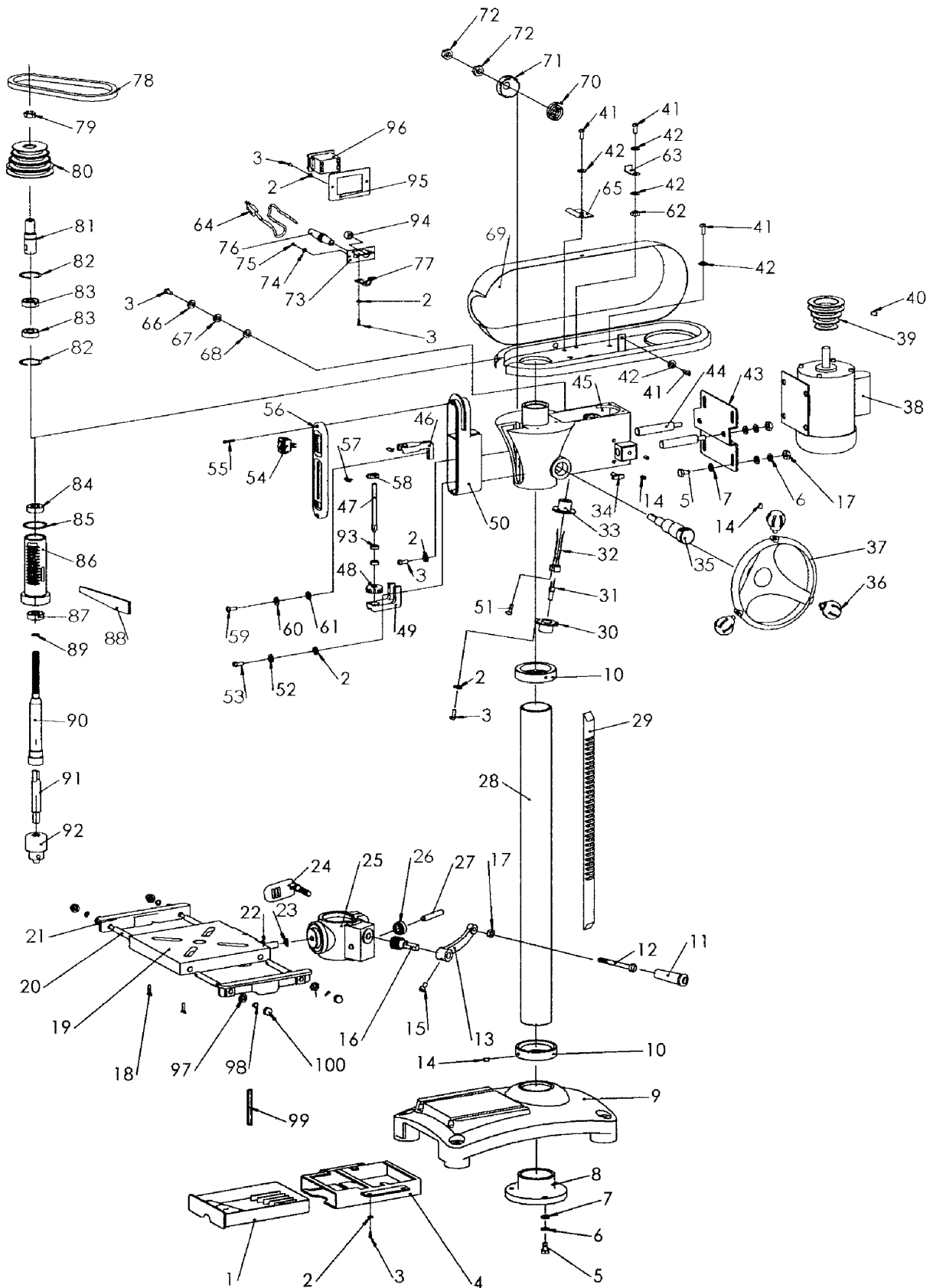
Pos.	Quantity	Designation	Dimension	part number
1	5	hexagon bolt	M8x16	
2	7	spring washer	8	
3	9	washer	8	
4	1	spindle flange		0331400
5	10	screw	M4x12	
6	17	washer	4	
7	1	bit drawer		0331401
8	1	bit drawer - housing		0331402
9	1	stand		0331403
10	1	tripod		0331404
11	1	quick action drill chuck		
12	1	drilling spindle		0331405
13	2	bearing	6201	0331406
14	1	rubber ring		
15	1	spindle sleeve		0331407
16	1	washer	12	
17	1	clamping lever		0331408
18	1	support for drilling machine table		0331409
19	1	washer	12	
20	1	screw	M12x26	
21	2	wing nut	M6x12	0331410
22	1	drilling machine table		0331411
23	4	extension rod drilling machine table		0331412
24	2	extension of support drilling machine table		0331413
25	4	cap nut	M6	0331414
26	1	lower holder drill depth stop		0331415
27	6		4	
28	5		M4x20	
29	1	handwheel drill depth stop		0331416
30	2		625	
31	1	threaded rod drill depth stop		0331417
32	1	drill depth stop		
33	3		5	
34	1	upper holder drill depth stop		0331418
35	2			0331419
36	2		5	
37	2		M5x20	
38	1	housing drill depth stop		0331420
39	1	front cover drill depth stop		0331421
40	1	light switch		0331422
41	6	screw	M4x12	
42	2	ring	40	
43	2	bearing	6203	0331423
44	1	taper		0331424
45	1	ring		
46	1	V-belt pulleys drilling spindle		0331425
47	2	set screw	M6x10	
48	1	V-belt	XPZ662	0331426
49	2	screw	M3x6	

5.4.1 Spare parts list B140T (Vario)

Pos.	Quantity	Designation	Dimension	part number
50	1	screw	M3x12	
51	1	sight protection frame		0331427
52	1	protective screen		0331428
53	1	sight protection frame		0331429
54	1	bow		0331430
55	1	wing screw	M5x12	0331431
56	4	screw	M3x12	
57	1	sight protection support		0331432
58	2	screw	M4x8	
59	1			
60	1	angle		0331433
61	1	fitting		0331434
62	1	halogen lamp		0331435
63	2	nut	M10x1	0331460
64	1	spiral spring housing		0331436
65	1	spiral spring		0331437
66	2	washer		
67	3	screw	M4x8	
68	1	protective cover V-belts		0331438
69	1	screw	M5x12	
70	1	angle		0331439
71	1	nut	M5	
72	1	connecting cable		0331440
73	1	spring		0331441
74	1	bolt		0331442
75	1	rubber		
76	4	screw	M4x10	
77	1	clamping screw		0331443
78	3	set screw	M8x10	
79	1	shaft pinion		0331444
80	1	housing drilling head		0331445
81	1	handwheel		0331446
82	3	handle hand wheel		0331447
83	1	engine hood		0331448
84	1	engine B140T	350 W	0331449
		engine B140T Vario	350 W	0331450
85	1	protective cover		0331451
86	1	V-belt pulleys engine		0331452
87	9	washer	6	
88	5	screw	M6x12	
89	1	aperture		0331453
90	4	washer	6	
91	1	cover plate		0331454
92	2	washer	3	
93	1	traction relief		
94	1	aperture		
95	1	cable bushing		
96	1	switch ON / OFF		0331455
97	1	cable bushing		
98	1	aperture		0331456
99	2	screw	M3x10	
-	1	potentiometer B140T Vario		0331457
-	1	condensator engine		0331458
-	1	complete spindle sleeve		0331459

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5.5 Spare parts drawing B160 T / B160 T Vario



Illustr. 5-6: exploded view

5.5.1 Spare parts list B160 T (Vario)


Pos.	Quantity	Designation	Dimension	part number
1	1	bit drawer		0331600
2	12	washer	4	
3	10	screw	M4x12	
4	1	bit drawer - housing		0331601
5	7	screw	M8x25	
6	7	spring washer	8	
7	11	washer	8	
8	1	column flange		0331602
9	1	stand		0331603
10	2	guide ring		0331604
11	1	crank handle		0331605
12	1	screw	M8x35	0331606
13	1	handle table hight adjustment		0331607
14	5	set screw	M8x10	
15	1	hexagon socket	M5x12	
16	1	driving worm		0331608
17	5	nut	M8	
18	2	wing screw	M6x12	0331609
19	1	drilling table		0331610
20	4	extension rod drilling table		0331611
21	2	extension of support drilling table		0331612
22	1	screw	M12x25	
23	1	washer	12	
24	1	clamping lever		0331613
25	1	drilling machine table support		0331614
26	1	toothed wheel toothed rack		0331615
27	1	bolt		0331616
28	1	drilling column		0331617
29	1	toothed rod		0331618
30	1	aperture		0331619
31	1	halogen lamp		0331620
32	1	fitting		0331621
33	1	aperture		0331622
34	2	clamping screw		0331623
35	1	shaft pinion		0331624
36	3	handle hand wheel		0331625
37	1	hand wheel		0331626
38	1	engine B160T	400 W	0331627
	1	engine B160T Vario	500 W	0331628
39	1	V-belt pulley engine		0331629
40	2	screw	M6x10	
41	7	screw	M6x12	
42	8	washer	6	
43	1	fixing plate		0331630
44	2	guide rail rod		0331631
45	1	housing drilling head		0331632
46	1	upper holder drill depth stop		0331633
47	1	threaded rod		0331634
48	1	handwheel		0331635
49	1	lower holder		0331636

5.5.1 Spare parts list B160 T (Vario)

Pos.	Quantity	Designation	Dimension	part number
50	1	drill depth stop		0331637
51	2	screw	M3x12	
52	4	washer	4	
53	4	screw	M4x16	
54	1	light switch		0331638
55	2	screw	M4x12	
56	1	aperture drill depth stop		0331639
57	2	display		0331640
58	1	holding fixture		0331641
59	2	screw	M5x16	
60	2	washer	5	
61	2	washer	5	
62	1	nut	M6	
63	1	angle		
64	1	connection cable		
65	1	traction relief	Q235A	0331642
66	2	washer	4	
67	2	washer		
68	2	nut		
69	1	protective cover V-belts		0331643
70	1	spiral spring		0331644
71	1	spiral spring housing		0331645
72	2	nut	M12x1	0331646
73	1	aperture		
74	2	washer	3	
75	2	screw	M3x10	
76	1	cable bushing		
77	1	traction relief		
78	1	V-belt	XPZ800	0331647
79	1	nut		0331648
80	1	V-belt pulleys drilling spindle		0331649
81	1	taper		0331650
82	2	ring	42	
83	2	bearing	6004	0331651
84	1	bearing	6201	0331652
85	1	ring		
86	1	drilling sleeve		0331663
87	1	bearing	6005	0331654
88	1	drill drift		0331655
89	1	washer	12	
90	1	drilling spindle		0331656
91	1	morse taper		0331657
92	1	quick action drill chuck		
93	2		625	
94	1	cable bushing		
95	1	aperture		0331658
96	1	switch ON / OFF		0331659
97	4	washer	6	
98	4	spring washer	6	
99	2	scale	3x5	
100	4	cap nut	M6	0331660
-	1	potentiometer B160T Vario		0331661
-	1	condensator engine		0331662
-	1	complete spindle sleeve		0331663

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6 Malfunctions

Malfunction	Cause / possible effects	Solution
Noise during working	<ul style="list-style-type: none"> Spindle turning dry. Tool blunt or is being incorrectly secured. Protective cover of the V-belts not completely closed. 	<ul style="list-style-type: none"> Grease spindle. Use new tool and check securing (fixed setting of the bit, drill chuck and morse taper).
Bit „burnt“.	<ul style="list-style-type: none"> Incorrect speed. The chips have not been removed from the bore hole. Bit blunt. Operating without cooling agent. 	<ul style="list-style-type: none"> Select another speed, feed is too fast. Extract the bit more often. Sharpen or replace bit. Use coolant.
Bit tip moves, bore hole is not circular.	<ul style="list-style-type: none"> Hard fibre in the wood or unequal length of the cutting spiral or unequal angles in the bit. Bit deformed. 	<ul style="list-style-type: none"> Replace bit or re-sharpen it.
Defective bit.	<ul style="list-style-type: none"> No support used. 	<ul style="list-style-type: none"> Place a wooden board beneath the workpiece and secure them to one another.
Bit running off-centre or "hopping".	<ul style="list-style-type: none"> Bit deformed. Bearings worn down in the drill head. Bit badly secured. Drill chuck defective. 	<ul style="list-style-type: none"> Replace bit. Have the bearings in the drill head replaced. Secure the bit properly. Replace the drill chuck.
Impossible to introduce drill chuck or morse taper	<ul style="list-style-type: none"> There is dirt, grease or oil on the inner conical surface of the drill chuck or on the conical surface of the drilling spindle. 	<ul style="list-style-type: none"> Clean surfaces well. Keep surfaces free of grease.
Drill spindle does not turn	<ul style="list-style-type: none"> V-belt defective V-belt slips 	<ul style="list-style-type: none"> Replace V-belt. Check V-belt tension and adjust it if necessary.
Engine does not start	<ul style="list-style-type: none"> Defective fuse. Malfunction in the frequency converter (only Vario) Potentiometer defective (only Vario) Engine defective 	<ul style="list-style-type: none"> Have it checked by authorized personnel.
Overheating of motor and lack of power	<ul style="list-style-type: none"> Engine overloaded Insufficient mains voltage 	<ul style="list-style-type: none"> Disconnect immediately and have it checked by authorized personnel.
Precision of the work deficient	<ul style="list-style-type: none"> Heavy and unbalanced or twisted workpiece Inexact horizontal position of the workpiece holder Inclination angle of the drilling machine table not being correctly adjusted. 	<ul style="list-style-type: none"> Balance workpiece statically and secure it without straining Adjust workpiece holder Check and adjust inclination angle of the drilling machine table.
Drilling spindle sleeve does not return to its initial position	<ul style="list-style-type: none"> Spindle return spring 	<ul style="list-style-type: none">  "adjust stretch return spring" on page 27

7 Appendix

7.1 Copyright

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The company reserves the right to make technical alternations without prior notice.

7.2 Terminology/Glossary

Term	Explanation
drill sleeve	fixed hollow shaft which runs in the drill spindle
drill spindle	shaft driven by the engine
quick action drill chuck	drill holding fixture to be clamped manually
drill chuck	drill holding fixture
drill drift	tool to release the bit or the drill chuck from the drill spindle
morse taper	cone of the drill or of the drill chuck
tool	bit, countersink, etc.
workpiece	part to be drilled, part to be machined
drilling machine table	support face, clamping surface
drilling head	upper part of the bench drilling machine
handwheel	manual control for the drill feed

7.4 EC - declaration of conformity

**The manufacturer /
retailer:** Optimum Maschinen Germany
Dr.-Robert-Pfleger-Str. 26
D-96103 Hallstadt

hereby declares that the following product,

type of machine: bench drilling machine

designation of machine: **B140 T**
B140 T Vario
B160 T
B160 T Vario

relevant EU directives

machine directives 98/37/EG, Appendix II A
89/336/EWG

low voltage directive 73/23/EWG

meets the provisions of the aforementioned directive, including any amendments valid at the time of this statement.

In order to ensure conformity, the following harmonized standard in particular have been applied:

EN 12717: 2001 Safety of machine tools, drilling machines



Thomas Collrep
(Manager)



Kilian Stürmer
(Manager)

Hallstadt, Oct. 25th, 2002

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The drills at a glance

Bench and upright drills



B 17 Pro



B 23 Pro



B 26 Pro



B 33 Pro

Model	B 17 Pro	B 23 Pro	B 26 Pro	B 33 Pro
Drill capacity in steel (max.)	16 mm	25 mm	25 mm	30 mm
Working radius	152 mm	180 mm	210 mm	254 mm
Spindle securing	MT 2	MT 2	MT 3	MT 4
Spindle speed [rpm]	500 - 2520	200 - 2440	200 - 2440	120 - 1810
No. of intervals	5	12	12	9
Spindle sleeve run	65 mm	80 mm	80 mm	110 mm
Drilling table swivelling	- 45° / 0° / + 45°	- 45° / 0° / + 45°	- 45° / 0° / + 45°	- 45° / 0° / + 45°
Upright diameter	60 mm	73 mm	85 mm	120 mm
Size of table / T-shaped grooves	235 x 220 mm / 12 mm	280 x 250 mm / 12 mm	330 x 290 mm / 14 mm	475 x 425 mm / 14 mm
Power rating	500 W/230 V	750 W	750 W	1100 W
Total height	860 mm	1000 mm	1670 mm	1720 mm
Net weight	39	66	82	135
Item no.	300 3171	3003231 (230 V) 3003233(400V)	300 3263	300 3333

Upright / Geared drills



Model	B 23 PRO Vario	B 26 PRO Vario	B 33 PRO Vario	B 33 GP	B 39 GP	B 40 GSM
Drill capacity in steel (max.)	25 mm	25 mm	30 mm	32 mm	32 mm	35 mm
Working radius	180 mm	210 mm	254 mm	260 mm	260 mm	350 mm
Spindle securing	MT 2	MT 3	MT 4	MT 3	MT 4	MT 4
Spindle speed [rpm]	30 - 3500	30 - 3500	20 - 3500	50 - 2500	50 - 2500 U/min.	50 - 1450
No. of intervals	12 continuos	12 continuos	9 continuos	12	12	18
Spindle sleeve run	80 mm	85 mm	120 mm	125 mm	125 mm	180
Automatic spindle sleeve feed				0.10 / 0.18 / 0.26 mm/U.	0.10 / 0.18 / 0.26 mm/U.	0.10 / 0.2
Upright diameter	73 mm	80 mm	92 mm	115 mm	115 mm	150
Size of table / T-shaped grooves	280 x 245 mm / 12 mm	330 x 290 mm / 14 mm	475 x 425 mm / 14 mm	550 x 495 mm / 16 mm	540 x 470 mm 16 mm	560 x 560 / 18mm
Power rating	750 W / 400 V	750 W / 400 V	1500 W / 400 V	1.1 kW / 400 V	1.5 kW/400 V	1.5 kW/400 V
Total height	1000 mm	1670 mm	1720 mm	1920 mm	2260 mm	2270
Net weight	75	90	140	270	280	660
Item no.	301 1233	301 1263	301 1333	333 3033	333 3039	3334400

Upright drills / Radial drills / Geared drills



Model	B 25 F	B 32 F	RB 3 T	RB 6 T	RB 8 S	B 28 GS	B 30 GT	B 30 GS	B 40 GSP
Drill cap. steel (max.)	25 mm	32 mm	13 mm	16 mm	16 mm	30 mm	30 mm	30 mm	35 mm
Working radius	170 mm	225 mm	100 - 350 mm	115 - 430 mm	115 - 430 mm	225 mm	225 mm	315 mm	350 mm
Spindle securing	MT 3	MT 4	B 16	MT 2	MT 2	MT 3	MT 3	MT 3	MT 4
Spindle speed [rpm]	210-2220	140-1980	390-3000	390-3000	390-3000	100 - 2900	100-2900	100-2900	50 - 1450
No. of intervals	12	9	5	5	5	8	8	8	18
Spindle sleeve run	80 mm	125 mm	100 mm	80 mm	80 mm	140 mm	150 mm	140 mm	180 mm
Drill. table swivelling	45°	360°	- 45° / 0° / + 45°	- 45° / 0° / + 45°	- 45° / 0° / + 45°	-	-	-	-
Upright diameter	70 mm	92 mm	46 mm	60 mm	70 mm	100 mm	100 mm	125 mm	180 mm
Size of table / T-shaped grooves	275 x 275 mm / 14 mm	360 x 360 mm / 14 mm	195 x 220 mm	225 x 230 mm	262 x 262 mm	310 x 360mm / 14mm	300 x 305 mm / 14 mm	480 x 375 mm / 14 mm	560x560 / 18 mm
Power rating	550 W / 400 V	1.1 KW / 400 V / 50 Hz	400 W / 230V	600W / 230V	600W / 400V	0.75KW / 400V	0.75 KW / 400 V	0.75KW / 400 V	1.5KW / 400V
Total height	1570 mm	1730 mm	735 mm	930 mm	1640 mm	1700 mm	1230 mm	1830 mm	2270 mm
Net weight	63	138	26	40	63	270	140	440	660
Item no.	300 8253	300 8323	300 9131	300 9161	300 9181	333 4283	333 4303	333 4313	333 4403

Bench and upright drills



Model	B140 T (Vario)	B160 T (Vario)	B 13 F	B 14 F	B 16 F	B 20 F (Vario)	B 25 F (Vario)	B 32 F (Vario)
Drill capacity in steel (max.)	14 mm	16 mm	13 mm	14 mm	16 mm	20 mm	25 mm	32 mm
Working radius	102 mm	126 mm	104 mm	104 mm	125 mm	170 mm	170 mm	225 mm
Spindle securing	B 16	MT 2	fixed B 16	MT 3	MT 2	MT 2	MT 3	MT 4
Spindle speed [rpm]	580-2650 (180 ~ 3000)	425 - 2545 (180 ~ 3000)	520-2620	85-2550	660-2500	210-2220	210-2220	140-1980
No. of intervals	5 (2 continuos)	12 (2 continuos)	5	4 (4 continuos)	5	12 (12 continuos)	12 (12 continuos)	9 (9 continuos)
Spindle sleeve run	50 mm	60 mm	50 mm	80 mm	65 mm	80 mm	80 mm	125 mm
Drilling table swivelling	45°	45°	45°	45°	45°	45°	45°	45°
Upright diameter	50 mm	60 mm	46 mm	46 mm	60 mm	70 mm	70 mm	92 mm
Size of table / T-shaped grooves	195 x 170 max. 280 x 170 14 mm	240 x 200 max. 330 x 200 14 mm	160 x 160 mm / 14 mm	160 x 160 mm / 14 mm	200 x 200 mm / 14 mm	275 x 275 mm / 14 mm	275 x 275 mm / 14 mm	360 x 360 mm/ 14 mm
Power rating	350 W / 230 V / 50 Hz	400 W (500W) / 230 V / 50 Hz	300 W / 230 V / 50 Hz	350 W / 230 V / 50 Hz	450 W / 230 V / 50 Hz	450 W / 230 V / 50 Hz 450 W / 400 V / 50 Hz	550 W / 400 V / 50 Hz	1.1 kW / 400 V / 50 Hz
Total height	730	850	580 mm	700 mm	820 mm	990 mm	1570 mm	1730 mm
Net weight	27	40	21	24	38	56	63	138
Item no.	3007141 (3011714)	3007161 (3011716)	300 8131	300 8141	300 8161	300 8201 (3011420)	300 8253 (3011425)	300 8323 (3011432)

Upright / Geared drills



Model	B 23 PRO Vario	B 26 PRO Vario	B 33 PRO Vario	B 33 GP	B 39 GP	B 40 GSM
Drill capacity in steel (max.)	25 mm	25 mm	30 mm	32 mm	32 mm	35 mm
Working radius	180 mm	210 mm	254 mm	260 mm	260 mm	350 mm
Spindle securing	MT 2	MT 3	MT 4	MT 3	MT 4	MT 4
Spindle speed [rpm]	85 - 2550	85 - 2550	35 - 3200	50 - 2500	50 - 2500 U/min.	50 - 1450
No. of intervals	12 continuos	12 continuos	9 continuos	12	12	18
Spindle sleeve run	80 mm	85 mm	120 mm	125 mm	125 mm	180
Automatic spindle sleeve feed				0.10 / 0.18 / 0.26 mm/U.	0.10 / 0.18 / 0.26 mm/U.	0.10 / 0.2
Upright diameter	73 mm	80 mm	92 mm	115 mm	115 mm	150
Size of table / T-shaped grooves	280 x 245 mm / 12 mm	330 x 290 mm / 14 mm	475 x 425 mm / 14 mm	550 x 495 mm / 16 mm	540 x 470 mm 16 mm	560 x 560 / 18mm
Power rating	750 W / 400 V	750 W / 400 V	1100 W / 400 V	1.1 kW / 400 V	1.5 kW/400 V	1.5 kW/400 V
Total height	1000 mm	1670 mm	1720 mm	1920 mm	2260 mm	2270
Net weight	75	90	140	270	280	660
Item no.	301 1233	301 1263	301 1333	333 3033	333 3039	3334400

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