

PALMGREN®

16" Drill press W/PF



Read carefully and follow all safety rules and operating instructions before first use of this product.




1	Safety	
1.1	Rating plate	4
1.2	Safety instructions (warning notes)	5
	1.2.1 Classification of hazards	5
	1.2.2 Other pictograms	5
1.3	Intended use	6
1.4	Reasonably foreseeable misuse	7
	1.4.1 Avoiding misuse	7
1.5	Possible dangers caused by the drilling machine	7
1.6	Qualification	8
	1.6.1 Target group private users	8
	1.6.2 Obligations of the User	8
	1.6.3 Additional requirements regarding the qualification	8
1.7	User positions	9
1.8	Safety measures during operation	9
1.9	Safety devices	9
1.10	Safety check	10
1.11	Emergency-stop switch	10
	1.11.1 Master switch	10
	1.11.2 Drill chuck guard	11
1.12	Personal protective equipment	11
1.13	Safety during operation	12
1.14	Safety during maintenance	12
	1.14.1 Disconnecting and securing the drilling machine	12
1.15	Using lifting equipment	12
	1.15.1 Mechanical maintenance	12
1.16	Accident report	13
1.17	Electronics	13
1.18	Inspection deadlines	13
2	Technical specification	
2.1	Emissions	14
2.2	Dimensions DH28FS(9680130)	16
3	Assembly	
3.1	Scope of delivery	18
3.2	Transport	18
3.3	Set-up and assembly	18
	3.3.1 Installation site requirements	19
3.4	Installation	19
	3.4.1 Fixing	19
3.5	First commissioning	20
	3.5.1 Electrical connection	20
	3.5.2 Warming up the machine	21

4	Operation	
4.1	Control and indicating elements	22
4.1.1	Drilling machine DH28FT - DH28FS(9680130)	22
4.1.2	Control panel	23
4.2	Safety.....	23
4.3	Switching on the machine.....	24
4.4	Switching off the machine.....	24
4.5	Speed variation.....	24
4.5.1	Speed table	24
4.6	Drill depth stop.....	25
4.7	Automatic spindle sleeve feed	25
4.8	Disassembly, assembly of drill chucks and drill bits	25
4.9	Cooling.....	25
4.10	Before starting work	26
4.11	During work.....	26
5	Maintenance	
5.1	Safety.....	27
5.1.1	Preparation	27
5.1.2	Restarting	27
5.2	Inspection and maintenance.....	27
5.3	Repair	29
5.3.1	Customer service technician	29
6	Malfunctions	
7	Appendix	
7.1	Copyright	31
7.2	Terminology/Glossary.....	31
7.3	Liability claims/warranty.....	31
7.4	Advice for disposal / Options of reuse:	32
7.4.1	Decommissioning	32
7.4.2	Disposal of new device packaging	32
7.4.3	Disposal of the old device	32
7.4.4	Disposal of electrical and electronic components	33
7.5	Disposal via municipal collection facilities	33
7.6	Product follow-up	33
7.7	Storage	33
8	Ersatzteile - Spare parts	
8.1	Bohrkopf - Drilling head	35
8.2	Pinolenvorschub - Spindle sleeve feed.....	36
8.2.1	Keilriemenantrieb - V-belt drive	37

8.2.2	Säule und Bohrtisch - Column and drilling table	38
8.3	Ersatzteilliste - Parts list	39
8.4	Bohrfutterschutz - Drill chuck protection.....	43
8.5	Schaltplan - Wiring diagram DH28FT/DH28FS (9680130).....	44

1 Safety

Glossary of symbols

	provides further instructions
	calls on you to act
	listings

This part of the operating instructions

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

In addition to these operation instructions, please observe

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

Always keep this documentation close to the drilling machine.

1.1 Rating plate

INFORMATION

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




Exclusive USA Agent
C.H.HANSON
2000 North Aurora Rd.
Naperville,IL 60563



1.2 Safety instructions (warning notes)

1.2.1 Classification of hazards

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

Symbol	Alarm expression	Definition / consequence
	DANGER!	Impending danger that will cause serious injury or death to people.
	WARNING!	A danger that can cause serious injury or death.
	CAUTION!	A danger or unsafe procedure that can cause personal injury or damage to property.
	ATTENTION!	Situation that could cause damage to the drilling machine and product, as well as other types of damage. No risk of injury to persons.
	Information	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram with



1.2.2 Other pictograms





Switching on forbidden!



Do not climb onto the machine!



Read the operating instructions before commissioning!



Pull out the mains plug!



Wear protective glasses!



Wear protective gloves!



Wear safety shoes!



Wear a protective suit!



Use ear protection!



Only switch during standstill!



Protect the environment!



Contact address

1.3 Intended use

WARNING!

In the event of improper use of the drilling machine

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



The drilling machine is designed and manufactured to be used in a non-explosive environment. The drilling machine is designed and manufactured for holes in cold metals or other non flammable materials or that not constitute a health hazard using a rotating filing-stripping tool that has a number of grooves for collecting the filings.

If the drilling machine is used in any way other than described above, modified without authorization of Optimum Maschinen Germany GmbH, then the geared drill is being used improperly.

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

We expressly point out that the guarantee will expire, if any constructive, technical or procedural changes are not performed by the company Optimum Maschinen Germany GmbH.

It is also part of the intended use that you

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

☞ "Technical specification" on page 52

WARNING!

Extremely severe injuries.

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



1.4 Reasonably foreseeable misuse

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

Any other use has to be discussed with the manufacturer.

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

In order to avoid misuse, it is necessary to read and understand the operating instructions before first commissioning.

Operators must be qualified.

1.4.1 Avoiding misuse

- Use of suitable cutting tools.
- Adapting the speed setting and feed to the material and workpiece.
- Clamp workpieces firmly and free of vibration.

ATTENTION!

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



WARNING!

Risk of injury caused by flying workpieces.

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



- Use cooling and lubricating agents to increase the durability of the tool and to improve the surface quality.
- Clamp the cutting tools and workpieces on clean clamping surfaces.
- Sufficiently lubricate the machine.
- Set the bearing clearance and guides correctly.

Recommendations:

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

When drilling, make sure that

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

1.5 Possible dangers caused by the drilling machine

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

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

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

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

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

INFORMATION

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

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

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the machine and other material values,
- the correct function of the drilling machine may be affected.

Always disconnect the drilling machine if cleaning or maintenance work is being carried out, or is no longer in use.



WARNING!

The drilling machine may only be operated with functional safety devices.

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

All additional devices installed by the operator must be equipped with the stipulated safety devices. This is your responsibility as the operator!

👉 "Safety devices" on page 47



1.6 Qualification

1.6.1 Target group private users

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

1.6.2 Obligations of the User

The user must

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

1.6.3 Additional requirements regarding the qualification

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

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

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

- ➔ disconnect all poles,
- ➔ secure against restarting,
- ➔ check that there is no voltage.

1.7 User positions

The operator position is in front of the drilling machine.

1.8 Safety measures during operation

CAUTION!

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

Dependent on the material which need to be processed and the used auxiliaries dusts and mist may be caused which might impair you health.

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



CAUTION!

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

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



1.9 Safety devices

Use the drilling machine only with properly functioning safety devices.

Stop the drilling machine immediately, if a safety device fails or is faulty or becomes ineffective.

It is your responsibility!

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

- the cause of the fault has been eliminated,
- you have verified that there is no danger to personnel or objects.

WARNING!

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

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

The drilling machine features the following safety devices:

- an emergency stop push button,
- a drilling table with T-slots to fix the workpiece or a vice,
- a drill chuck guard, in order to prevent interference with the rotating tool.

INFORMATION

The drilling machine can only be switched on if the drill chuck guard is closed.



WARNING!

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



1.10 Safety check

Check the drilling machine before each start-up or at least once per shift. Inform the person responsible immediately of any damage, defects or changes 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) and
- after all maintenance and repair work.

Check that prohibition, warning and information signs and the labels on the drilling machine

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

INFORMATION

Organise the checks according to the following table;



General check		
Equipment	Check	OK
Guards	Mounted, firmly bolted and not damaged	
Signs, Markers	Installed and legible	
Date:	Checked by (signature):	

Functional check		
Equipment	Check	OK
Emergency-stop switch	The drilling machine must switch off after the emergency stop impact switch has been actuated.	
Drill chuck guard	The drilling machine may only switch on, if the drill chuck guard is closed. The engine must switch off when the drill chuck guard is opened during operation.	
Date:	Checked by (signature):	

1.11 Emergency-stop switch

ATTENTION!

The drilling spindle keeps turning for a short time even after actuating the emergency stop push button depending on the preset speed.



1.11.1 Master switch

WARNING!

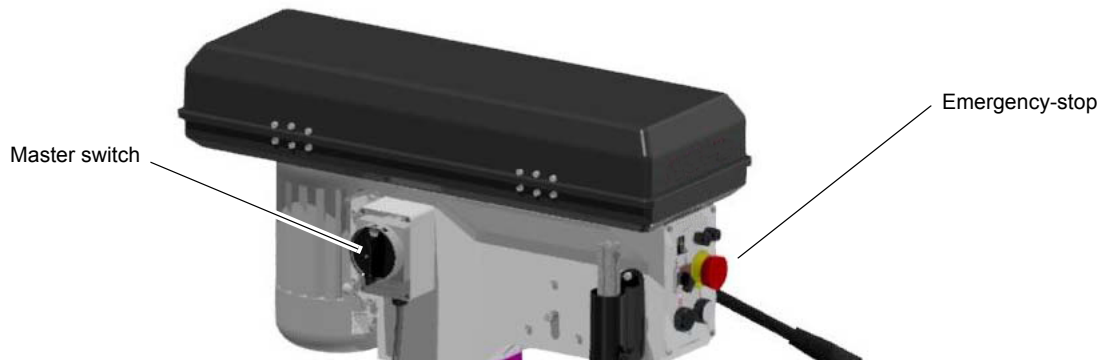
Dangerous voltage even if the main switch is switched off.



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

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

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



Img. 1-1: Master switch

1.11.2 Drill chuck guard

Adjust the guard to the correct height before you start working.

To do so, slacken the clamping screw, set the required height and re-tighten the clamping screw.

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

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed.



1.12 Personal protective equipment

For some works you need personal protective equipment as protective equipment. These are

- Safety helmet,
- protective glasses or face guard,
- protective gloves,
- safety shoes with steel toe caps,
- ear protection.

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

CAUTION!

Soiled personal protection equipment that may be contaminated may cause illness.

Clean your personal protective equipment

- after each use,
- regularly once a week.

Personal protective equipment for special works

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

Wear protective gloves when handling pieces with sharp edges.

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



1.13 Safety during operation

We provide information about the specific dangers when working with and on the drilling machine in the descriptions for these types of work.

WARNING!

Before switching on the drilling machine make sure that there are

- **No dangers generated for persons,**
- **No objects are damaged.**



Avoid any unsafe work methods:

- Make sure that your operation does not create a safety hazard.
- The rules specified in these operating instructions must be observed during assembly, operation, maintenance and repair.
- Do not work on the drilling machine if your concentration is reduced, for example, because you are taking medication.
- Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities applicable to your company.
- Inform the supervisor about all hazards or faults.
- Stay on the drilling machine until the machine completely stopped moving.
- Use the specified personal protective equipment. Ensure you wear close-fitting clothing and, if necessary, a hairnet.
- Do not use protective gloves when drilling.

1.14 Safety during maintenance

Inform the operators in good time of any maintenance and repair works.

Report all safety relevant changes and performance details of the drilling machine or their operational behavior. Any changes must be documented, the operating instructions updated and machine operators instructed accordingly.

1.14.1 Disconnecting and securing the drilling machine

Switch off the drilling machine with the main switch and secure the main switch with a padlock against unauthorised switching-on or switching-on by accident.

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



1.15 Using lifting equipment

WARNING!

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

Check that the lifting and load suspension gear

- **they have sufficient load carrying,**
- **and that it is in perfect condition.**

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

Fasten the loads carefully. Never walk under suspended loads!



1.15.1 Mechanical maintenance

Reinstall all protection and safety devices after any maintenance work once the work has been completed. This includes:

- covers,
- safety instructions and warning signs,

- grounding cables.

Check if they are working properly!

1.16 Accident report

Inform your supervisors and Optimum Maschinen Germany GmbH immediately in the event of accidents, possible sources of danger and any actions which almost led to an accident (near misses).

There are many possible causes for "near misses".

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

1.17 Electronics

INFORMATION

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



For craft and industry

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

A second person must be present during work on live components to disconnect the power in the event of an emergency. Disconnect the machine immediately if there is a malfunction in the power supply!

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

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

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

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

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

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

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

1.18 Inspection deadlines

For craft and industry

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

2 Technical specification

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

Electrical connection	DH28FS/9680130
Connection	115V ~60 Hz 1PH
Drilling capacity	
Drilling capacity in steel [mm]/inch	28/1.1"
Throat [mm]	200/7.87"
Spindle sleeve stroke [mm]	105/4.13"
Spindle seat	
Spindle seat	MT 3
Drilling table	
Table size [mm] Length x Width of the working surface	340 x 360/13.88"x14.09"
T-slot size [mm]	14
Maximum distance [mm] spindle - stand	2.3 "Dimensions DH28FS" on page 55
Required space	
Height [mm]	2.3 "Dimensions DH28FS" on page 55
Depth [mm]	
Width [mm]	
Weight [kg]	1.1 "Rating plate" on page 42
Speeds	
Spindle speeds [rpm]	4.5.1 "Speed table" on page 62
Environmental conditions	
Temperature	535 °C
Relative humidity	25 - 80 %
Operating material	
toothed rod	commercial lubricating grease
Drilling column	acid-free oil, e.g. machine oil, motor oil

2.1 Emissions

Maximum sound pressure level at 1 m distance from the machine and 1.60 m above the ground is 76 dB(A) to 79 dB(A) when idling.

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

INFORMATION

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



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

INFORMATION

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



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

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

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

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

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

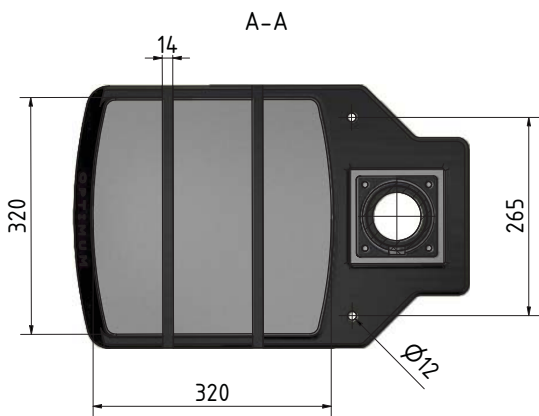
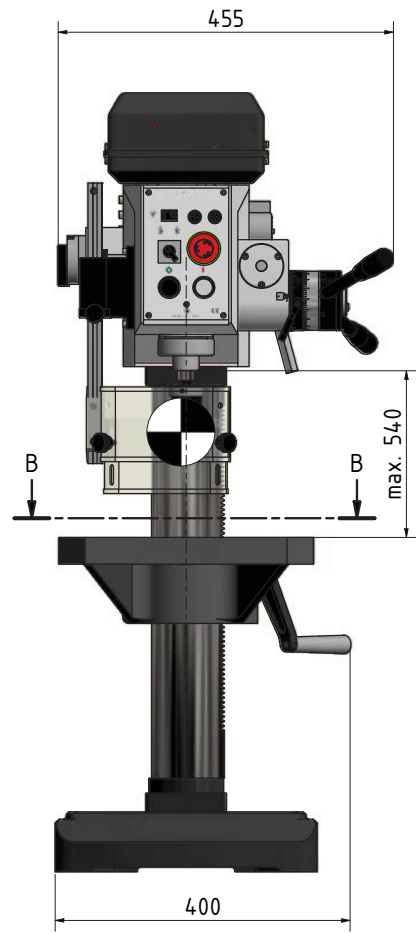
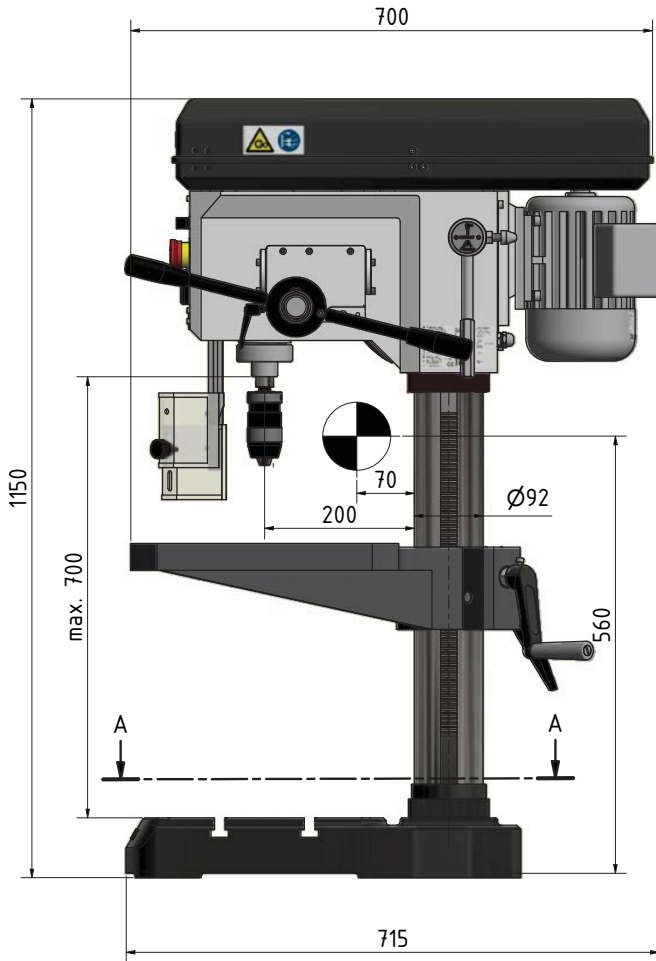
CAUTION!

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



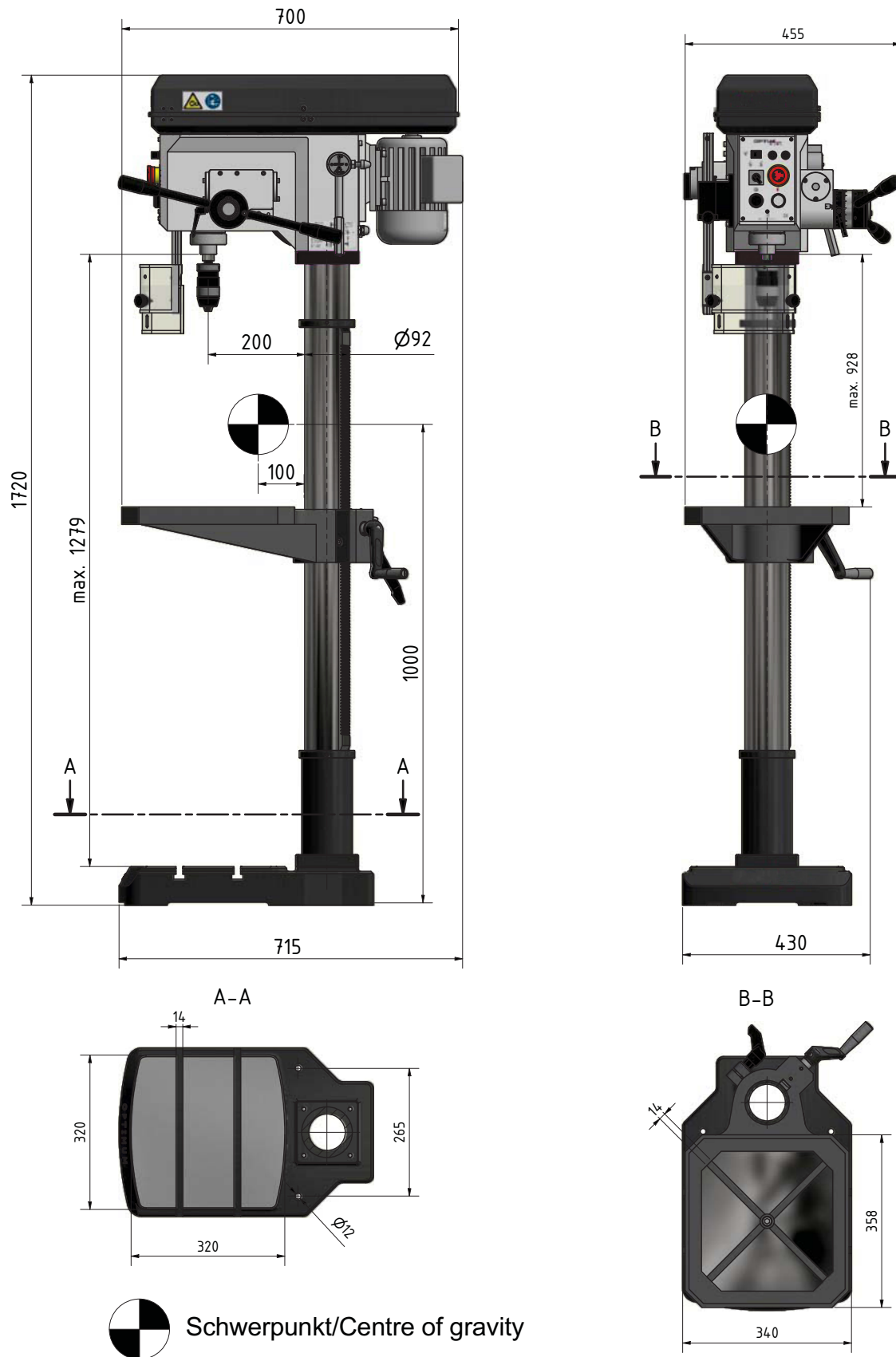
We generally recommend the use of noise and ear protection.





Img.2-1: Dimensions DH28FT

2.3 Dimensions DH28FS



Img.2-2: Dimensions DH28FS

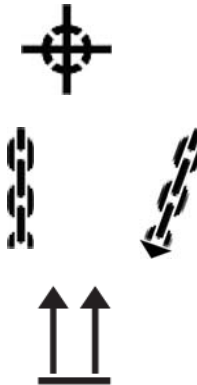
3 Assembly

3.1 Scope of delivery

When the machine is delivered, please check immediately that it has not been damaged during transport. Compare the scope of delivery with the attached packing list.

3.2 Transport

- Centres of gravity
- Load suspension points
(Marking of the positions for the load suspension gear)
- Prescribed transport position
(Marking of the top surface)
- Means of transport to be used
- Weights



WARNING!

Severe or fatal injuries may occur if parts of the machine tumble or fall down from the forklift truck or from the transport vehicle. Follow the instructions and information on the transport box.



WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death. Check that the lifting and load suspension gear has sufficient load capacity and that it is in perfect condition.

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

Fasten the loads carefully.

Never walk under suspended loads!



3.3 Set-up and assembly

3.3.1 Installation site requirements

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

INFORMATION

In order to attain good functionality and a high processing accuracy as well as a long service life of the machine, the place of installation should fulfil certain criteria.



Please observe the following points:

- The device must only be installed and operated in a dry and well-ventilated place.
- Avoid places close to machines which cause chips or dust.
- The installation site must be vibration-free, i.e. located away from presses, planing machines, etc.
- The substructure must be suitable for the drilling machine. Make sure that the floor has sufficient load-bearing capacity and is level.
- The ground must be prepared in a way that potential coolants cannot penetrate the floor.
- Any parts sticking out such as stops, handles, etc. have to be secured by measures taken by the customer if necessary in order to avoid endangering persons.
- Provide sufficient space for the personnel preparing and operating the machine and transporting the material.
- Also make sure the machine is accessible for setting and maintenance works.
- Provide for sufficient backlight (Minimum value: 500 Lux, measured at the tool tip). In the event of a lower level of lighting, additional illumination must be provided, e.g. by means of a separate workplace light.

INFORMATION

The mains plug of the drilling machine must be freely accessible.



3.4 Installation

- ➔ Check that the drilling machine foundation is horizontal with a spirit level.
- ➔ Check that the foundation has sufficient load-bearing capacity and rigidity.
- ➔ Place the drilling machine on the provided foundation.
- ➔ Fix the drilling machine base to the substructure through the holes pre-drilled for this purpose.



WARNING!

The condition of the underground and the fixing type of the machine foot to the underground must be in a way that it can bear the loads of the drilling machine. The foundation must be level. Check that the drilling machine foundation is horizontal with a spirit level.



3.4.1 Fixing

In order to provide for the necessary stability of the drilling machine, it is necessary to firmly connect the drilling machine with its foot to the substructure.

- ➔ Fix the foot of the drilling machine to the substructure with the holes pre-drilled for this purpose.

ATTENTION!

Tighten the fixing screws of the drilling machine only as much that it is safely fixed and cannot break away or tilt over.

If the fixing screws are too tight in particular in connection with an uneven substructure it may result in a broken stand of the machine.



3.5 First commissioning

ATTENTION!

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



WARNING!

Risk from using improper workpiece clamping materials or operating the machine at an inadmissible speed.

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

Only use tool holders in the intended admissible speed range.

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



WARNING!

There is a danger to persons and equipment, if the first commissioning of the drilling machine is carried out by inexperienced personnel.

We do not accept any liability for damages caused by incorrectly performed commissioning.



3.5.1 Electrical connection

→ Connect the electrical supply cable.

→ Check the fusing (fuse) of your electrical supply according to the technical instructions regarding the total connected power of the machine.

→ Mains fuse 10A to 16A

ATTENTION!

For 400V machines: Ensure that all 3 phases (L1, L2, L3) are connected correctly.

Most motor defects result of wrong connections. For instance if a motor phase is not correctly clamped or connected to the neutral conductor (N).

Effects may be as follows:

- The motor is getting hot very rapidly.
- Increased motor noises.
- The motor has no power.



ATTENTION!

Make sure that the direction of rotation of the drive motor is correct. The switch position of the rotation selector switch for right-handed rotation (R) has to turn the drill spindle clockwise. If necessary, exchange two phase connections.

If your connector plug is equipped with a phase inverter, this is done by turning it by 180°.

The guarantee will become null and void if the machine is connected incorrectly.



3.5.2 Warming up the machine

ATTENTION!

If the drilling machine and in particular the drilling spindle is immediately operated at maximum load when it is cold it may result in damages.

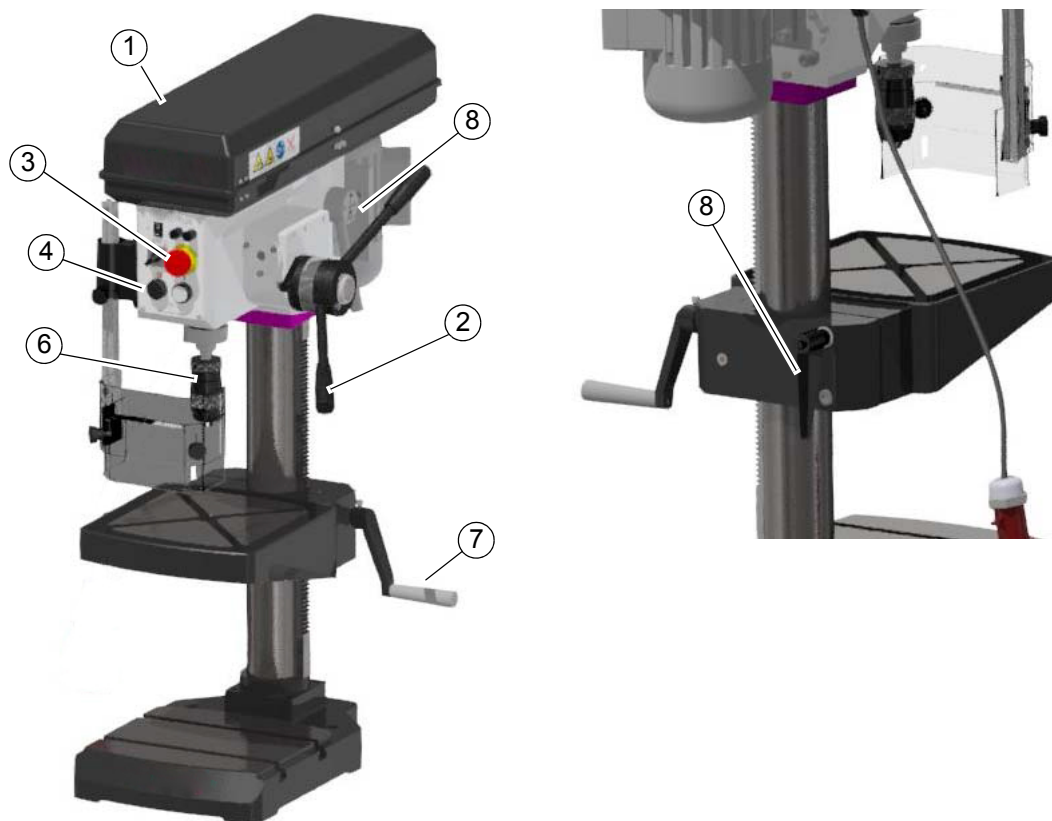
If the machine is cold, e.g. directly after having transported the machine, it should be warmed up at a spindle speed of only 500 1/min for the first 30 minutes.



4 Operation

4.1 Control and indicating elements

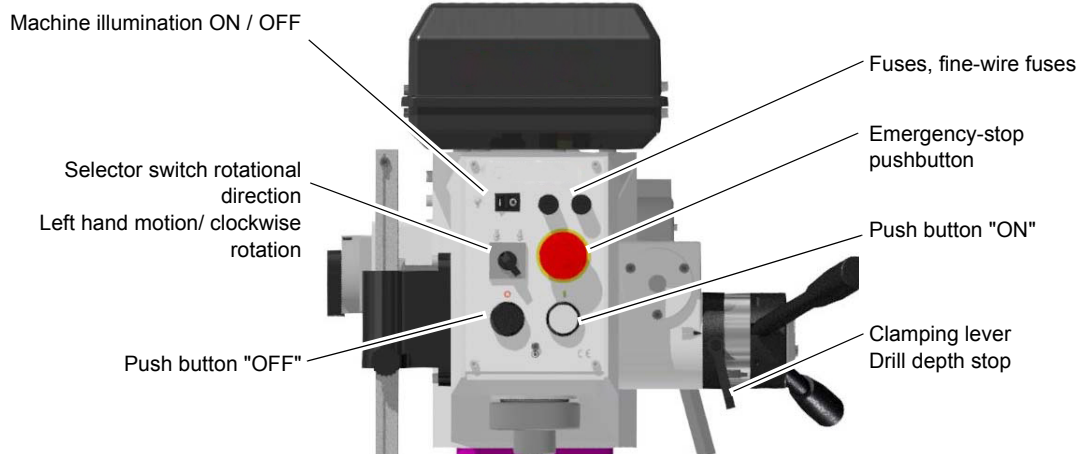
4.1.1 Drilling machine DH28FT - DH28FS(9680130)



Img.4-1: DH28FT

Pos.	Designation	Pos.	Designation
1	Belt drive with housing	2	Lever for spindle sleeve feed
3	Emergency-stop		Automatic quill feed activation
5	Drill chuck	4	On , Off
7	Table height adjustment	6	Drilling table
9	Drilling table clamping lever	8	Lever for belt tension

4.1.2 Control panel



Img.4-2: Operating elements on the control panel

4.2 Safety

Commission the machine only under the following conditions:

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

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

Notify the person responsible immediately of any modification.

☞ "Safety during operation" on page 50

Selector switch rotational direction

Operation mode for selection of right-handed or left-handed rotation.

Push button ON

The push button "ON" switches on the rotation of the drilling spindle in preselected operating mode.

Push button OFF

The "push button OFF" switches the rotation of the drilling spindle off.

Quill lever

Manual quill feed and for engaging the automatic quill feed.

Machine illumination ON / OFF

Switches the backlight on or off.

Master switch

Interrupts or connects the power supply.

4.3 Switching on the machine

- Switch on the master switch.
- Select the direction of rotation.
- Actuate the push button "ON".

4.4 Switching off the machine

CAUTION!

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

- Actuate the push button "OFF".
- For a long-term standstill of the machine switch it off at the master switch.



4.5 Speed variation

WARNING!

Danger due to drill chuck or tools flying off at high speed. Make sure not to exceed the maximum speed of the drill chuck when setting the spindle speed.

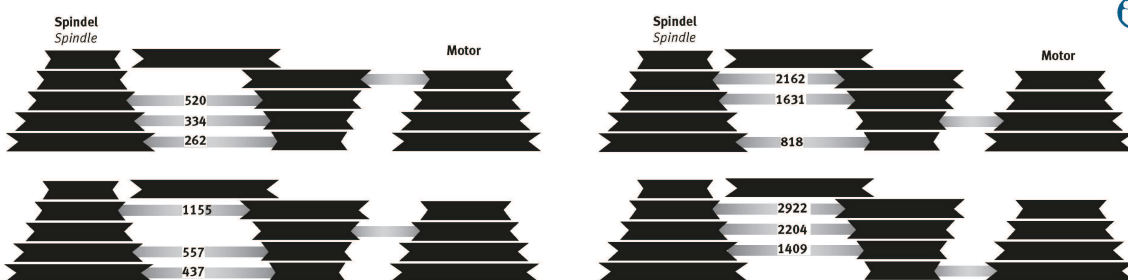
- Switch off the machine by using the main switch.
- Open the protective cover.
- Loosen the lever of the V-belt tensioning.
- Position the V-belt respectively on the required transmission stage.
- Tighten the clamping lever again and thus tighten the belt drive.
- Close the protective cover.



4.5.1 Speed table

INFORMATION

Make sure that the V-belt length is correct at the respective position.



Img.4-3: Speed table

The higher the speed, the lower the torque at the drill. At a speed of about 1500 rpm, the torque is about 5.4 Nm without losses due to frictional resistances in the mechanics. 100 Nm is about the torque with which aluminium rims are attached to a vehicle.

4.6 Drill depth stop

Use the drilling depth stop when drilling several holes of the same depth.

- Loosen the locking screw and turn the graduated collar until the required drilling depth matches with the indicator.
- Re-tighten the locking screw.

4.7 Automatic spindle sleeve feed

The drilling depth stop is adjustable in the range of 0-95 mm. After reaching the set drilling depth, the feed is automatically switched off and returned to its initial position by the spring force of the return spring.

Recommended speeds in connection with the automatic quill feed.

Drill diameter [mm]	Ø 22	Ø 20	Ø 18	Ø 16 - 12	Ø 6 - 12	
Spindle speed [1/min]	120	250	330	400	500	530
Drill diameter [mm]	Ø 6		Ø 5	Ø 4	Ø 3	Ø 2
Spindle speed [1/min]	900	1000	1300	1400	1800	3000

4.8 Disassembly, assembly of drill chucks and drill bits

The drill chuck and the taper mandrel are loosened from the drill spindle by means of a drill drift.

WARNING!

Only disassemble the drill chuck if the drilling machine is disconnected from the electrical supply.

- Switch off the drilling machine on the master switch or disconnect the mains plug.
- Move the drill sleeve down.
- Turn the drilling spindle until the openings of the sleeve and of the drilling spindle are super-imposed.
- Loosen the taper mandrel of the drill chuck with the help of a drill drift.



4.9 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 realised 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.

CAUTION!

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 emulsion as a cooling agent. This can be acquired from authorised distributors.

Make sure that the cooling agent is being collected.

Respect the environment when disposing of lubricants and coolants.

Follow the manufacturer's disposal instructions.



4.10 Before starting work

Before starting work, select the desired speed. It is depending on the used drilling diameter and on the material.

WARNING!

For drilling jobs, it is necessary to clamp the workpiece firmly to prevent the bit catching on the pieces. A machine vice or clamping claws is a suitable clamping device.



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

If required, adjust the desired drilling depth by means of the drilling depth stop in order to obtain a uniform drilling depth.

Please make sure to use a suitable dust suction when treating wood since wood dust may be health hazardous. Wear a suitable dust mask when performing works at which dust is generated.

4.11 During work

The spindle sleeve feed is done via the star grip. Make sure that the feed is constant and not too fast.

The spindle sleeve is returned to its initial position by the return spring.

WARNING!

Seizing of clothes and / or hair.

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



CAUTION!

Danger of bumps from the levers on the star grip. Do not release the star grip when repositioning the drilling spindle sleeve.



CAUTION!

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



INFORMATION

The smaller the bit the more easily it may break.

In the case of deep drilling, remove the bit from time to time to remove filings from the drill. Add a few drops of oil to reduce friction and prolong the service life of the bit.



5 Maintenance

In this chapter you will find important information about

- Inspection,
- Maintenance and
- Repair.

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

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



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

5.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

- **very serious injury to personnel working on the machine,**
- **damage to the machine.**



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

5.1.1 Preparation

WARNING!

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

Lock the main switch with a padlock and unplug the power cord.



5.1.2 Restarting

Before restarting, run a safety check.

 "Safety check" on page 48

WARNING!


Before starting the machine you must be sure that

- **no dangers generated for persons,**
- **the machine is not damaged.**



5.2 Inspection and maintenance

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

Interval	Where?	What?	How?
Start of shift After each maintenance or repair work	Drilling machine	Examination for outside damages. ☞ "Safety check" on page 48	
Every month	Drilling column and toothed rod	Oiling	<ul style="list-style-type: none"> → Lubricate the drill column regularly with commercial oil, machine oil, engine oil. → Lubricate the toothed rod regularly with commercial grease (e.g. friction bearing grease).
Every 6 months	V-belt on drill head	Visual inspection	→ Check whether the V-belts have become porous and worn.
Monthly	Oiler cup	Oiling	→ Lubricate all oiler cups with machine oil, do not use grease guns or the like.
according to operator's, in accordance with German DGUV (BGV A3)	Electronics	Electrical check	Check the electrical equipment / parts of the drilling machine.
as required	Spindle return spring	Readjusting	 CAUTION! Parts can be thrown towards you. When disassembling the key housing, please make sure that the machine is only maintained and prepared by qualified staff.

INFORMATION

The spindle bearing is lifetime-lubricated. It is not necessary to lubricate it again.



5.3 Repair

5.3.1 Customer service technician

For any repair work request the assistance of an authorised customer service technician. Contact your specialist dealer if you do not have customer service's information or contact Stürmer Maschinen GmbH in Germany who can provide you with a specialist dealer's contact information. Optionally, the

Stürmer Maschinen GmbH

Dr. Robert-Pfleger-Str. 26

D- 96103 Hallstadt

can provide a customer service technician, however, the request for a customer service technician can only be made via your specialist dealer.

If the repairs are carried out by qualified technical personnel, they must follow the indications given in these operating instructions.

Optimum Maschinen Germany GmbH accepts no liability nor does it guarantee against damage and operating malfunctions resulting from failure to observe these operating instructions.

For repairs, only use

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

INFORMATION

The warranty is guaranteed by law. It covers damage that the machine had from the beginning.

Machine operators can use it to complain to the seller about a damaged machine in the first six-months without any problems. After six months, however, the buyer must prove that the damage was present from the onset.

The guarantee, on the other hand, is a voluntary service provided by the manufacturer. The manufacturer is free to determine the duration and conditions. The legal warranty always remains in addition.

If both warranty and guarantee are still valid, the buyer can usually choose which system he wants to use to complain about the machine.

📖 "Liability claims/warranty" on page 69



6 Malfunctions

Malfunction	Cause/ possible effects	Solution
Motor is hot	<ul style="list-style-type: none"> Wrong electrical connection of 400V machines 	<ul style="list-style-type: none"> 👉 "Electrical connection" on page 58
Noise during work.	<ul style="list-style-type: none"> Spindle is too little lubricated Tool is blunt or wrongly clamped 	<ul style="list-style-type: none"> Lubricate spindle (only possible when disassembled) Use new tool and check tension (fixed setting of the bit, drill chuck and taper mandril)
Bit „burnt“	<ul style="list-style-type: none"> Drill speed too high /feed too high Chips do not come out of the drill hole. Drill blunt No or too little cooling 	<ul style="list-style-type: none"> Select another speed Extract drill more often during work Sharpen or use new drill Use cooling agent
Drill tip is running off centre, the drilled hole is non-round	<ul style="list-style-type: none"> Hard points on the workpiece Length of the cutting spirals/or angles on the tool are unequal Drill deformed 	<ul style="list-style-type: none"> Use new drill
Drill is defective	<ul style="list-style-type: none"> No base / support used. 	<ul style="list-style-type: none"> Use support and clamp it with the workpiece
Drill is running non-round or shaking	<ul style="list-style-type: none"> Bit deformed Bearing worn down Drill is not correctly clamped. Drill chuck defective 	<ul style="list-style-type: none"> Use new drill Have the spindle bearings replaced Correctly clamp drill Replace the drill chuck
The drill chuck or the taper mandrel cannot be inserted.	<ul style="list-style-type: none"> Dirt, grease or oil on the taper inside of the drill chuck or on the taper surface of the drill spindle 	<ul style="list-style-type: none"> Clean surfaces well Keep surfaces free of grease
Motor does not start.	<ul style="list-style-type: none"> Motor is wrongly connected Fuse is defective 	<ul style="list-style-type: none"> Have it checked by qualified
Motor is overheating and there is no power	<ul style="list-style-type: none"> Motor overloaded? Too low mains voltage Motor is wrongly connected 	<ul style="list-style-type: none"> Reduce feed Disconnect immediately and have it checked by authorized personnel Have it checked by qualified
Precision of the work deficient	<ul style="list-style-type: none"> Irregularly heavy or tensed work-piece Inexact horizontal position of the work-piece holder 	<ul style="list-style-type: none"> Balance the piece statically and secure without straining Adjust workpiece-holder
Drilling spindle sleeve does not return to its initial position	<ul style="list-style-type: none"> Spindle return spring does not work Locking bolt inserted 	<ul style="list-style-type: none"> Check spindle return spring, replace it, if necessary Pull out locking pin
Spindle bearing overheating	<ul style="list-style-type: none"> Bearing worn down Bearing pretension is too high Working at high drilling speed over a longer period of time. 	<ul style="list-style-type: none"> Replacing Increase bearing clearance for fixed bearing (taper roller bearing) Reduce drill speed and feed rate

7 Appendix

7.1 Copyright

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Subject to technical changes without notice.

7.2 Terminology/Glossary

Term	Explanation
Drill drift	Tool to release the bit or the drill chuck from the drill spindle
Drill chuck	Drill bit adapter
Drill head	Upper part of the drilling machine
Drill sleeve	Fixed hollow shaft which runs in the drill spindle.
Drilling spindle	Shaft activated by the motor
Drilling table	Supporting surface, clamping surface
Taper mandrel	Cone of the drill or of the drill chuck
Spindle sleeve lever	Manual operation for the drill feed
Quick-action drill chuck	Drill holding fixture to be clamped manually.
Workpiece	Part to be drilled, part to be machined.
Tool	Drill bit, countersink, etc.

7.4 Advice for disposal / Options of reuse:

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

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

7.4.1 Decommissioning

CAUTION!

Immediately decommission used machines in order to avoid later misuse and endangering of the environment or of persons.



- **Unplug the power cord.**
- **Cut the connection cable.**
- **Remove all operating materials from the used device which are harmful to the environment.**
- **If applicable remove batteries and accumulators.**
- **Disassemble the machine if required into easy-to-handle and reusable assemblies and component parts.**
- **Dispose of machine components and operating fluids using the intended disposal methods.**

7.4.2 Disposal of new device packaging

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

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

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

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

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

7.4.3 Disposal of the old device

INFORMATION

Please take care in your interest and in the interest of the environment that all component parts of the machine are only disposed of in the intended and admitted way.



Please note that the electrical devices comprise a variety of reusable materials as well as environmentally hazardous components. Please ensure that these components are disposed of

separately and professionally. In case of doubt, please contact your municipal waste management. If appropriate, call on the help of a specialist waste disposal company for the treatment of the material.

7.4.4 Disposal of electrical and electronic components

Please make sure that the electrical components are disposed of professionally and according to the statutory provisions.

The device is composed of electrical and electronic components and must not be disposed of as household waste. According to the European Directive 2011/65/EU regarding electrical and electronic used devices and the implementation of national legislation, used power tools and electrical machines need to be collected separately and supplied to an environmentally friendly recycling centre.

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

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

7.5 Disposal via municipal collection facilities

Disposal of used electrical and electronic components

(Applicable in the countries of the European Union and other European countries with a separate collecting system for those devices).

The sign on the product or on its packing indicates that the product must not be handled as common household waste, but that it needs to be disposed of at a central collection point for recycling. Your contribution to the correct disposal of this product will protect the environment and the public health. Incorrect disposal constitutes a risk to the environment and public health. Recycling of material will help reduce the consumption of raw materials. For further information about the recycling of this product, please consult your District Office, municipal waste collection station or the shop where you have purchased the product.



7.6 Product follow-up

We are required to perform a follow-up service for our products which extends beyond shipment.

We would be grateful if you could inform us of the following:

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

Exclusive USA Agent

C.H.HANSON

2000 North Aurora Rd.

Naperville, IL 60563

7.7 Storage

ATTENTION!

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

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

Follow the instructions and information on the transport box.



- Fragile goods
(Goods require careful handling)



- Protect against moisture and humid environment



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



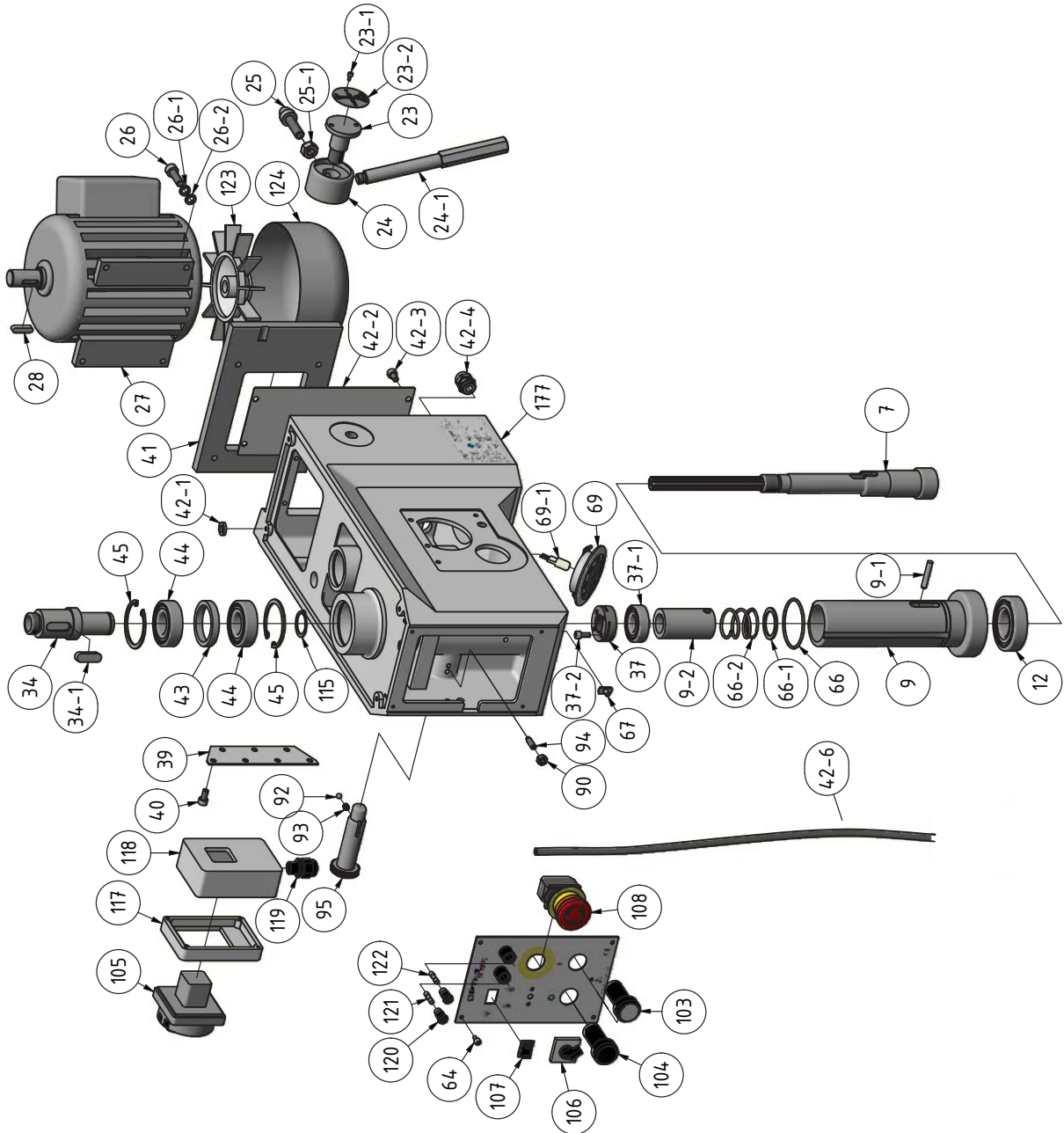
- Maximum stacking height

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



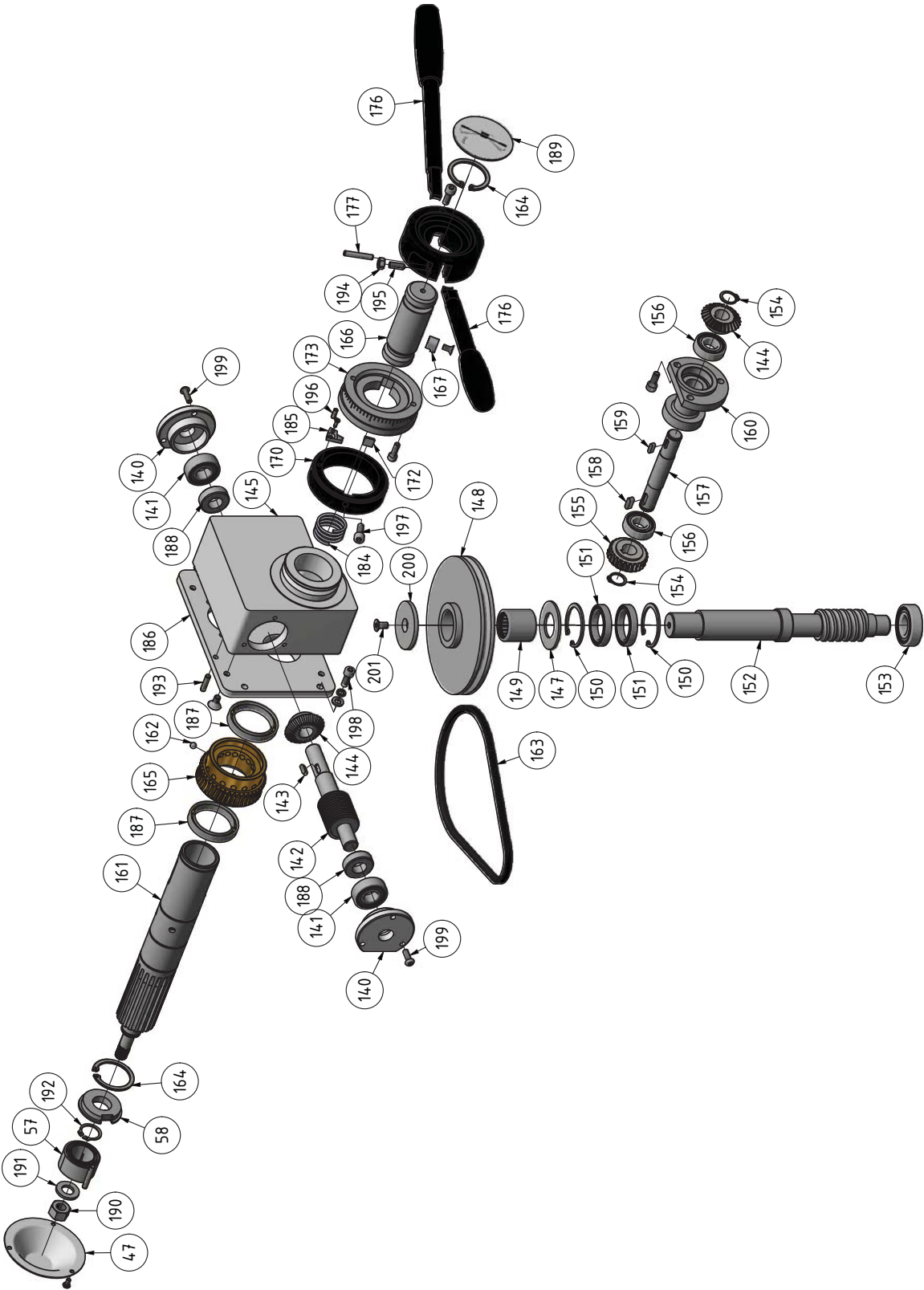
8 Ersatzteile - Spare parts

8.1 Bohrkopf - Drilling head



8-1: Bohrkopf - Drilling head

8.2 Pinolenvorschub - Spindle sleeve feed



8-2: Pinolenvorschub - Spindle sleeve feed

8.2.2 Säule und Bohrtisch - Column and drilling table



8-4: Säule und Bohrtisch DH28FS- Column and drilling table DH28FS

8.3 Ersatzteilliste - Parts list

DH28FT - DH28FS					
Pos.	Bezeichnung	Designation	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1	Standfuss	Base	1		030202841
2	Säule	Column	1	DH28FS	0302028402
2	Säule	Column	1	DH28FT	0302026002
3	Zahnstange	Toothed rack	1		030202843
4	Zahnrad	Toothed wheel	1		030202414
5	Antriebsschnecke	Drive screw	1		030202415
7	Spindel	Spindle	1		030202847
7-1	Welle	Shaft	1		
9	Pinole	Spindle sleeve	1		0302028409
CPL	Pinole komplett	Sleeve complete	1		0302028409CPL
9-1	Spannstift	Spring pin	1	5x40	03432240460
9-2	Buchse	Bushing	1		03020284092
10	Innensechskantschraube	Socket head screw	4	M12x60	
10-1	Scheibe	Washer	4	GB/T93-1987-12	
10-2	Scheibe	Washer	4	GB/T97.1-1985-12	
12	Kugellager	Ball bearing	1	6206	0406206R
13	Distanzscheibe	Distance plate	2		0302024113
15-1	Griff komplett	Grip complete	1	JB-T7270.4-1994	03020219139
16	Kurbel	Crank	1		0302024116
19-1	Innensechskantschraube	Socket head screw	1	M16x90	
20-1	Innensechskant - Stiftschraube	Threaded pin	1	M6x6	
23	Klemmschraube	Clamping screw	1		0302024123
23-1	Innensechskantschraube	Socket head screw	2	M3x10	
23-2	Schild „Spannen“ „Lösen“	Label „spans“ „release“	1		
24	Buchse Schnellspanngriff	Bushing quick action grip	1		0302024124
24-1	Schnellspanngriff	Quick action grip	1		
25	Bolzen	Bolt	1		0302024125
25-1	Sechskantmutter	Hexagonal nut	1		
26	Sechskantschraube	hexagon bolt	4	M8x25	
26-1	Scheibe	Washer	4	GB/T93-1987-8	
26-2	Scheibe	Washer	4	GB/T97.1-1985-8	
27	Motor	Motor	1		850W/115V/60Hz
28	Paßfeder	Feather key	1	6x6x20	042P6620
29	Innensechskantschraube	Socket head screw	3	M5x10	
29-1	Scheibe	Washer		5	
31	Riemenscheibe	Pulley	1		USA
31-1	Innensechskant - Stiftschraube	Threaded pin	1		
32	Riemengehäuse Oberteil	Belt housing upper part	1		0302024132D
34	Welle (Riemenscheibe)	Washer	1		0302028434

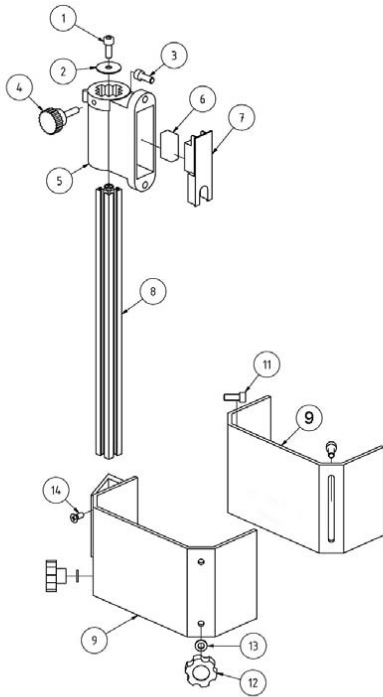
34-1	Paßfeder	Feather key	1		
35	Platte Schließler	Plate closer	1		
36	Innensechskantschraube	Socket head screw	4	M6x15	
36-1	Scheibe	Washer	4		
36-2	Innensechskantschraube	Socket head screw	4		
36-3	Scharnier	Articulation	2		
36-4	Scheibe	Washer	12		
36-5	Sechskantmutter	Hexagonal nut	12		
37	Spindelmutter	Spindle nut	1		0302028437
37-1	Kugellager	Ball bearing	1	6004-2Z	0406004ZZ
37-2	Innensechskantschraube	Socket head screw	2		
39	Halteplatte	Socket head screw	1		0302024140
40	Innensechskantschraube	Socket head screw	7	M6x15	
41	Motorplatte	Motor plate	1		0302024141
42-1	Scheibe	Washer	4		
42-2	Platte	Plate			
42-3	Innensechskantschraube	Socket head screw	4	M6x10	
42-4	Kabelverschraubung	Cable connection	2		
42-5	Buchse	Bushing	1		
42-6	Stecker- Netzanschluss	Connector electric supply	1		
43	Distanzring	Spacer ring	1		0302028443
44	Kugellager	Ball bearing	2	6205-2R	0406205R
45	Sicherungsring	Circlip	2	DIN472 47x1.6	042SR47I
46	Innensechskantschraube	Socket head screw	3	M4x10	
47	Abdeckplatte	Covering plate	1		
53-3	Schalter Bohrfutterschutz	Switch drill chuck	1		030031712018
55	Sicherungsring	Circlip	1	DIN471-12x1	042SR12W
56-1	Spanner Spiralfeder	Spanner spiral spring	1		03020284561
57	Rückholfeder inkl. Gehäuse	Return spring incl. Housing	1		0302024157
58	Rückholfedersitz	recuperating spring seat	1		0302028458
64	Innensechskantschraube	Socket head screw	4	M4x10	
66	O-Ring	O-ring	1		0302028466
66-1	Scheibe	Washer	1		03020284661
66-2	Feder	Spring	1		03020284662
67	Nutenstein	Sliding block	1		0302024167
69	Maschinenbeleuchtung	Machine illumination	1		0302024169
69-1	Glühlampe	Lamp	1	12V/20W	046423800
71	Platte	Plate	1		0302028471
72	Innensechskantschraube	Socket head screw	4	M10x25	
74	Oeler	Oiler	1		
75	Klemmhebel	Clamping lever	1		0333440011
75-1	Scheibe	Washer	1	16	
76	Innensechskantschraube	Socket head screw	1	M6x20	
78	Klemmschraube	Clamping screw	1	M16x80	302028478
82	Oeler	Oiler	2		

83	Distanzscheibe	Distance plate	1		0302024183
83-1	Innensechskant - Stiftschraube	Threaded pin	1	M6x6	
90	Sechskantmutter	Hexagon nut	1	M6	
92	Kugel	Ball	1	Ø6mm	042KU06
93	Feder	Feather	1		0302028493
94	Gewindestift	Setscrew	1	M6x20	
95	Auswerfer	Ejector	1		0302028495
97	Sicherungsring	Circlip	2		
97-1	Sicherungsring	Circlip	1		
98	Lager	Bearing	2	6203	0406203R
99	Ring	Ring	2		0302028499
100	Gewindestift	Setscrew	1	M8x15	
100-1	Gewindestift	Setscrew	1	M8x15	
101	Scheibe	Washer	1		03020284101
102	Innensechskantschraube	Socket head screw	1	M6x20	
103	Drucktaster Ein	Bush button On	1	230V 5A	0302024186
104	Drucktaster Aus	Bush button Off	1	230V 5A	0302024185
105	Hauptschalter	main switch	1	660V 20A	0302024187
106	Schalter Drehrichtung	switch for direction of rotation	1		0460009
107	Schalter Licht	light switch	1	250V 6A	
108	Schalter NOT-Halt	emergency -stop switch	1	600V 10A	0460058
109	Mutter	Nut	4	M4	
111	Reed kontakt	Reed contact	1	PS-3150	0302024192
112	Innensechskantschraube	Socket head screw	4	M3x10	
113	Nutmutter	Groove nut	1	M24x1,5	3020284113
114	Bohrtisch	Drilling machine table	1		
115	Sicherungsring	Circlip	1		
117	Deckel	Cover	1		03020245240
118	Schaltkasten	Switch box	1		03020245241
119	Kabelentlastung	Cable discharge	1		0302024198
120	Sicherungsgehäuse	Fuse housing	2		
121	Sicherung	Fuse	1		
122	Sicherung	Fuse	1		
123	Lüfferrad	Fan wheel	1		
124	Motordeckel	Motor cover	1		
126	Gleitlager	Plain bearing	1	20x23x11	03020284126
127	Gleitlager	Plain bearing	1	32x36x22	03020284127
140	Flansch	Flange	1		03020284140
141	Kugellager	Bearing	2	6202	0406202
142	Schnecke	Worm	1		03020284142
143	Passfeder	Fitting key	1		
144	Kegelrad	Bevel gear	2		03020284144
145	Gehäuse	Housing	1		03020284145
146	Zeiger	Indicator	1		
147	Scheibe	Washer	2		

148	Riemenscheibe	Pulley	1		03020284148
149	Nadellager	Needle bearing	1		
150	Sicherungsring	Retaining ring	2	42	042SR42W
151	Kugellager	Ball bearing	2	61806	04061806
152	Welle	Shaft	1		03020284152
153	Kugellager	Ball bearing	1	6004	0406004
154	Sicherungsring	Retaining ring	2	15	042SR15W
155	Zahnrad	Gear	1		03020284155
156	Kugellager	Ball bearing	2	6002	0406002R
157	Welle	Shaft	1		03020284157
158	Passfeder	Fitting key	1	5x5x14	042P5516
159	Passfeder	Fitting key	1	4x4x12	042P4412
160	Flansch	Flange	1		03020284160
161	Welle	Shaft	1		03020284161
162	Stahlkugel	Steel ball	4		
163	Keilriemen	V-belt	1	7M545	03020284163
164	Sicherungsring	Retaining ring	3		
165	Zahnrad	Gear	1		03020284165
166	Welle	Shaft	1		03020284166
167	Passfeder	Fitting key	1		
168	Schraube	Screw	1		
169	Ring	Ring	1		03020284169
170	Skalenring	Scale ring	1		Inch
171	Klemmhebel	Clamping lever	1		03020284171
172	Klemmteil	Clamping plate	1		03020284172
173	Skalenring	Scale ring	1		03020284173
174	Nabe	Collet	1		03020284174
175	Knopf	Knob	2		03020284175
176	Spannhebel	Claming lever	2		03020284176
177	Gehäuse	Housing	1		03020284177
178	Keilriemen	V-belt	1	7M450	03020284178
179	Riemenscheibe	Pulley	1		USA
180	Riemenscheibe	Pulley	1		USA
181	Exzenter	Eccentric	1		03020284181
182	Abdeckung	Cove	1		03020284182
183	Keilriemen	V-belt	1	7M670	03020284183
184	Feder	Spring	1		03020284184
185	Platte	Plate	1		03020284185
186	Platte	Plate	1		03020284186
187	Axiallager	Thrust bearing	2	61808	04061808
188	Buchse	Bushing	2		03020284188
189	Abdeckung	Cover	1		03020284189
190	Sechskantmutter	Hexagon nut	1	M12	03020284190
191	Scheibe	Washer	1	12	
192	Sicherungsring	Retaining ring	1	20	
193	Zylinderstift	Cylindrical pin	2	5x20	

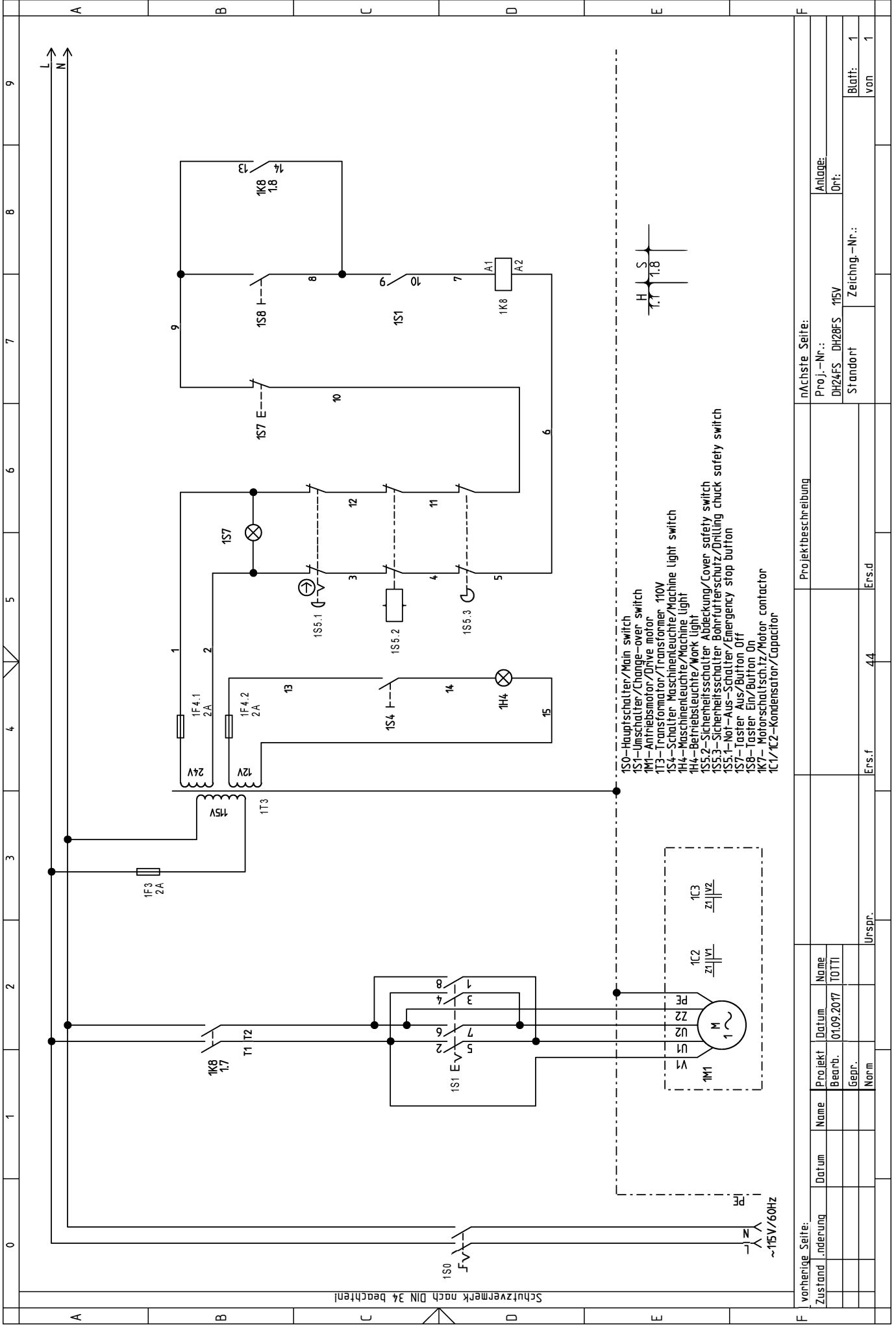
194	Sechskantmutter	Hexagon nut	1	M6	
195	Gewindestift	Grub screw	1	M6x12	
196	Zylinderstift	Cylindrical pin	1	4x12	
197	Schraube	Screw	1	M6x12	
198	Schraube	Screw	4		
199	Schraube	Screw	6	M5x16	
200	Scheibe	Washer	1		03020284191
201	Schraube	Screw	1	M6x12	
0	Transformator (ohne Abbildung)	Transformer (without illustration)	1		0302024196
0	Schütz (ohne Abbildung)	Contact (without illustration)	1	230V 16A	0460025

8.4 Bohrfutterschutz - Drill chuck protection



Bohrfutterschutz - Drill chuck protection					
Pos.	Bezeichnung	Designation	Menge	Größe	Artikelnummer
1	Innensechskantschraube	Hexagon Head Screw	1		
2	Beilagscheibe	Washer		M5	
3	Innensechskantschraube	Hexagon Head Screw			
4	Rändelschraube	Knurled Head Screw	1		03020241535
6	Mikroschalter	Micro switch	1	bis Bj. 2018	030031712018
6	Mikroschalter	Micro switch	1	ab Bj. 2018	030031712018V2
7	Abdeckung Halter	Cover Holder			
8	Aluprofil	Aluprofile	1	19x19x350mm	0302028351
9	Sichtschutzscheibe	Protection Glass	1		0302024153
11	Nutschraube	Nut Screw		M5x20	
12	Rändelschraube	Knurled Head Screw			
13	Beilagscheibe	Washer		M5	
14	Spezialschraube	Special Screw	2	M5x10	
Komplett-Sätze					
	Bohrfutterschutz Halter	Holder Drill Chuck Protection CPL	1		0302024149CPL
	Bohrfutterschutz Kpl	Drill Chuck Protection CPL	1		0302024153CPL

8.5 Schaltplan - Wiring diagram DH28FT/DH28FS(9680130)



vorherige Seite:		Projektbeschreibung		nächste Seite:	
Zustand	änderung	Datum	Name	Projekt-Nr.:	Anlage:
				DH24FS_DH28FS	115V
				Standort	Ort:
					Zeichng.-Nr.:
					Blatt: 1
					von 1
				Ers.f	Ers.d
				44	

Index

A		
Abmessungen	20	
Accident report	51	
Anschluss		
elektrisch	18	
Assembly	56, 57	
Aufstellen	23	
B		
Bedien- und Anzeigeelemente	26	
Bedienung	26	
Bestimmungsgemäße Verwendung	9	
Betriebsmittel	18	
C		
Classification of hazards	43	
Connection		
electrical	52	
Control and indicating elements	60	
Copyright	69	
Customer service	67	
Customer service technician	67	
D		
Dimensions	54	
Disposal	71	
Drehzahltafel	28	
E		
Electronics	51	
Elektrik	16	
Entsorgung	38	
Erste Inbetriebnahme	24	
F		
Fachhändler	33	
Fehlanwendung	10	
First commissioning	58	
G		
Garantie	33	
Gefahren-Klassifizierung	8	
Gewährleistung	33	
Garantie	67	
I		
Inspection	65	
Inspektion	31	
Installation	57	
Intended use	44	
K		
Körperschutzmittel	14	
Kundendienst	33	
Kundendiensttechniker	33	
M		
Maintenance	65	
Malfunctions	68	
Misuse	45	
Montage	22	
Montieren	23	
O		
Obligations		
user	46	
Operating material	52	
Operation	60	
P		
Personal protective equipment	49	
Pflichten		
Bediener	11	
Pictograms	43	
Piktogramme	8	
Product follow-up	71	
Produktbeobachtung	38	
S		
Safety		
During maintenance	50	
During operation	50	
Safety devices	47	
Safety instructions	43	
Sicherheit		
bei der Instandhaltung	15	
während des Betriebs	15	
Sicherheitseinrichtungen	12	
Sicherheitshinweise	8	
Specialist dealer	67	
Spindelaufnahme	18	
Spindle seat	52	
Störungen	34	
T		
Target group		
private users	46	
Technical specification	52	
Technische Daten	18	
U		
Unfallbericht	16	
Urheberrecht	36	
W		
Warnhinweise	8	
Warning notes	43	
Warranty	67	
Wartung	31	
Z		
Zielgruppe		
private Nutzer	11	