

BE TR IE BS AN LEI TU NG

**OPERATING
MANUAL**

FLÖTT
Werkzeugmaschinen

SCAN ME



SB 18 Plus / TB 18 Plus / TBZ 18 Plus
SB 20 Plus / TB 20 Plus / TBZ 20 Plus
SB 23 Plus / TB 23 Plus / TBZ 23 Plus
SB 25 Plus / TB 25 Plus / TBZ 25 Plus
SB 20 FB Plus



Important Notice!

This operating manual has been prepared in the German language, which is the language of the original. All versions available in other languages are only the translations of the German original operating manual.

Contents

Contents 3

1 Introduction 6

1.1	Pillar Drilling Machine	7
1.1.1	Technical Data	7
1.1.1	Technical Data	8
1.1.2	Rating Plate of the Pillar Drilling Machine	9
1.1.3	Intended Use	10
1.1.4	Improper Use	10
1.2	Legal Provisions	11
1.2.1	Liability	11
1.2.2	Warranty	12
1.2.3	Copyright	12
1.3	Operating Manual	13
1.3.1	Definition of Terms	13
1.3.2	Illustrations and Signs in this Text	15
1.3.3	Structure and Design of Safety Instructions	16

2 Safety Instructions 18

2.1	General Safety Instructions	18
2.1.1	The Operating Manual	18
2.1.2	The Duties of the Operating Company	19
2.1.3	The Safety of the Machine	19
2.1.4	The Working Staff	20
2.1.5	The Workplace	20
2.2	Safety Instructions for the Use of the Machine	21
2.2.1	Transport to the Installation Site	21
2.2.2	Commissioning, Operation, Decommissioning	22
2.2.3	Maintenance and Repair	23
2.2.4	Disposal	24
2.3	Safety Devices of the Machine	25

3	Technical Description	26
3.1	Functional Description	26
3.2	Machine Overview	27
4	Installation of the Machine	28
5	Before Using the Machine	30
5.1	Mounting Accessories and Options.....	30
5.1.1	Mounting Drill Chuck.....	30
5.1.2	Installing the Cutter	31
5.1.3	Set Drill Guard and Press	32
5.1.4	Installing Machine Vice	33
5.2	Adjusting the Height of the Machine	34
5.3	Connecting the Machine Electrically	35
5.4	Checks Before Commissioning.....	36
6	Operating the Machine	37
6.1	Control Elements of the Machine.....	37
6.2	Drilling Through Hole.....	41
6.3	Drilling Hole with Limiter	43
6.4	Bore with Depth Adjustment	45
6.5	Tapping with Depth Adjustment	48
6.6	Changing Drilling Parameters.....	51
6.7	Calling up the Operator Menu of the Control System.....	53
7	Shutting Down the Machine	54
7.1	Switching the Machine Off.....	54
7.2	Press Emergency Stop of the Machine.....	55
7.3	Measures Before Maintenance and Repair.....	56
8	Troubleshooting	57

8.1	Error Messages on the Display.....	57
8.2	Other Malfunctions and Remedies.....	58
8.3	Release of the Machine After a Fault.....	59

9 Maintenance of the Machine 60

9.1	Inspection and Maintenance Intervals	60
9.2	Dismantling Drill Chuck	62
9.3	Installing/Removing the Protective Hood	63
9.3.1	Removing the Protective Hood.....	63
9.3.2	Installing the Protective Hood.....	65
9.4	Tensioning or Replacing Ribbed V-belt	68
9.5	Replacing Control Panels	71
9.6	Lubrication Schedule	73
9.7	Repair	74

10 Spare Parts List and Drawings 75

11 Dimensional Drawings and Wiring Diagrams 88

12 EC Declaration of Conformity 93

Notes 94

Notes 95

1 Introduction

Dear customer,

Thank you for choosing this quality FLOTT product! With the purchase of this machine, you acquired a product that has an almost unique position in the machine market due to its performance, design, user-friendliness and quality. The outstanding FLOTT quality gives you the certainty of trouble-free and highly efficient use of this machine for a long period of time. The machine is thus inexpensive and gives you a provable increase in value for the benefit of your company and your customers!

FLOTT – High Quality. Built on tradition...

In 1854 a small family-run company was founded in Remscheid, which developed braces and breast drilling machines and manufactured them for the German market. With these products the company Arnz FLOTT Werkzeugmaschinen made industrial history and is therefore often cited in industry circles as a "pioneer" in drilling technology. Thanks to its outstanding experience and product quality, the company has become a powerful international player a long time ago. Always close to its customers – "High Quality – made in Germany". With its partners in Europe, FLOTT is not only rich in tradition but is also one of the leading manufacturers of state-of-the-art, high-quality drilling, sawing and grinding machines in Europe.

Traditionally committed to innovation.

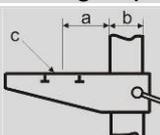
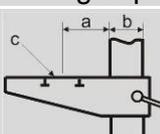
FLOTT is the German antonym for stagnant. As a forward-looking and client-oriented company, FLOTT continuously invests almost 5% of its annual turnover in its own research and development projects. Permanent improvements and, above all, intelligent, industry-specific innovations in drilling, sawing and grinding technology – evidenced by numerous patents, industrial property rights, customer and design awards – speak clearly for the company's innovative strength and legendary pioneering spirit. For customers, this means the certainty of having acquired a product, which is perfect in terms of technology and suitability for drilling, sawing and grinding applications. The product always reflects the latest state of manufacturing technology, taking into account the ergonomics for users. With an impressive guarantee and additional services: traditionally the highest quality and service.

Service is the key to customer satisfaction...

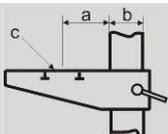
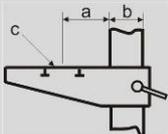
With dedicated, modern training facilities for theory and practice offered by the FLOTT drilling academy, as well as mobile training and demonstration units at the FLOTT locations in Remscheid and the FLOTT commercial agencies we satisfy all customer needs and interests highly efficiently. However, service also means fast repairs to reduce machine downtimes to a minimum. With its service partners across Germany and Europe, FLOTT offers a 24 hour repair and spare parts service. These are just a few points of the FLOTT's service concept. Please read more at www.flott.de or use the consulting services from our highly qualified dealers.

1.1 Pillar Drilling Machine

1.1.1 Technical Data

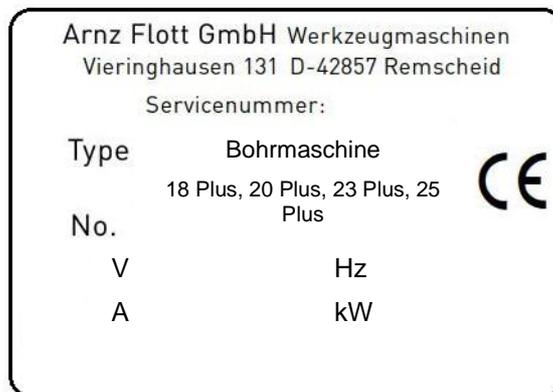
Type		SB 18 Plus	TB 18 Plus	TBZ 18 Plus
Order No.		218.308	218.303	218.309
Permanent/normal drilling performance	[mm]	18/20		
Thread cutting performance	[mm]	max. M12		
Spindle holder	Type	Mk2		
Drilling depth	[mm]	100		
	[mm]	a = 240		
	[mm]	b = 82		
	[mm]	c = 340 x 280		
Mains voltage	[V]	230		
Frequency	[Hz]	50/60		
Motor capacity	[kW]	0.75		
Stepless spindle speed	[rpm]	30-3.000		
Weight without packaging	[kg]	195	170	155
Weight incl. packaging	[kg]	225	200	185
permissible ambient temperature	[°C]	+10 to +40		
Noise emission	dB(A)	60		
Type		SB 20 Plus	SB 20 Plus	TBZ 20 Plus
Order No.		220.100	220.105	220.110
Order No. SB 20 FB Plus		220.115	---	---
Permanent/normal drilling performance	[mm]	20/23		
Thread cutting performance	[mm]	max. M12		
Spindle holder	Type	Mk2		
Drilling depth	[mm]	100		
	[mm]	a = 240		
	[mm]	b = 82		
	[mm]	c = 340 x 280		
Mains voltage	[V]	400		
Frequency	[Hz]	50/60		
Motor capacity	[kW]	1.5		
Stepless spindle speed	[rpm]	40-4.000		
Weight without packaging	[kg]	195	170	155
Weight incl. packaging	[kg]	225	200	185
permissible ambient temperature	[°C]	+10 to +40		
Noise emission	dB(A)	60		

1.1.1 Technical Data

Type		SB 23 Plus	SB 23 Plus	TBZ 23 Plus
Order no. R1		223.020	223.021	223.022
Order no. R2		223.025	223.026	223.027
Permanent/normal drilling performance	[mm]	23/25 (R1) 20/23 (R2)		
Thread cutting performance	[mm]	max. M16 (R1) max. M12 (R2)		
Spindle holder	Type	Mk2		
Drilling depth	[mm]	100		
	[mm]	a = 260		
	[mm]	b = 110		
	[mm]	c = 420 x 340		
	[mm]			
Mains voltage	[V]	400		
Frequency	[Hz]	50/60		
Motor capacity	[kW]	1.5		
Stepless spindle speed	[rpm]	20-2.000 (R1) 30-3.000 (R2)		
Weight without packaging	[kg]	290	250	235
Weight incl. packaging	[kg]	320	280	265
permissible ambient temperature	[°C]	+10 to +40		
Noise emission	dB(A)	60		
Type		SB 25 Plus	SB 25 Plus	TBZ 25 Plus
Order no. R1		225.010	225.011	225.012
Permanent/normal drilling performance	[mm]	25/28		
Thread cutting performance	[mm]	max. M16		
Spindle holder	Type	Mk3		
Drilling depth	[mm]	120		
	[mm]	a = 260		
	[mm]	b = 110		
	[mm]	c = 420 x 340		
	[mm]			
Mains voltage	[V]	400		
Frequency	[Hz]	50/60		
Motor capacity	[kW]	1.5		
Stepless spindle speed	[rpm]	20-2.000		
Weight without packaging	[kg]	292	252	237
Weight incl. packaging	[kg]	322	282	267
permissible ambient temperature	[°C]	+10 to +40		
Noise emission	dB(A)	60		

1.1.2 Rating Plate of the Pillar Drilling Machine

The pillar drilling machine is identified by the type and type no. These and other data can be found on the rating plate, which is attached to the protective hood of each machine.



Manufacturer:

Arnz FLOTT GmbH Werkzeugmaschinen
Vieringhausen 131

42857 Remscheid, Germany

Tel: +49 21 91 979-0

Fax: +49 21 91 979-222

e-mail: info@flott.de

Web: www.flott.de

1.1.3 Intended Use

The pillar drilling machine is designed exclusively for drilling, countersinking, reaming and tapping metal, plastic and wood materials using suitable cutters. The pillar drilling machine is intended to be operated by one person only.

Intended use also comprises

- That the machine, depending on the type of machine, must be anchored to the foundation or other suitable support
- Compliance with the drilling performance stated in the technical data
- That only appropriate cutters are used in their machine
- That the cutters are properly fixed in the spindle
- That the workpiece to be machined shall be secured against rotation on the drilling table (e.g. by clamping or stop)
- Compliance with inspection and maintenance schedules
- That only FLOTT original spare parts are used and
- Compliance with all instructions and information in this operating manual and that of the cutter manufactures.

1.1.4 Improper Use

The pillar drilling machine must not be used for purposes other than as stated in the section "Intended use". Any other use is considered improper.

Examples of improper use are

- Drilling in other not suitable materials
- The use of the machine without the necessary safety equipment
- The use of unsuitable cutters and coolants
- Unauthorized conversions or modifications to the machine.

Any improper use may result in:

- Injury or killing of persons
- Damage to the machine
- Damage to other property.

Any improper use **without exception** is an action taken at the sole risk of the user. Any resulting liability claims against Arnz FLOTT GmbH Werkzeugmaschinen are excluded unless otherwise required by mandatory statutory provisions.

1.2 Legal Provisions

1.2.1 Liability

Arnz FLOTT GmbH Werkzeugmaschinen makes reference to the validity of its general terms and conditions (see the Internet homepage <http://www.flott.de/de/flott/service/downloads/>). These general terms and conditions and the provisions contained therein for the limitation of the liability of Arnz FLOTT GmbH Werkzeugmaschinen (especially the clauses 8.5, 8.8, 9.1 – 9.3 and 10.) are part of this operating manual.

The information, data and notes given in the operating manual were up to date at the time of printing. We reserve the right to technical changes as part of the further development of the machines. Information, illustrations and descriptions are non-binding. The information, illustrations and descriptions contained in this operating manual are in particular not subject to any claims or rights for previously delivered machines.

No liability is accepted for damage or malfunctions that occur as described below:

- Failure to comply with the operating manual
- Operational errors
- Improper working on and with the machine
- Use of non-genuine spare parts and accessories of other origin than Arnz FLOTT GmbH Werkzeugmaschinen
- Unauthorized modifications and changes to the machine by the own or its staff.

The following documents are relevant to the assessment of liability of Arnz FLOTT GmbH Werkzeugmaschinen towards the user of the machine

- With regard to the technical handling of the machine, only the requirements of this operating manual
- In all other cases, the individual contract concluded between the operating company and Arnz FLOTT GmbH Werkzeugmaschinen in conjunction with the relevant general terms and conditions of Arnz FLOTT GmbH Werkzeugmaschinen
- The general legal provisions.

In the event that the user themselves or via a third party operates or commissions the machine outside the contract concluded with Arnz FLOTT GmbH Werkzeugmaschinen or as a buyer after a reselling original purchaser, the liability of Arnz FLOTT GmbH Werkzeugmaschinen is limited to the liability under the Product Liability Act and under the general statutory provisions provided this operating manual has been adhered to.

1.2.2 Warranty

Warranty claims shall be submitted to Arnz FLOTT GmbH Werkzeugmaschinen immediately after the error or defect has been identified, stating the machine number, the machine type and the serial number.

Wear parts are not subject to warranty. The warranty is null and void in case of:

- Improper use of the machine
- Improper working on and with the machine
- Use of improper cutters and equipment and
- Use of non-genuine spare parts and accessories of other origin than Arnz FLOTT GmbH Werkzeugmaschinen.

1.2.3 Copyright

This operating manual and all documents contained therein are protected by copyright. Any (even partial) duplication and disclosure to third parties, communication and utilization of its contents are not permitted or require the express consent of Arnz FLOTT GmbH Werkzeugmaschinen.

Violations are liable to prosecution and oblige the offender to compensation for damages. All rights for the exercise of intellectual property rights are reserved.

© Copyright 2018 by Arnz FLOTT GmbH Werkzeugmaschinen

1.3 Operating Manual

This operating manual contains information and instructions which shall ensure that the operating personnel can work safely, properly and economically on and with the machine. Only if the contents of the operating manual are understood and observed, can

- Help to avoid hazards
- Reduce repair costs and downtime and
- Increase the reliability and service life of the machine.

To help you in the use of the operating manual, the sections below provide explanations of systematics and rules used, as well as content and design specifications, and, in some cases, illustrations with an example.

1.3.1 Definition of Terms

This operating manual uses some important terms, which are defined below.

Pillar drilling machine (machine)

The term pillar drilling machine means in this manual the complete machine. For the sake of simplicity, only the term machine will be used in the following.

Spindle

The term spindle means the rotating component in which the drill chuck with the cutter can be clamped directly.

Workpiece

The term workpiece means the material in the form of a component to be processed.

Cutter

The term Cutter means in this operating manual the machining cutter (drill, countersink, reamer and tap) used in the machine with which the workpiece is machined.

Operating company

The operating company is any natural or legal person using the machine or on whose behalf the machine is used.

Target group

The target group is a specific group of persons for whom specific information in this operating manual is destined.

Operating personnel

Operating personnel is who has been **tasked** and **instructed** to operate the machine. The operating personnel is entitled to perform simple maintenance such as cleaning the machine.

Authorized personnel

Authorized personnel are those who have been commissioned by the operating company to operate the machine as intended.

Trained personnel

Trained personnel who

- Was informed about the tasks entrusted to them and, if necessary, trained
- Was informed about the possible dangers of improper conduct and
- Was informed about the necessary safety equipment, protective measures, accident prevention regulations, relevant regulations and operating conditions.

Technical staff

Technical staff are those who, due to their professional training, knowledge and experience, can assess and professionally carry out the work assigned to them. The technical staff are familiar with the accident prevention regulations, the relevant regulations and the operating conditions.

Personnel of Arnz FLOTT GmbH Werkzeugmaschinen

Personnel of Arnz FLOTT GmbH Werkzeugmaschinen is who is technical staff **and** employee of Arnz FLOTT GmbH Werkzeugmaschinen.

Residual risks

Residual risks are not obvious risks that are given during the operation of the machine.

Example:

- Risk of burns from hot machinery and components after the machine has been shut down.

Protective clothing

Protective clothing is a personal protective equipment that protects the body against hazards from the work process. The protective clothing must comply with the **Occupational Safety Act**.

When protective clothing must and should be used is defined by the applicable accident prevention regulations.

1.3.2 Illustrations and Signs in this Text

To emphasize important information, this manual uses the following pictograms, symbols and typographical signs.

Pictograms

General danger



Indicates safety instructions which must be observed and which cannot be identified with a specific pictogram (e.g. one of the following pictograms).



High electrical voltage

Indicates the risk of electric shock.



Hot parts

Indicates the risk of burns when touching hot machinery and components.



Hand injuries

Indicates the danger of being pulled in, crushed or otherwise injured



Environmentally hazardous substances

Indicates the risk posed by chemical substances if these substances are not disposed of in accordance with applicable environmental protection laws.



Safety note

Indicates instructions for safe working on and with the machine.



Use ear protection



Use safety goggles



Use safety shoes



Use protective clothing

Symbols

The operating manual uses three different symbols:

- This symbol indicates a single handling instruction. If there are more than one instruction, they are numbered consecutively.
- This symbol indicates lists that consist of equal content.
 - This symbol identifies subitem lists that are subordinate to the lists and also consist of equal content.

Typographical signs

These safety instructions contain note of the type of danger in italics (see page 17, section *Examples for safety instructions*).

1.3.3 Structure and Design of Safety Instructions

All safety instructions contained in this operating manual have a uniform structure.

Components of a safety instructions

A safety instruction consists of several components:

- A pictogram
- A signal word that indicates the degree of danger
- A note on the nature of the danger and
- A note on the prevention of the danger.

The following signal words indicate the degree of danger:

Danger

Indicates an imminent danger to persons.

Possible consequences: Death or serious injuries

Warning

Indicates a potential hazard to persons.

Possible consequences: Death or serious injuries

Attention

Indicates a possible hazard to persons or property.

Possible consequences: Minor personal injury or damage to property

Note

Indicates a potentially harmful situation for property or the environment.

Possible consequences:

- Damage to machine itself
- Damage to property in the environment of the machine
- Damage to the environment

Examples of safety instructions



Warning

Danger by improper use of the machine.

The machine may only be operated by authorized and trained personnel.
The machine may only be operated when it is in flawless condition. All safety devices must be present and fully functional.



Note

Check all screw connections before commissioning the machine

- Tight fit
- Externally visible damage.

2 Safety Instructions

2.1 General Safety Instructions

The machine corresponds to the state of the art at the time of placing the order and is generally considered to be operationally reliable.

The machine can still be dangerous if

- Unauthorized and untrained personnel operates the machine and
- The machine is used improperly.

Then there is danger for

- People
- The machine and
- Other property of the operating company.

2.1.1 The Operating Manual

The prerequisite for safe handling and trouble-free operation is knowledge of the specific safety instructions and safety regulations, e.g.

- DGUV Regulation 1 – Principles of Prevention
- DGUV Rule 100–500 – Operation of Work Equipment

This operating manual shall be used in particular for safe working on and with the machine. It contains safety instructions that must be observed.

In addition to the basic safety instructions in this section, you must also observe the special safety instructions in the other sections. They contain specific safety instructions for specific instructions that warn you of an impending danger.

The operating manual must

- Be read and understood by all persons who work on and with the machine before beginning their work
- Be available at the place of use of the machine at a designated place and
- Be always complete and in perfectly readable state.

If you do not understand this operating manual or individual paragraphs, you should not start your activity. Ask the technical staff

- of the operating company or
- of Arnz FLOTT GmbH Werkzeugmaschinen

before you get into a potentially dangerous situation.

2.1.2 The Duties of the Operating Company

The operating company must take into account a number of obligations with respect to its staff.

The operating company is obliged to

- Supplement the operating manual by instructions based on national regulations for accident prevention and environmental protection
- Inform the staff of all relevant regulations, instructions and laws, where required
- Control all relevant regulations, notes and laws that will be complied with
- Instruct the staff how to work on and with the machine
- Clearly define the responsibilities for operation, maintenance and repair of the machine
- Check that the specified responsibilities are complied with
- Verify at regular intervals whether its staff is aware of potential hazards and operates the machine in accordance with the safety standards laid down in the operating manual and
- Ensure that the staff has read and understood the operating manual, especially the section on safety. If necessary, the operating company should have the staff confirmed this in writing.

2.1.3 The Safety of the Machine

The following must be observed during all work on and with the machine:

- The applicable regulations
- The applicable professional association regulations (DGUV)
- The relevant provisions and applicable environmental laws

Only use the machine in a technically perfect condition. This means that all safety equipment of the machine is present and functional. In case of malfunctions or errors, you must immediately shut down the machine and notify the person in charge of the operating company of this condition.

You may take the machine into operation after restoring the proper functioning of the machine.

Do not dismantle or put out of operation any safety devices. If you still need to dismantle the safety devices, e.g. during maintenance or servicing work, you must install them again immediately after the work has been completed. Check all safety devices for proper operation before operating the machine.



Note

Modifications, extensions and conversions of the machine that impair safety are strictly prohibited. They require the written approval of Arnz FLOTT GmbH Werkzeugmaschinen.

Only use original spare parts if you need to replace components of the machine. Operation and safety of the machine are preserved only with original spare parts.

2.1.4 The Working Staff

Only authorized and trained personnel may work on and with the machine. Unauthorized persons are prohibited from using the machine. Personnel undergoing training or instruction or who are undertaking a general programme of education may only work on the machine under the continuous supervision of an experienced person.

Young people under 18 years are only allowed to work on the machine

- As part of their education
- After successful detailed instruction and
- Under the guidance and supervision of an authorized person.

Works on the electrical equipment or operating materials of the machine may only be carried out by authorized personnel.

The responsible supervisor must instruct the operating staff at regular intervals, at least once a year, on safe working practices. The instructions must be appropriately recorded and be signed by the trained staff.

The operating personnel must promptly inform their supervisor of any changes in the performance of the machine. This applies especially if the safety of the machine is no longer guaranteed.

Personnel is not permitted to have loose hair, loose clothing or jewellery, including rings, when standing near the machine.

The personnel must wear personal protective equipment as required or provided by a regulation.

2.1.5 The Workplace

Only occupy workplaces which of intended for the operation or maintenance of the machine. The workplaces must always be dry, clean and unobstructed. The machine must always be accessible from all sides. Do not store flammable or explosive substances near workplaces. The working area must be ventilated so that no hazardous or highly flammable mixtures or gases can accumulate in dangerous quantities. If necessary, a suitable ventilation system must be installed. To provide for the possibility of immediate and proper action in the event of accidents and breakdowns, you must always have at hand at your workplace:

- Officially approved fire extinguisher
- First aid kit

2.2 Safety Instructions for the Use of the Machine



Use safety goggles

Always wear the necessary goggles when working on and with the machine!



Use safety shoes

Always wear the necessary safety shoes when working and with the machine!



Use protective clothing

Always wear the necessary tight-fitting protective clothing when working on and with the machine!

2.2.1 Transport to the Installation Site



Warning

Danger of falling down of the transported object.

- The machine may only be transported by technical staff.
- Use only transport equipment and transport aids that
 - Comply with safety regulations and
 - Are capable of bearing the loads.
- The machine may only be lifted and transported at the designated points.
- Before transporting at the company's premises, make sure that all transport routes are free and if possible at the ground level.



Note

Damage to the machine due to frost, heat and moisture.

Transport and store the machine only at temperatures above 0 °C. Protect the machine against moisture (e.g. with tarpaulins).

2.2.2 Commissioning, Operation, Decommissioning



Danger

Danger by electric voltage.

The machine (class A) is designed according to EN55011 for an industrial environment. In other environments, appropriate measures on part of the operating company may be necessary.



Warning

Danger due to improper work on and with the machine. Danger by improper use of the machine.

- Only authorized and trained personnel may operate the machine.
- Only operate the machine when it is in perfect condition. All safety devices must be present and functional on the machine. In the event of defects or malfunctions, the machine must be shut down immediately and secured against being switched on again.
- Restart the machine only after all defects or malfunctions have been rectified and the machine is working properly.



Warning

Danger due to fast rotation of the drill spindle.

Fast rotation of the drill spindle can result in hair or clothing being pulled in. This can lead to serious injuries.

Therefore, during operation of the machine

- It is mandatory to wear a hairnet for long hair or a suitable headgear
- **Never** wear gloves, neckties, bracelets, finger rings, chains or other loose clothing.



Warning

Danger due to unsecured workpiece.

A sudden jamming of the cutter in the workpiece can cause an unsecured workpiece to strike and cause injury.

Secure the workpiece to be machined against rotation by clamping it on the drilling table or by a suitable stop.



Attention

Danger due to lying around cutters or other objects.

Make sure that there are no cutters or other objects in the working area of the machine, especially in the working area of the drill spindle.



Attention

Danger due to inadequate lighting.

The operator of the machine must ensure that there is adequate lighting to operate the machine.



Attention

Danger due to sharp-edged swarf.

Do not remove swarf with your bare hands.

The blowing out with compressed air is also unsuitable, since the swarf can easily get into the eye.

Always use a suitable tool (swarf removing hook and hand brush).



Attention

Danger due to overuse of the cutters.

Observe the specifications of the cutter manufacturer with regard to the permissible technical characteristics (material to be machined, speed, feed, coolant, maintenance and care).

An overuse of the cutter can lead to breakage and thus damage to the cutter and the machine.



Note

Check all screw connections before commissioning the machine

- Tight fit
- Externally visible damage.

2.2.3 Maintenance and Repair



Danger

Danger due to hot machinery and components.

- Make sure that the machine has cooled down.
- Wear appropriate protective clothing.



Danger

Danger due to improper maintenance of the machine.

- Only authorized and trained personnel may carry out the cleaning of the machine and the maintenance.
- For the machine to remain safe and have a long service life, you must comply with the maintenance works and intervals that are specified in this operating manual.
- Shut down the machine and secure it against restart.
- Do not dismantle safety devices of the machine. If dismantling of safety devices cannot be avoided during maintenance, you must reinstall the safety devices and check their function.
- Screw connections that you have loosened for maintenance must always be tightened again.



Danger

Danger by electric voltage.

Maintenance work on electrical components may only be carried out by authorized personnel (electricians). Make sure that the electrical equipment of the machine is de-energized for the period of maintenance.



Danger

Danger by electric voltage.

Only authorized electrician is allowed to open the control cabinet and remove covers above live parts. Existing covers may only be removed if it has been ensured that the covered part is de-energized.

2.2.4 Disposal



Note

Danger to the environment due to incorrect disposal.

- Dispose of all used equipment, auxiliary materials and replacement parts in a safe and environmentally friendly manner. Observe the respective regulations and laws for the protection of the environment.
- Do not return unused machines to the manufacturer for final disposal.

2.3 Safety Devices of the Machine

For the safety devices on the machine, see the figure in section 3.2 *Machine overview* on the page 27.

Protective hood

The protective hood serves as protection against intervention in the rotating drive unit and the electrical components. The protective hood may only be removed from the machine by qualified personnel for maintenance and repair.

During operation of the machine, the protective hood must be properly mounted.

Drill guard

The height-adjustable drill guard is installed directly in front of the cutter that is inserted into the spindle and protects the operator from flying swarf.

The drill guard can be swung sideways, which deactivates a protective switch and the machine cannot be started or stops the rotation. Only when the drill guard is swung back into its protection position and the protective switch is activated, the machine can be started.

Clamping lever of the drilling table

The clamping lever of the drilling table is used to lock or fix the height-adjustable drilling table. If the drilling table has been moved to the desired machining height by means of the hand crank, it must be fixed in this position by the clamping lever.



Emergency stop push-button

You can use the emergency stop button of the control unit, to stop the motor drive and thus the rotational movement of the spindle in the event of imminent danger.

The emergency stop button is self-locking. This means you cannot use the machine until you have eliminated the cause for the interruption and unlocked the emergency stop button.

3 Technical Description

3.1 Functional Description

FLOTT pursued high standards in developing the PLUS series. The goal was not another type of drilling machine – but drilling technology that is years ahead of the time. Innovative in ergonomics and design, which keeps FLOTT firmly anchored in the market "as a brand" of superior drilling technology.

Depending on the model, the pillar drilling machine consists of a stable machine base, a resilient column, a pivotable and height-adjustable drilling table as well as the drive and control unit.

The machine is driven by a frequency converter controlled three-phase motor, which uses a ribbed V-belt and pulleys to set the quill in rotation. The complete drive unit as well as the control panel are located underneath or in the screw-mounted protective hood.

The drill chuck is mounted on the spindle, which holds the cutter (drill, countersink, reamer or tap). On the side next to the spindle, there are 2 LEDs, which provide for a good illumination of the workpiece.

The drilling table is used to safely secure the workpiece to be machined. Clamping jaws or a vice can be secured with the T-blocks in the T-recesses in the drilling table. These aids are used to secure the workpiece against rotation. The drilling table can be adjusted in height with the aid of a toothed rack and hand crank.

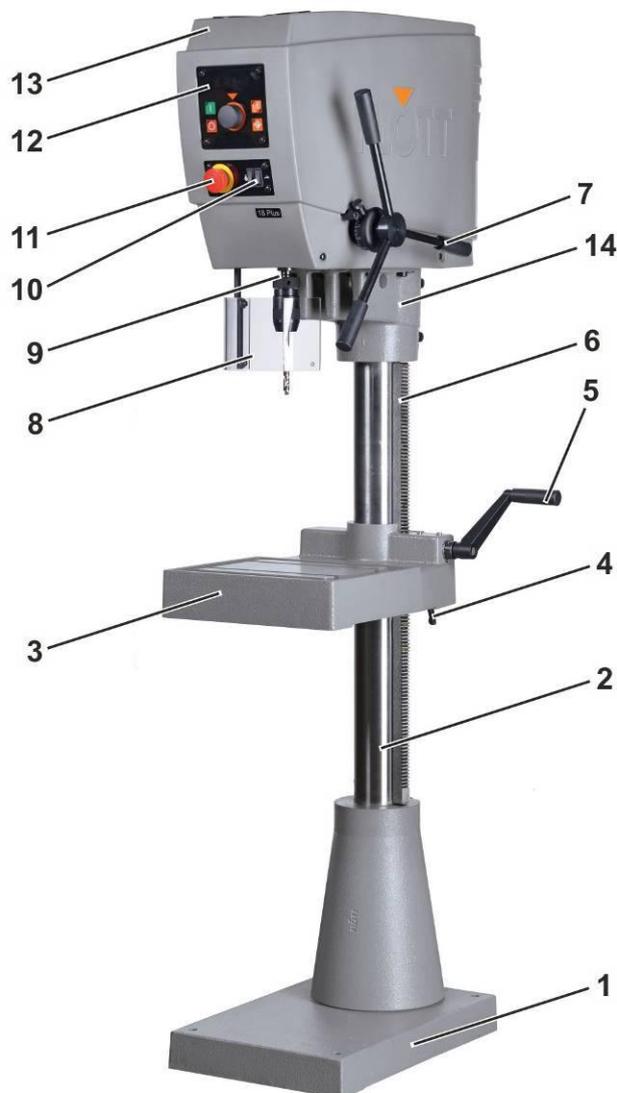
The machines without drilling table and toothed rack are provided with a gas spring with which the machine head can be adjusted in height.

The machine is operated via the control panel with digital display and the manual three-arm-lever. The spindle speed, the zero point and the drilling depth can be set with the aid of the control panel. In addition, the machine still has a limiter, with which the drilling depth can be manually limited. The operator moves the rotating spindle with the three-arm-lever in the direction of the workpiece and can process it accordingly.

3.2 Machine Overview

The following figure shows the individual outer components are shown, which may be different depending on the machine type.

1	Machine base	8	Drill guard
2	Pillar	9	Spindle
3	Arm / drilling table	10	Lighting / coolant switch
4	Clamping lever	11	Emergency stop button
5	Hand crank	12	Operator panel
6	Toothed rack	13	Protective hood
7	Three-arm-lever	14	Adapter



Machine type: SB 18 Plus

4 Installation of the Machine

The machine usually comes packaged on a small pallet. Bear in mind the weight of the machine and, if necessary or appropriate, use transport equipment or a second person.



Warning

Danger of falling down of the transported object.

- The machine may only be transported by authorized personnel.
- Only use transport equipment and transport aids that comply with the relevant safety regulations and have sufficient load-bearing capacity.
- The machine may only be fastened, lifted and transported at the designated points.
- Secure the machine against tilting and slipping with suitable transport aids.



Attention

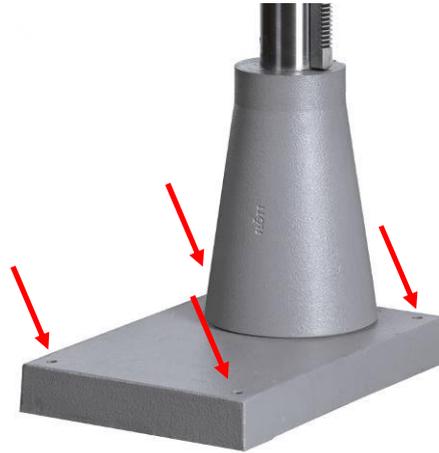
Danger due to swinging loads.

- The machine must be transported without swinging. Every contact with obstacles must be avoided.
- Make sure that nobody is in the danger zone or under the machine during transport.



1. Insert a suitable metal rod through the hole in the adapter so that you can attach straps to its ends.
2. Attach the straps in each end of the metal bar.
3. Use a suitable hoist to carefully lift the machine by the straps and move it to the desired installation location. Make sure that the machine is raised vertically and not pulled diagonally to the side.
4. Carefully deposit the machine and remove the straps and metal rod.
5. Align the machine to its final position.

6. Mark the holes for fixing the machine base.



7. Move the machine slightly and drill out the holes (depending on the design with 2 or 4 through holes or dowel holes for M12).
8. Place suitable vibration dampers (rubber mat or rubber damper) under the machine base in order to absorb vibrations during operation.
9. Realign the machine.
10. Attach the machine base to the foundation or a machine table using suitable M12 connection screws.



Note

Make sure that the machine base is not distorted by the fastening screws. A distorted machine base can result in unwanted vibration transmission of the drive unit.

11. Tighten the screws only hand-tight so that the machine base is not distorted.

5 Before Using the Machine

5.1 Mounting Accessories and Options

Depending on the order, the machine comes without machine vice and drill chuck. These optional components must be properly installed by the operator after the machine has been set up.

5.1.1 Mounting Drill Chuck



Manually swivel the drill guide to the left side. This activates the drill guard switch and prevents the machine from starting.

Check that the cone of the drill chuck and the spindle are free from contamination and grease.

If necessary, add a little spray oil to the cone of the drill chuck and the spindle.



Warning

Risk of damaging the spindle or the drill chuck.

Never hit the chuck directly with a metal hammer. Insert a rubber mallet or a wooden board in between.

Place the chuck vertically under or in the spindle.

Attach the drill chuck to the spindle by gently tapping the drill chuck from below with a rubber mallet.

This jams the chuck in the spindle.

Check the tight fit of the drill chuck by gently shaking and pulling.

How to disassemble a chuck is described in section 9 *Maintenance of the machine*.

5.1.2 Installing the Cutter

Depending on how the workpiece is to be machined, the appropriate cutter (drill, countersink, reamer or tap) must be inserted into the chuck.



Note

Please note

- The technical data of this operating manual, in particular with regard to the performance limits and
- The technical data of the cutter manufacturer.

These must be strictly adhered to in order to ensure safe working on and with the machine and to obtain the desired machining result.

Turn the drill chuck by hand or with a chuck key until you can easily insert the cutter into the chuck.

Insert the cutter into the chuck and hold it in place.

Clamp the cutter in the drill chuck by

- fixing it by hand in case of a quick-action drill chuck
- fixing it with a chuck key in case of a keyed chuck.

The cutter will thus be clamped by the three clamping jaws.



Quick-action drill chuck



Keyed chuck

5.1.3 Set Drill Guard and Press

The drill guard is an important safety device of the machine and can be both adjusted in height and swung sideways.

For the machining process, the height of the drill guard must be set correctly and swung as far as possible in the direction of the cutter.

Adjusting the drill guard in height

The drill guard is fixed in the machine housing with a size 5 hexagon socket screw. The fixation should be adjusted so that the drill guard

- Remains in its respective position
- Manually pushed up or pulled down to the desired position.



Warning

Danger of incorrectly set drill guard.

Hot drill swarf can fly around if the drill guard is set incorrectly. This can cause serious injuries.

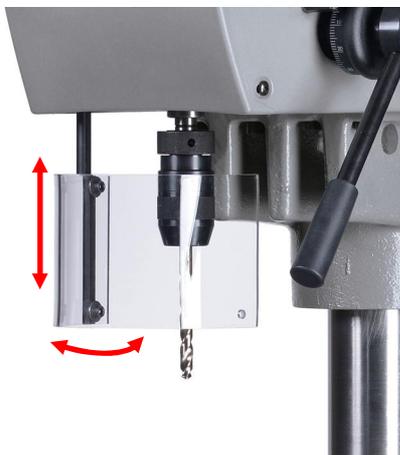
Therefore, adjust the drill guard to the height of the workpiece before each machining operation.



If necessary:

Tighten the two hexagon socket screws size 5 only so that the drill guard can be pushed up or pulled down by hand to the desired position.

- Tighten the hexagon socket screws = clockwise
- Loosen the hexagon socket screws = counter clockwise
- The clamping of the drill guard bracket must not be overtorqued
- The drill guard must not slide down by its own weight.



Carefully adjust the height of the drill guard to the desired position with both hands. Easy turning of the drill guard simplifies this process.

Operating drill guard

The drill guard is equipped with a protective switch in the machine housing. Only when the drill guard is swivelled to its protection position, the protective switch is activated and only then is released by the control system for operation.



Use safety goggles

Always wear the necessary goggles when working on and with the machine!



- Before starting the machine, swivel the drill guard into its protection position in front of the cutter.

5.1.4 Installing Machine Vice

The drilling table is used to safely secure the workpiece to be machined. Clamping jaws or a vice can be secured with the T-blocks in the T-recesses in the drilling table. These aids are used to secure the workpiece against rotation.



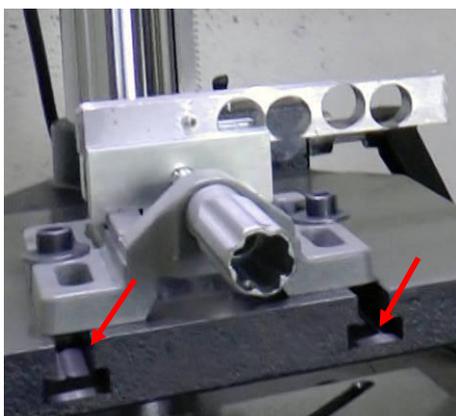
Warning

Danger due to unsecured workpiece.

A sudden jamming of the cutter in the workpiece can cause an unsecured workpiece to strike and cause injury.

Secure the workpiece to be machined against rotation by clamping it on the drilling table or by a suitable stop.

The mounting of a machine vice to the drilling table is described below.



Slide the machine vice with the T-blocks into the T-recesses of the drilling table.

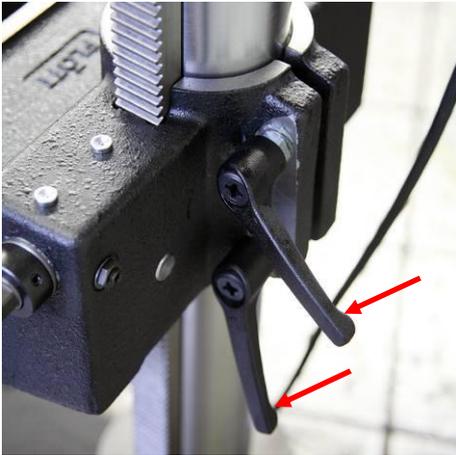
Align the machine vice so that it is positioned centrally under the spindle.

Hand-tighten the T-blocks to secure the machine vice to the drilling table.

The vice or workpiece must be aligned in the vice relative to the cutter for each machine operation.

5.2 Adjusting the Height of the Machine

Depending on the design of the machine, the drilling table or the machine head can be adjusted in height. This is always necessary if the distance from the drilling spindle to the workpiece has to be changed.



Loosen the clamping lever(s) on the rear side of the machine.



Move the drilling table to the desired height using the hand crank

- turn clockwise and raise the drilling table,
- turn counter clockwise and lower the drilling table.

Hand-tighten the clamping levers again to fix the drilling table at the set height.

5.3 Connecting the Machine Electrically



Warning

Danger due to faulty electrical connection.

Observe the electrical connection values in the operating manual and the rating plate when connecting the machine.

- Excessive connection voltage may cause operator injury and damage to the machine.
- If the connection voltage is too low, the machine motor may be damaged.
- The earthing contact plug has an earthing conductor and may only be replaced with an original component.

If local and national regulations prescribe upstream protection by a residual-current protective device (RCD), you must use a type A device for single-phase converters and a type B device for three-phase converters according to IEC 60755. This device must have the following characteristics:

- Filtering high-frequency currents,
- A time delay which prevents tripping caused by loading capacitance and stray capacitance on power-up. This delay is not possible with 30 mA devices. In this case, select devices that are insensitive to unintentional tripping.

Make sure, that

- A protective conductor terminal is present
- There is a mains fuse of 16 A
- The differential current (leakage current) is <7.5 mA.

Note: Due to the construction the leakage current is > 3.5 mA, caused by an EMC filter. See also the following points from DIN VDE 0701-0702: 5.5 Measurement of the protective conductor current and Annex D:

Of 5.5 Measurement of the protective conductor current.

Only for SB/TB/TBZ 18 Plus Before connecting the machine to the power supply, as a precaution press the emergency stop button to prevent undesired start-up of the machine.

Insert the earthing contact plug into a suitable socket of the mains supply.

Only for SB/TB/TBZ 20 Plus, 23 Plus and 25 Plus:

Turn the main switch below the protective hood towards I to switch on the power supply of the machine.

Unlock the emergency stop button by turning it counter clockwise. As soon as the emergency stop button is unlocked

- The machine control system reboots
- The display and the drill light are switched on and
- The control system is started. There is no rotational movement and the display is turned on.



5.4 Checks Before Commissioning

Before putting the machine into operation, you need to check some points. These checks are needed for the safety and work preparation of all persons working on the machine.

Take the utmost care in these checks so that you do not unnecessarily endanger yourself, other persons or the machine.

Workplace

- Make sure your workplace
 - Is always clean and dry, especially in places where entry of liquid metal or cinder is possible
 - If it is located in areas where flames and splashing out fire-liquid mass is expected, it has inlets and outlets that allow a fast and safe leaving of the risk area
 - Has enough space in the area around the machine and
 - Has sufficient lighting adapted to the workplace.

Personal protective equipment

Since you as the operator carry out various activities, you should always have a minimum of protective equipment.

- Wear during all activities on and with the machine:
 - Safety goggles
 - If necessary, hearing protection
 - Safety shoes and
 - Work clothing

Safety equipment

- Make sure, that
 - Nobody is inside the safety area of the machine
 - Only authorized personnel are at the machine
 - All safety devices are present and functional (see section 2.3 *Safety devices of the machine*).

6 Operating the Machine



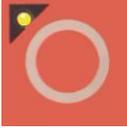
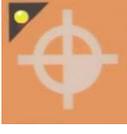
Read and observe the safety instructions in this operating manual before performing any work on and with the machine (see section 2.2 *Safety instructions for the use of the machine*, page 21).

6.1 Control Elements of the Machine

The machine has 4 important control elements, which are used by the operator to operate the machine:

- The control panel with display
- The emergency stop button
- The three-arm-lever and
- The fixed limiter.



Item	Image	Type	Function
1		Emergency stop button	Turns off the drive and the drill light. The display remains switched on until the supply voltage of the frequency converter dies off. The button is used in every situation as an emergency stop button.
2		Coolant switch	Switches a connected coolant supply on or off. In the machine, only electrical wiring is prepared for this.
3		Lighting switch	Turns the LED lighting on or off.
4		Push-button Stop	Switches the drive of the machine off. <ul style="list-style-type: none"> • The button lamp is off when the control system requires input (e.g. speed). • The lamp lights up when the drive is off. • The lamp flashes when the drive is on.
5		Push-button Start	Turns the drive of the machine on. The spindle is rotated. <ul style="list-style-type: none"> • The lamp is off when the control system requires input (e.g. speed). • The lamp lights when the drive is on. • The lamp flashes when the drive is off.
6		Rotary switch/push-button	Must be rotated and/or pressed as required. The button is used to <ul style="list-style-type: none"> • Set and acknowledge machine values • Confirm error messages • Switch the display on in standby mode • Select menu items of the control system.
7		Push-button Drill type	Switches between <i>drilling</i> or <i>tapping</i> modes. <ul style="list-style-type: none"> • The top left lamp lights when the <i>drilling</i> mode is selected. • The bottom right lamp lights when the <i>tapping</i> mode is selected.
8		Push-button Zero point	Sets a given zero point (e.g. for workpiece surface). <ul style="list-style-type: none"> • The lamp lights up when a zero point is stored. • The lamp flashes when no zero point is stored.

Item	Image	Type	Function
------	-------	------	----------

9		Three-arm-lever	The operator moves the spindle up and down using the drill lever during the machining operation.
10		Fixed limiter	<p>Is used during the drilling operation to mechanically limit a drilling depth.</p> <ul style="list-style-type: none"> • The limiter is active when it is pushed completely onto the three-arm-lever axle. • The limiter is deactivated when it is pulled out in the direction of the three-arm-lever.
11		Main switch	<p>Only for SB/TB/TBZ 20/23'/25 Plus</p> <p>Switches the power supply of the machine on or off.</p>

Emergency stop button (push-button)



The control panel emergency stop button is used by the operator as a safety switch while working on and with the machine.

You can use the emergency stop button to stop all drives and movements of the machine in the event of imminent danger, regardless of the currently selected operating mode or function.

In the event of an interruption by emergency stop, the machine and the movements triggered by the actuation push-buttons are stopped, i.e. they do not continue to move. The drive motor and drill light are switched off.

To stop the machine, simply press the emergency stop button.



Note

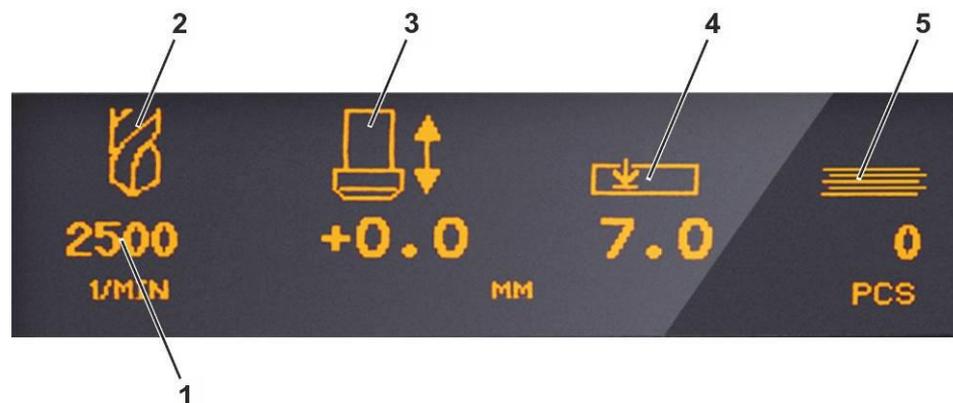
However, you should normally not use the emergency stop button to shut down the machine (normal shutdown), since this immediately stops the controlled movement of the machine. Always press the emergency stop button only in case of danger or to reset the control system.

The emergency stop button is self-locking. This means that you cannot operate the machine until you have eliminated the cause for the interruption and unlocked the actuated emergency stop button.

Digital display

The display is integrated into the control panel and is used to display

- error messages (superimposed on all other displays)
- (1) Spindle speed
- (2) Display of active drilling style (drilling or tapping)
- (3) Drilling depth as actual value
- (4) Drilling depth as setpoint
- (5) Piece counter of already executed holes



6.2 Drilling Through Hole



Use safety goggles

Always wear the necessary goggles when working on and with the machine!



Warning

Danger due to fast rotation of the drill spindle.

Fast rotation of the drill spindle can result in hair or clothing being pulled in. This can lead to serious injuries.

Therefore, during operation of the machine

- It is mandatory to wear a hairnet for long hair or a suitable headgear
- **Never** wear gloves, neckties, bracelets, finger rings, chains or other loose clothing.

Carry out all necessary work to prepare the machine (see section 5 *Before using the machine*).

Then the drill is clamped and the machine set to the required height.



Attention

Danger due to repeated loads.

The repeated lifting of heavy weights can lead to unfavourable body loads and rapid fatigue. When handling workpiece weights > 10 kg, use a suitable hoist for loading and unloading operations.



Clamp the workpiece in the mounted vise.

Unlock the emergency stop button. Only for 20,23,25 Plus

Then the control system is restarted and the display appears:



After starting the control system, the drilling type *Drilling* shall always be preselected.



Before starting the machine, swivel the drill guard into its protection position in front of the cutter. This will activate the protective switch, which releases the operation of the machine.



If necessary:
Press the push-button to select the drill type *Drilling*.
The top left lamp lights when the *drilling* mode is selected.



Select the appropriate speed for the inserted drill bit and workpiece by pressing the rotary switch/push-button

- Set the speed (rpm) by turning slowly and
- Apply the speed in the control system by pressing.

The set speed can be read off the display.



Press the push-button to start the machine.
The lamp lights when the drive is turned on and the spindle is rotated.



Use the three-arm-lever to slowly move the drill bit towards the workpiece by pressing down on the three-arm-lever.
Drill the through hole in the workpiece.
Then return the three-arm-lever back to its initial position.



Press the push-button to stop the machine.
The lamp lights up when the drive is off.

The machining operation is over.

6.3 Drilling Hole with Limiter

You can use the limited if a small series of holes with the same drilling depth is to be drilled.

Limiter equipped with freewheel ensures the required drilling depth through mechanical limitation during the drilling operation.



Use safety goggles

Always wear the necessary goggles when working on and with the machine!



Warning

Danger due to fast rotation of the drill spindle.

Fast rotation of the drill spindle can result in hair or clothing being pulled in. This can lead to serious injuries.

Therefore, during operation of the machine

- It is mandatory to wear a hairnet for long hair or a suitable headgear
- **Never** wear gloves, neckties, bracelets, finger rings, chains or other loose clothing.

Carry out all necessary work to prepare the machine (see section 5 *Before using the machine*, page 30).

Then the drill is clamped and the machine set to the required height.



Attention

Danger due to repeated loads.

The repeated lifting of heavy weights can lead to unfavourable body loads and rapid fatigue. When handling workpiece weights > 10 kg, use a suitable hoist for loading and unloading operations.

Clamp the workpiece in the mounted vise.

Unlock the emergency stop button. Only for 20,23,25 Plus

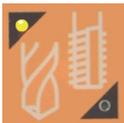
Then the control system is restarted and the display appears:



After starting the control system, the drilling type *Drilling* shall always be preselected.



Before starting the machine, swivel the drill guard into its protection position in front of the cutter. This will activate the protective switch, which releases the operation of the machine.



If necessary:
Press the push-button to select the drill type *Drilling*.
The lower right lamp lights when the *Drilling* mode is selected.



Select the appropriate speed for the inserted drill bit and workpiece by pressing the rotary switch/push-button

- Set the speed (rpm) by turning slowly and
- Apply the speed in the control system by pressing.



The set speed is shown in the display.



Use the three-arm-lever to slowly move the drill bit towards the workpiece by pressing down on the three-arm-lever.
Drill the first blind hole in the workpiece.
Hold the three-arm-lever in the lowest position of the bore.



Push the limiter all the way to the three-arm-lever axle.
Turn the limiter counter clockwise until the pin of the limiter rests on the stop pin.

Then return the three-arm-lever back to its initial position.



Note

Note that drilling with the limiter only allows a very rough setting of the drilling depth. For a more precise setting, you should use the drilling depth setting of the control system.

Now drill all other holes with the limitation of the drilling depth by means of a limiter.

Pull the limiter out in the direction of the three-arm-lever until it stops in order to deactivate the limiter.

Press the push-button to stop the machine.
The lamp lights up when the drive is off.



The machining operation is over.

6.4 Bore with Depth Adjustment

The depth adjustment of the control system is only connected to an acoustic signal, there is no mechanical or technical limitation of the drill hole depth. Since the drilling process is carried out manually with the three-arm-lever, it is also possible to drill deeper after the signal.



Use safety goggles

Always wear the necessary goggles when working on and with the machine!



Warning

Danger due to fast rotation of the drill spindle.

Fast rotation of the drill spindle can result in hair or clothing being pulled in. This can lead to serious injuries.

Therefore, during operation of the machine

- It is mandatory to wear a hairnet for long hair or a suitable headgear
- **Never** wear gloves, neckties, bracelets, finger rings, chains or other loose clothing.

Carry out all necessary work to prepare the machine (see section 5 *Before using the machine*).

Then the drill is clamped and the machine set to the required height.

Clamp the workpiece in the mounted vise.



Attention

Danger due to repeated loads.

The repeated lifting of heavy weights can lead to unfavourable body loads and rapid fatigue. When handling workpiece weights > 10 kg, use a suitable hoist for loading and unloading operations.



Unlock the emergency stop button. Only for 20.23.25 Plus

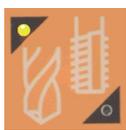
Then the control system is restarted and the display appears:



After starting the control system, the drilling type *Drilling* shall always be preselected.



Before starting the machine, swivel the drill guard into its protection position in front of the cutter. This will activate the protective switch, which releases the operation of the machine.



If necessary:
Press the push-button to select the drill type *Drilling*.
The top left lamp lights when the *drilling* mode is selected.



Select the appropriate speed for the inserted drill bit and workpiece by pressing the rotary switch/push-button

- Set the speed (rpm) by turning slowly and
- Apply the speed in the control system by pressing.



The set speed is shown in the display.



Use the drill lever to slowly move the drill bit tip to the workpiece surface while pressing down on the drill lever.

Press the push-button to transfer the zero point to the control system.
The lamp lights up when the zero point is stored in the control system.
The set zero point is shown in the display.

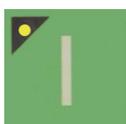


Set the required drilling depth by pressing the rotary switch/push-button

- Set the drilling depth (mm) by turning slowly or move the drill lever to the desired drilling depth and
- Push to apply the drilling depth in the control system.



The set drilling depth is shown on the display.



Press the push-button to start the machine.
The lamp lights when the drive is turned on and the spindle is rotated.



Use the three-arm-lever to slowly move the drill bit towards the workpiece by pressing down on the three-arm-lever.

Drill the through hole or blind hole in the workpiece.

As soon as the pre-set drilling depth is reached, a signal ("beep") sounds.

In addition, the drilling depth is shown in the display.

Then return the three-arm-lever back to its initial position.



Press the push-button to stop the machine.

The lamp lights up when the drive is off.

The machining operation is over.

6.5 Tapping with Depth Adjustment

Tapping is carried out with a tap suitable for the pre-drilled hole. As soon as the pre-set threading depth is reached, the direction of rotation of the spindle automatically reverses so that the tap is move out of the cut thread.



Use safety goggles

Always wear the necessary goggles when working on and with the machine!



Warning

Danger due to fast rotation of the drill spindle.

Fast rotation of the drill spindle can result in hair or clothing being pulled in. This can lead to serious injuries.

Therefore, during operation of the machine

- It is mandatory to wear a hairnet for long hair or a suitable headgear
- **Never** wear gloves, neckties, bracelets, finger rings, chains or other loose clothing.

Carry out all necessary work to prepare the machine (see section 5 *Before using the machine*).

Then the tap is clamped and the machine set to the required height.

Clamp the workpiece in the mounted vise.



Attention

Danger due to repeated loads.

The repeated lifting of heavy weights can lead to unfavourable body loads and rapid fatigue. When handling workpiece weights > 10 kg, use a suitable hoist for loading and unloading operations.

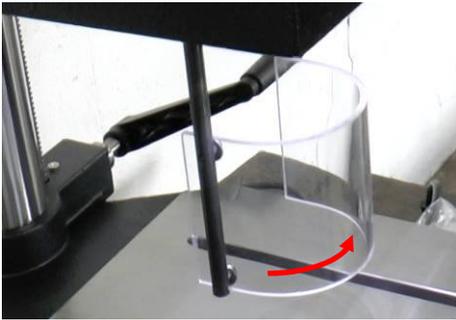


Unlock the emergency stop button. Only for 20,23,25 Plus

Then the control system is restarted and the display appears:



After starting the control system, the drilling type *Drilling* shall always be preselected.



Before starting the machine, swivel the drill guard into its protection position in front of the cutter. This will activate the protective switch, which releases the operation of the machine.



If necessary:

Press the push-button to select the drilling type *Tapping*. The lower right lamp lights when the *Tapping* mode is selected.



Select the appropriate speed for the inserted tap and workpiece by pressing the rotary switch/push-button

- Set the speed (rpm) by turning slowly and
- Apply the speed in the control system by pressing.



The set speed is shown in the display ($N_{max} = 800$ rpm).

Use the drill lever to slowly move the tap tip to the workpiece surface while pressing down on the drill lever.



Press the push-button to transfer the zero point to the control system. The lamp lights up when the zero point is stored in the control system. The set zero point is shown in the display.



Set the required tapping depth by pressing the rotary switch/push-button

- Set the tapping depth (mm) by turning slowly or
move the drill lever to the desired tapping depth and
- Push to apply the tapping depth in the control system.



The set tapping depth is shown on the display.



Press the push-button to start the machine.

The lamp lights when the drive is turned on and the spindle is rotated.



Note

Slightly correct the position of the spindle with the drill lever when cutting a thread. This will relieve the tensile force on the thread. This is especially important for soft materials.



Use the three-arm-lever to slowly move the tap towards the workpiece by pressing down on the three-arm-lever.

Cut the thread into the pre-drilled hole of the workpiece.

As soon as the pre-set threading depth is reached, the direction of rotation of the spindle automatically switches to counter clockwise rotation and the tap is moved out of the cut thread.

Then return the three-arm-lever back to its initial position.

As soon as the tap is moved out of the workpiece (displayed drilling depth -0.3 mm), the direction of rotation of the spindle changes back to a clockwise direction.



Press the push-button to stop the machine.

The lamp lights up when the drive is off.

The machining operation is over.

6.6 Changing Drilling Parameters

Changing speed

The spindle speed can be changed at any time during a process.

- Adjust the speed accordingly by pressing the rotary switch/push-button
 - Set the speed (rpm) by turning slowly and
 - Apply the speed in the control system by pressing.
- The set speed is shown in the display.



Changing the zero point

The zero point (workpiece surface) can be changed at any time during a process.

Use the drill lever to slowly move the tap tip to the workpiece surface while pressing down on the drill lever.

- Press the push-button to transfer the zero point to the control system.
- The lamp lights up when the zero point is stored in the control system.
- The set zero point is shown in the display.



Changing drilling or threading depth

Turn the rotary switch/push-button until the drilling depth parameter flashes. Set the required drilling/tapping depth by pressing the rotary switch/push-button

- Set the drilling/tapping depth (mm) by turning slowly
- or
- move the drill lever to the desired drilling/tapping depth and
- Push to apply the drilling/tapping depth in the control system.

The set drilling/tapping depth is shown on the display. After that, the speed adjustment of the control system will be activated again.



Setting spindle stop

In the control system you can basically set whether the spindle

- Remains permanently on after the machine start (until the machine stops) or
- Is switched off automatically after the drilling operation and reaching the upper spindle position. This can for example be useful for safety reasons.

In the basic setting, the spindle stop is switched off and can be set accordingly in the operator menus. Please see section 6.7 *Calling up the operator menu of the control system*.

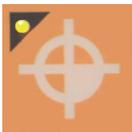
Setting piece counter

The control system is equipped with a piece counter. The piece counter counts the number of holes only when the machine is running. It always starts after the start of the machine with the number 0. As soon as the pre-set drilling depth is reached during a drilling operation, the piece counter is incremental by 1.



Note

As soon as the piece counter is reset to 0, the zero point is also reset. Therefore, check the zero point for further holes and adjust it if necessary.



- With the machine stopped, press the push-button for at least 3 seconds to set the piece counter to 0. This will reset the zero point, which then has to be readjusted if necessary.

6.7 Calling up the Operator Menu of the Control System

The control system has various operator menus, which are shown on the display and in which you can set parameters. For this, the machine must be in *Stop* mode.



Simultaneously press the two push-buttons to switch to the operator menu. After that, the operator menu appears on the display, which can be recognized by the ring spinner icon.



Select the desired submenu by turning the rotary switch/push-button slowly to select the submenu (highlighted in yellow). Please note the information in the following table.

Select the desired parameter of the submenu by pressing the rotary switch/push-button.



Press the push-button to exit the operator menu. Then the normal display appears on the display.



Submenu	Function	Setting
Version	Displays the software version loaded into the control system.	Display only, no setting possible.
Ser. No.	Displays the serial number of the control panel.	Display only, no setting possible.
Unit	Defines the measuring unit of the machine for zero point and drilling depth.	<ul style="list-style-type: none"> Measuring unit mm Measuring unit inch.
List of malfunctions	Displays all errors that have occurred.	Display only, no setting possible.
Spindle stop	Determines whether the spindle is switched off in the upper position after a drilling operation.	<ul style="list-style-type: none"> Spindle stop off. Spindle stop on.
Language	Sets the language of the display.	<ul style="list-style-type: none"> German English
Service password	Enables the input of the service password exclusively for FLOTT service technicians.	

7 Shutting Down the Machine

7.1 Switching the Machine Off



Warning

Danger due to faulty electrical connection.

Observe the electrical connection values in the operating manual and the rating plate when connecting the machine.

- Excessive connection voltage may cause operator injury and damage to the machine.
- If the connection voltage is too low, the machine motor may be damaged.
- The earthing contact plug has an earthing conductor and may only be replaced with an original component.

The system is switched off exclusively at the control panel of the machine.



1. Press the push-button to switch off the machine.
The spindle rotation is stopped and the display remains on.



2. Only for SB/TB/TBZ 20,23,25 Plus:
Turn the main On/Off switch to the **0** position to turn off the machine completely.
All control lamps, the drill light and the display are switched off.
3. Disconnect the earthing contact plug from the mains supply.
All control lamps, the drill light and the display are switched off.
4. Inspect the machine for contamination that may have been caused by the work process. Please observe the information in section 9 *Maintenance of the machine*.
5. Make sure that the protective hood is firmly attached to the machine. Under the protective hood there are components that carry residual voltage for a short time after disconnection from the mains supply. They need at least 15 min. to discharge independently.

Now you have shut down the machine correctly.

7.2 Press Emergency Stop of the Machine

The control panel emergency stop button is used by the operator as a safety switch while working on and with the machine.

You can use the emergency stop button to immediately stop all drives and movements of the machine in the event of imminent danger, regardless of the currently selected operating mode or function.

In the event of an interruption by emergency stop, the machine and the movements triggered by the actuation push-buttons are stopped immediately, i.e. they do not continue to move:



- Press the emergency stop button to stop the machine.
 - The control system and the control panel of the machine remain switched on
 - The drive motor and drill light are switched off.



Attention

You have shut down the machine for safety reasons. Before you switch the machine on again, you must eliminate (have eliminated) the cause of this interruption. Specialized work on the mechanics and electrics may only be carried out by technical staff.



Note

However, you should normally not use the emergency stop button to shut down the machine (normal shutdown), since this immediately stops the controlled movement of the machine.

Always press the emergency stop button only in case of danger or to reset the control system.

The emergency stop button is self-locking. This means that you cannot operate the machine until you have eliminated the cause for the interruption and unlocked the actuated emergency stop button.

7.3 Measures Before Maintenance and Repair



Danger

Danger by electric voltage.

Maintenance work on electrical components may only be carried out by authorized personnel (electricians). Make sure that the electrical equipment of the machine is de-energized for the period of maintenance.

Wait at least 15 minutes before removing the protective hood of the machine. The DC bus capacitors must first discharge themselves independently during this period.

maintenance and repair are activities that require special attention and safety. Therefore, the necessary precautions for yourself and others must be taken to work safely:

1. Inform the operating personnel about the extent and period of maintenance and repair work on the machine.
2. Appoint a specialist for the respective task, who will supervise and be responsible during the maintenance or servicing.
3. During maintenance or servicing work, shut down the machine appropriately (see section 7 *Switching the machine off*) and secure the machine against restart by
 - Pressing the emergency stop button only after shutting down the machine for safety reasons and
 - Attach a warning label indicating the work to be performed on the control panel,
 - Cordon off the respective danger zone (e.g. with red-white safety tape).

8 Troubleshooting

8.1 Error Messages on the Display

With the help of the control system, you can display a number of possible faults on the control panel.



Warning

Danger due to improper troubleshooting.

Improper troubleshooting can result in danger to the operating staff and to the machine.

Specialized work on the mechanics and electrics may only be carried out by technical staff.

Error text	Cause	Remedy
Drill guard active	Drill guard is not in its protection position.	Swing the drill guard into the protective position in front of the cutter and confirm with the rotary switch/push-button.
Machine does not work	<ul style="list-style-type: none"> Power plug is not plugged in. Emergency stop button is pressed. 	<ul style="list-style-type: none"> Plug in power plug. Unlock emergency stop button. <p>If this does not help:</p> <ul style="list-style-type: none"> Acknowledge with or rotary switch/push-button or Restart the machine or Contact FLOTT Service.
Display off	Machine is in standby mode.	<p>Acknowledge with the rotary switch/push-button.</p> <p>If this does not help:</p> <ul style="list-style-type: none"> Restart the machine or Contact FLOTT Service.
	<p>Line 1: Machine status</p> <p>Line 2: Error code</p> <p>Line 3: Code from FC</p> <p>Line 4: Cause.</p>	<p>Acknowledge with the rotary switch/push-button.</p> <p>If this does not help:</p> <ul style="list-style-type: none"> Restart the machine or Contact FLOTT Service.

8.2 Other Malfunctions and Remedies

The following table shows further faults and their elimination, which are not shown on the display.



Warning

Danger due to improper troubleshooting.

Improper troubleshooting can result in danger to the operating staff and to the machine.

Specialized work on the mechanics and electrics may only be carried out by technical staff.

Fault	Cause	Remedy
Display is off	Machine is in standby mode	Press the rotary switch/push-button
Machine is not running	<ul style="list-style-type: none"> ● Power connection defective ● Drill guard not activated ● Control panel defective ● Frequency converter defective ● Motor defective 	<ul style="list-style-type: none"> ● Check mains connection ● Activate drill guard ● Replace control panel ● Replace FC ● Replace motor
Machine is running, but low rotation or drilling capacity	<ul style="list-style-type: none"> ● Too low tension of ribbed V-belt ● Ribbed V-belt contaminated 	<ul style="list-style-type: none"> ● Tension the ribbed V-belt again ● Clean ribbed V-belts and pulleys
Unusually loud operating noises of the drive	<ul style="list-style-type: none"> ● Too low or too high tension of the ribbed V-belt ● Loosened pulleys 	<ul style="list-style-type: none"> ● Tension the ribbed V-belt again ● Secure pulleys
Drill runs out of true	<ul style="list-style-type: none"> ● Drill chuck not correctly mounted ● Clamping jaws of the chuck defective ● Spindle is defective 	<ul style="list-style-type: none"> ● Reinstall drill chuck ● Replace drill chuck ● Replace spindle
Drill generates sparks or smokes	<ul style="list-style-type: none"> ● Speed not suitable for the drill ● Poor swarf removal ● Drill is blunt or broken ● Drill requires coolant or lubricant ● Feed too low 	<ul style="list-style-type: none"> ● Adjust the speed according to the manufacturer's instructions ● Lift drill and remove swarf ● Sharpen or replace drills ● Use coolant or lubricant ● Increase feed
Drill has jammed in the work-piece	<ul style="list-style-type: none"> ● Feed too high ● Poor swarf removal 	<ul style="list-style-type: none"> ● Reduce feed ● Lift drill and remove swarf

8.3 Release of the Machine After a Fault



Warning

Danger due to improper troubleshooting.

Improper troubleshooting can result in danger to the operating staff and to the machine.

Specialized work on the mechanics and electrics may only be carried out by technical staff.

If required or specified:

Call qualified and authorized personnel and have the cause of the fault eliminated.

The error message will disappear on the control panel automatically as soon as the cause has been eliminated.

If further error messages appear on the control panel, you must proceed as described in operational step 1.

The machine is now released and can be used (see section 6 *Operating the machine*).

9 Maintenance of the Machine

9.1 Inspection and Maintenance Intervals

The following list for regular maintenance gives an overview of the minimum scope of works required to ensure trouble-free operation. It depends on the respective operating conditions and the utilization of the machine whether and to what extent further care and maintenance is required.

Maintenance work may only be carried out by technically trained personnel under careful observance of all necessary accident prevention regulations. It is also essential to observe the information in section *7.3 Measures before maintenance and repair*.

The following general inspection and maintenance work must be carried out in compliance with the safety regulations at regular intervals (daily if necessary) depending on the operating conditions or during maintenance work on the machine:

- All external machine areas and components must be cleaned regularly from dust and dirt.
- In particular, the machine area where swarf is produced, must be cleaned regularly. To do this, the swarf can be removed by hand brush.
- Regularly check the cutters used for wear and replace if necessary (see the documentation of the manufacturer).
- The parts of the machine that are not easy to access should be carefully cleaned with compressed air, possibly with a bellows. (Vacuuming is better, but not always practicable).
- All connection screws must be checked for tightness. All connection terminals for the control lines on devices and terminal strips must also be checked.
- The function of all lamps of the control panel and the drilling light must also be checked (see the documentation of the manufacturer).
- An important measure is the examination of the protection system. It must be carried out in accordance with VDE regulation 0100 or comparable national regulations.
- All monitoring equipment must be checked for responsiveness.
- All safety devices must be checked for responsiveness.
- The bearings of the drive motor must be maintained according to the operating manual (see the documentation of the manufacturer).
- If cooling air is sucked in through filters, the filter must be cleaned or replaced if necessary (see the documentation of the manufacturer).
- All warning and information signs must be checked for completeness and cleanliness, if necessary replaced or cleaned.

Maintenance interval								Assembly group	Maintenance activities	
yearly	six-monthly	quarterly	monthly	weekly	daily	in case of fail- ure				
						■	Machine in general	 <p>Danger Before starting any maintenance or cleaning work, you must shut down the machine (see section 7 <i>Shutting down the machine</i>).</p>		
						■			Free the machine from swarf. Use a hand brush.	
						■			Free machine and area around the machine from cooling lubricants.	
			■						Check drilling table for wear. Lightly oil with spray oil.	
				■					Clean the pillar. Lightly oil with spray oil.	
				■					Clean toothed rack. Grease with machine	
				■					Move the quill to the lowest position, clean it and lightly oil it. Lubricate the teeth of the quill.	
				■					Clean the control panel.	
					■				The function of all lamps of the control panel and the drill lights must be checked.	
					■				Check function of emergency stop button.	
					■				Check function of drill guard.	
Observe instructions of the manufacturer										Check wear and function of spindles/drill chuck, replace if necessary.
Observe instructions of the manufacturer										Check function of the inserted workpiece holders (vise, clamping jaws, ...), replace if necessary.
Observe instructions of the manufacturer										Check cutters regularly for wear, replace if necessary.
	■								All connection screws must be checked for tightness.	
				■			Clean the machine from dust and dirt. The parts that are not easy to access should be carefully cleaned with compressed air; it may be sufficient to use a bellows. (Vacuuming is better, but not always practicable).			
			■				Check all warning and information signs for completeness and cleanliness, clean or replace if necessary.			
	■						Drive			
	■					■		Check external condition of drive unit.		
	■					■		Check the condition of the pulleys.		
						■	Check condition, tension and fit of ribbed V-belt.			
					■		Electricity			
				■				Check the presence and secure function of the protective hood.		
				■				Check the integrity of the connecting cable and the earthing contact plug.		
	■							All connection terminals for the control cables on devices and terminal strips must also be checked.		
						■	Replace control panel.			

9.2 Dismantling Drill Chuck



Danger

Danger due to unintentional start-up of the machine.

You must shut down the machine prior to starting any maintenance or cleaning work.



Attention

Damage to the spindle or drill chuck.

Make sure that when dismantling the chuck, it does not fall onto the drilling table or vise. This can cause damage to components and render them unsuitable for further use.

Switch off the machine (see section 7.1 *Switching the machine off*).

Swivel the drill guide to the left side.

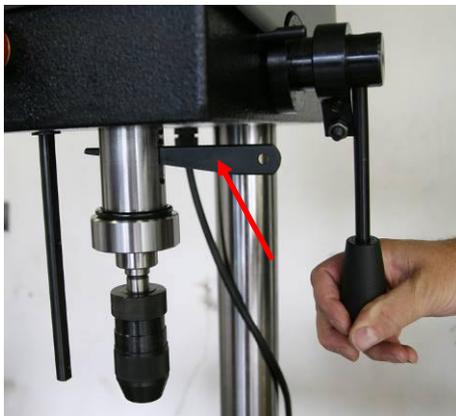


Attention

Danger due to hot cutter.

The cutter may still be hot after use. Cool the cutter with coolant or remove it with a protective glove.

First, remove the cutter from the chuck before disassembling the chuck.



Turn the drill lever down until the lateral pin openings are visible.

Hold the drill lever in this position.

Hold the drill chuck tight with one hand so that it does not fall onto the drilling table or vise after dismantling and is damaged.

Insert the pin punch through the side opening of the quill. Make sure the rounded side is at the top.



Attention

Damage to the quill.

Pay attention to the correct insertion of the pin punch in the quill. Never move the quill with the drill level turned up when the pin punch is inserted to loosen the chuck. This will damage the quill and may render the machine unsuitable for further use.

Gently tap the end of the pin punch with a hammer, this will release the chuck from the spindle.

Remove the chuck.

Check the drill chuck and spindle for dirt, wear or damage.

9.3 Installing/Removing the Protective Hood

In order to carry out the various maintenance and repair work on the electrical system and the drive unit, the protective hood of the machine must be dismantled.



Danger

Danger by electric voltage.

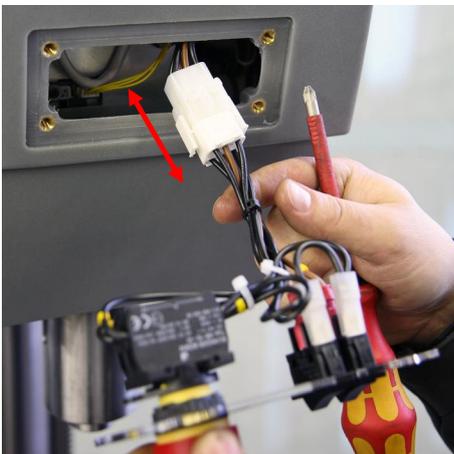
Maintenance work on electrical components may only be carried out by authorized personnel (electricians). Make sure that the electrical equipment of the machine is de-energized for the period of maintenance.

Wait at least 15 minutes before removing the protective hood of the machine. The DC bus capacitors must first discharge themselves independently during this period.

9.3.1 Removing the Protective Hood

Wait at least 15 minutes before removing the protective hood. Only then will the capacitors be discharged under the protective hood.

In the area of the spindle, loosen the size 4 hexagon socket screw to remove the three-arm-lever.



Loosen the 4 P screws on the lower control panel (emergency stop button).

Pull the control panel out of the housing until the plug connection is reached.

Loosen the plug connection by pressing on the outer wings and pulling the two connectors apart at the same time.

Deposit the dismantled control panel.

Insert the plug back into the protective hood.



Loosen the 4 Phillips screws of the upper control panel (display).

Pull the control panel out of the housing until the plug connections are reached.

Loosen the two plug connectors by

- pressing on the release hook and
- removing the plug.

Deposit the dismantled control panel.

Insert the plugs back into the protective hood.



Loosen the drilling depth limiter with a WAF13 hexagon wrench and remove it.



Remove the 2 side Phillips screws from the protective hood.



Tilt the protective hood slightly forward and pull it down from the machine head.

Deposit the protective hood.

The protective hood is now dismantled so that the required maintenance and repair work on the electrical system and the drive unit can be carried out.

9.3.2 Installing the Protective Hood



Put the protective hood slightly tilted forward on the machine head.

Feed the connection cables for the control panels through the individual openings of the protective hood.

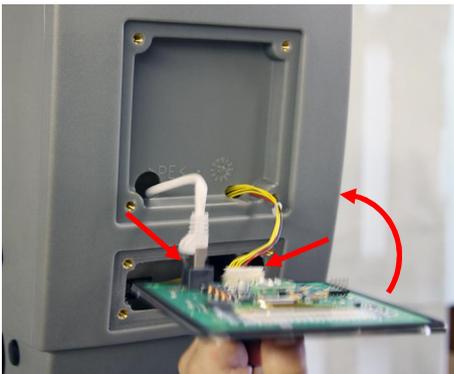
Lower the protective hood onto the machine head and make sure that it fits correctly.



Insert the 2 side Phillips screws into the protective hood and tighten them by hand.



Use an SW13 hexagon wrench to screw in the drilling depth limiter on the right side of the protective hood.



Plug in

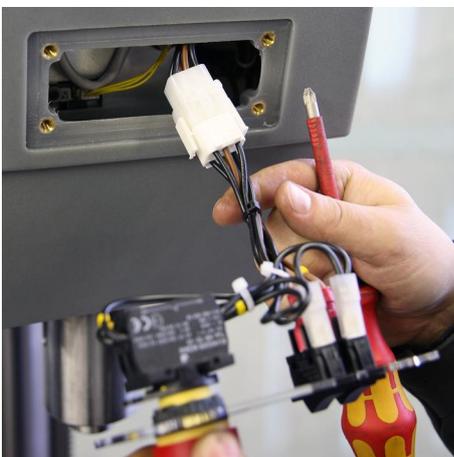
- the power plug and
- the multipolar connector

into the respective connector sockets on the back of the upper control panel.

Place the control panel in the upper insert of the protective hood.



Attach the control panel to the protective hood using the 4 Phillips screws.



Insert the multipolar plug into the connector socket on the back of the lower control panel.

Place the control panel in the lower insert of the protective hood.



Attach the control panel to the protective hood using the 4 Phillips screws.

9.3.3 Spiralfeder austauschen



1. Wait at least 15 minutes before removing the protective hood. Only then will the capacitors be discharged under the protective hood.
2. Remove the large black protective plug on the left side of the protective hood. Under it there is the spiral spring of the three-arm-lever.
3. Pinole in oberer Stellung mittels An-schlags festsetzen.
4. Loosen the spiral spring of the three-arm-lever by
 - fixing the clamping flange with the WAF19 hexagon wrench
 - and using the size 6 hexagon wrench to loosen the spiral spring.
5. Remove the spiral spring from the protective hood and insert a new spiral spring, observing the correct installation direction of the spiral spring winding. *Caution, spiral spring winding clockwise!*
6. Slightly tighten the hexagon socket screw of the assembly by hand. Clamp the spiral spring approx. ½ turn clockwise with the WAF19 hexagon wrench. Attach the spiral spring with the clamping flange of the three-arm-lever using the size 6 hexagon wrench to tight-en the spiral spring.
7. Insert the large black protective plug on the left side of the protective hoods.

9.4 Tensioning or Replacing Ribbed V-belt

In order to carry out the various maintenance and repair work on the electrical system and the drive unit, the protective hood of the machine must be dismantled.



Danger

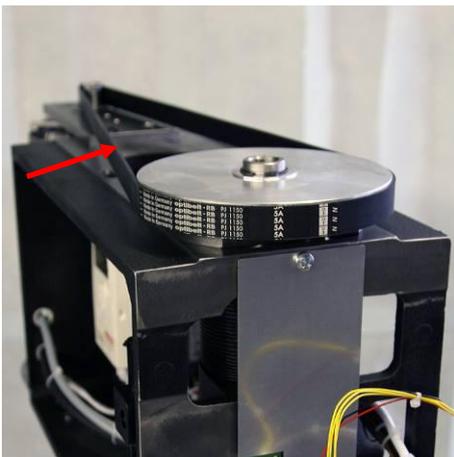
Danger by electric voltage.

Maintenance work on electrical components may only be carried out by authorized personnel (electricians). Make sure that the electrical equipment of the machine is de-energized for the period of maintenance.

Wait at least 15 minutes before removing the protective hood of the machine. The DC bus capacitors must first discharge themselves independently during this period.



Remove the protective hood from the machine head (see section 9.3 *Installing/removing the protective hood*). After that, the complete drive area incl. frequency converter will be accessible.



First check the condition and tension of the ribbed V-belt. The ribbed V-belt

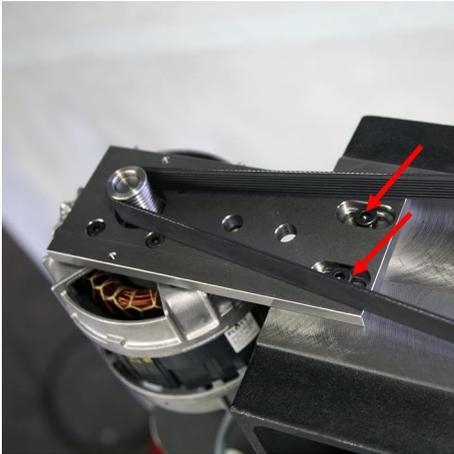
- Must be aligned on both pulleys. A misaligned ribbed V-belt will be very quickly worn or damaged.
- Must not be scratched, frayed or cracked over the entire circumference.
- Must have sufficient tension.
The correct tension is given if the ribbed V-belt between the pulleys can be pressed in 3–5 mm and the front pulley can still be turned by hand.

Also check the two pulleys for damage and wear.

If you notice when checking that the ribbed V-belt

- Is not tensioned correctly, it must be tightened.
- Is damaged, it must be replaced by a new one.

For all SB/TB/TBZ 18/20/23 Plus types



On the top of the motor bracket, loosen the two hexagon socket screws to loosen the motor and rear pulley. This will relieve the tension of the ribbed V-belt.

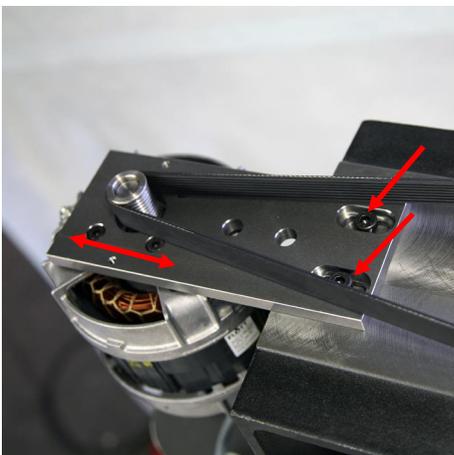


Note

Please note that only original spare parts from the manufacturer may be used. If you use other spare parts, the manufacturer gives no warranty and is not liable for functionality and safety of the machine.

If necessary:

Remove the damaged ribbed V-belt and replace it by a new one. When installing the new ribbed V-belt, make sure it is seated correctly and in alignment on both pulleys.



Clamp the ribbed V-belt in by

- slightly pushing the drive motor backwards with one hand
- checking the tension of the ribbed V-belt with the other hand.

The tension is correct if the ribbed V-belt between the pulleys can be pressed in 3-5 mm.

Tighten the two hexagon socket screws on the top of the motor bracket.

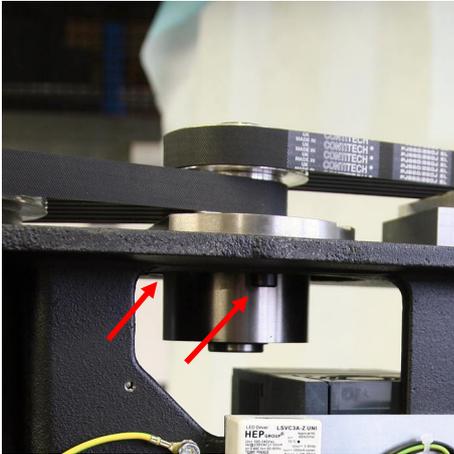
Then check that the ribbed V-belt is seated correctly and runs smoothly when turning the front pulley by hand.

Install the protective hood prior to using the machine again (see section 9.3 *Installing/removing the protective hood*).

The ribbed V-belt is now replaced (if necessary) and correctly tensioned.

Only for SB/TB/TBZ 23/25 Plus types

In these machine types, 2 ribbed V-belts are installed on 3 axles so that 2 ribbed V-belts must be tensioned if necessary. If the front ribbed V-belt is tensioned, the rear ribbed V-belt must also be tightened.



On the underside of the central axle bearing, loosen the two size 6 hexagon socket screws to remove the axle together with the transmission belt pulley. This will relieve the tension of the ribbed V-belts.



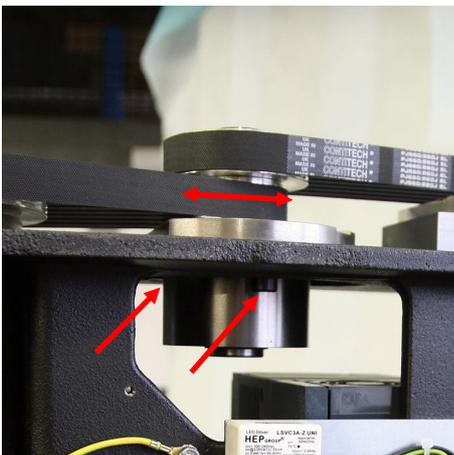
Note

Please note that only original spare parts from the manufacturer may be used. If you use other spare parts, the manufacturer gives no warranty and is not liable for functionality and safety of the machine.

If necessary:

Remove the damaged ribbed V-belt and replace it by a new one.

When installing the new ribbed V-belt, make sure it is seated correctly and in alignment on both pulleys.



Clamp the ribbed V-belt in by

- slightly pushing the middle axle bearing backwards with one hand,
- checking the tension of the ribbed V-belt with the other hand.

The tension is correct if the ribbed V-belt between the pulleys can be pressed in 3-5 mm.

Tighten the two hexagon socket screws on the underside of the middle axle bearing.

Then check that the ribbed V-belt is seated correctly and runs smoothly when turning the front pulley by hand.

Then also clamp the rear ribbed V-belt (see section 9.4 For all SB/TB/TBZ 23 Plus type).

The ribbed V-belts are now replaced (if necessary) and correctly tensioned.

9.5 Replacing Control Panels

In the event that the control panel or button of the control panel are defective, the control panel must be replaced as a whole.



Danger

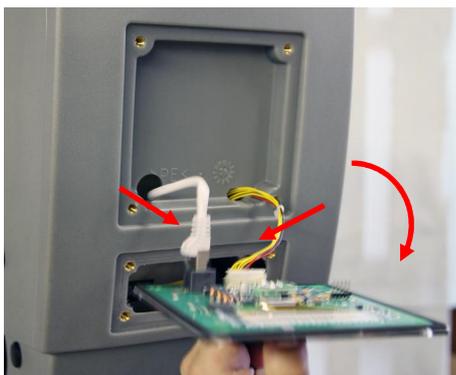
Danger by electric voltage.

Maintenance work on electrical components may only be carried out by authorized personnel (electricians). Make sure that the electrical equipment of the machine is de-energized for the period of maintenance.

Wait at least 15 minutes before replacing any electrical components. The DC bus capacitors must first discharge themselves independently during this period.

Switch off the machine (see section 7.1 *Switching the machine off*, page 55).

Loosen the 4 Phillips screws on the control panel and remove them.



Tilt the control panel slightly from the protective hood and hold it with one hand.

Remove with the other hand

- the power plug and
- the multipolar connector

by pressing the release button on the connector and pulling it off.

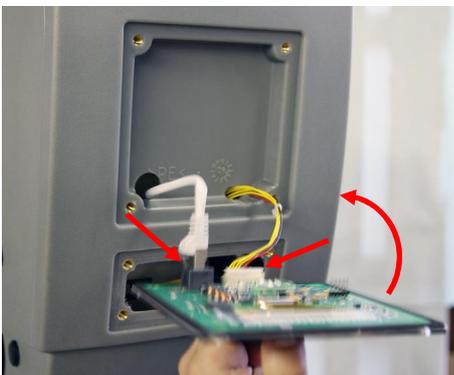


Note

Please note that only original spare parts from the manufacturer may be used. If you use other spare parts, the manufacturer gives no warranty and is not liable for functionality and safety of the machine.



Remove the control panel and replace it with a new one.



Plug in

- the power plug and
- the multipolar connector

into the respective connector sockets on the back of the control panel.

Place the control panel in the insert of the protective hood.



Attach the control panel to the protective hood using the 4 Phillips screws.



The control panel is now replaced, mounted and can be used again.

The lower control panel (emergency stop button) is replaced in the same way.

9.6 Lubrication Schedule



9.7 Repair

Most of repair work requires special knowledge of materials, components, test stands and equipment. Therefore, this work must only be carried out in consultation with the manufacturer.



Danger

Danger by electric voltage.

Repair work on electrical components may only be carried out by authorized personnel (electricians).

- Make sure that the electrical equipment of the system is de-energized for the period of repair.
- Changes in the circuit logic are only permitted by the manufacturer.



Danger

Danger due to improper work on and with the system.

- The repair of the system may only be carried out by instructed and trained personnel using original spare parts.
- Do not dismantle safety devices of the system. If dismantling of safety devices cannot be avoided during repair, you must reinstall the safety devices and check their function.
- Prior to restarting after repair measures, check all safety devices.



Note

If the equipment is damaged for unforeseen reasons, the manufacturer must be consulted before the repair.



Note

It is also essential to observe the repair instructions in the third-party documentation of the product manufacturer.



Note

Danger to the environment due to incorrect disposal.

Prepare suitable receptacles and containers to collect leaking or spilled operating materials (e.g., cooling lubricants). Dispose of all used equipment, auxiliary materials and replacement parts in a safe and environmentally friendly manner. Observe the respective regulations and laws for the protection of the environment.

10 Spare Parts List and Drawings

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 18 Plus	TB 18 Plus	TBZ 18 Plus
1	1	Protective hood	218321	218321	218321
1	2	Control panel *	212581	212581	212581
		Knob *	212608	212608	212608
1	3	Emergency stop push-button *	010053	010053	010053
1	3	Toggle switch *	009461	009461	009461
1	3	Small front plate	218322	218322	218322
1	3	Cable harness *	218378	218378	218378
1	4	Head	223051	223051	223051
1	4	Adapter	218391	218391	218391
1	5	Replacement sight protection	218366	218366	218366
1	5	Drill guard bracket	290817	290817	290817
1	5	Clamping jaws (1 pair)	009603	009603	009603
1	5	Cylinder head screw M6x16-DIN 912	004845	004845	004845
1	6	Arm	201103	201103	–
1	7	Toothed rack	218402	218411	218411
1	8	Pillar	218401	218406	218406
1	9	Stand pillar	140102	–	–
1	10	Stand plate	140101	–	–
1	11	Table foot	–	201122	201143
1	12	Machine cabinet (option)	–	–	201160

* Wear part

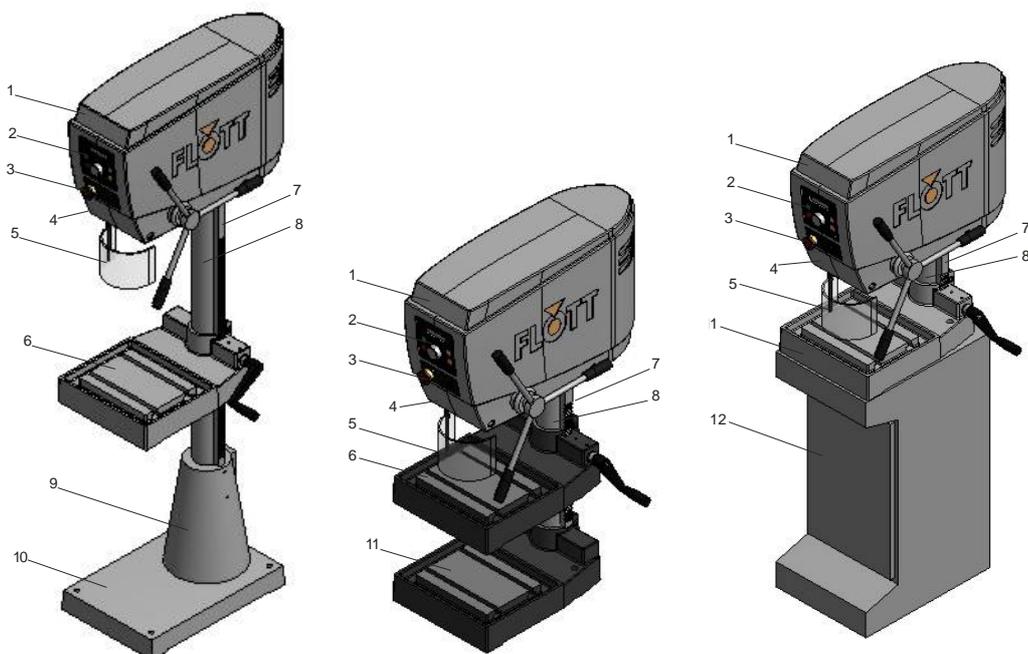


Fig. 1: SB/TB/TBZ P18 Plus

This does not apply to parts no longer manufactured

Order number

due to technical innovations!

Fig.	Item	Designation	SB 18 Plus	TB 18 Plus	TBZ 18 Plus
2	1	Bolt *	169243	169243	169243
2	2	Worm wheel *	169254	169254	169254
2	3	Worm complete * (incl. adjusting ring, bush and clamping sleeve)	200115	200115	200115
2	4	Funnel lubrication nipple * DIN 3405-D8	007534	007534	007534
2	5	Hand crank	009657	009657	009657
2	–	Clamping lever	009200	009200	009200
2	6	Spindle Mk2 *	201342	201342	201342
2	7	Bump stop *	201343	201343	201343
2	8	Grooved ball bearing DIN 625 * 25x52x15 – 6205 2Z	007137	007137	007137
2	9	Quill *	201341	201341	201341
2	10	Locknut self-locking M20x1.5	009797	009797	009797
2	11	Lamellar plugs	009731	009731	009731
2	12	Clamping flange	205664	205664	205664
2	13	Spiral spring *	205363	205363	205363
2	14	Pinion shaft *	218380	218380	218380
2	15	Drilling depth limiter compl. *	212545	212545	212545
2	16	Cylindrical knob *	009206	009206	009206
2	17	Drill lever	280390	280390	280390
2	18	Threaded pin DIN 915, M8x16 *	005809	005809	005809
2	19	Cylinder head screw DIN 912, M8x45 *	006554	006554	006554

* Wear part

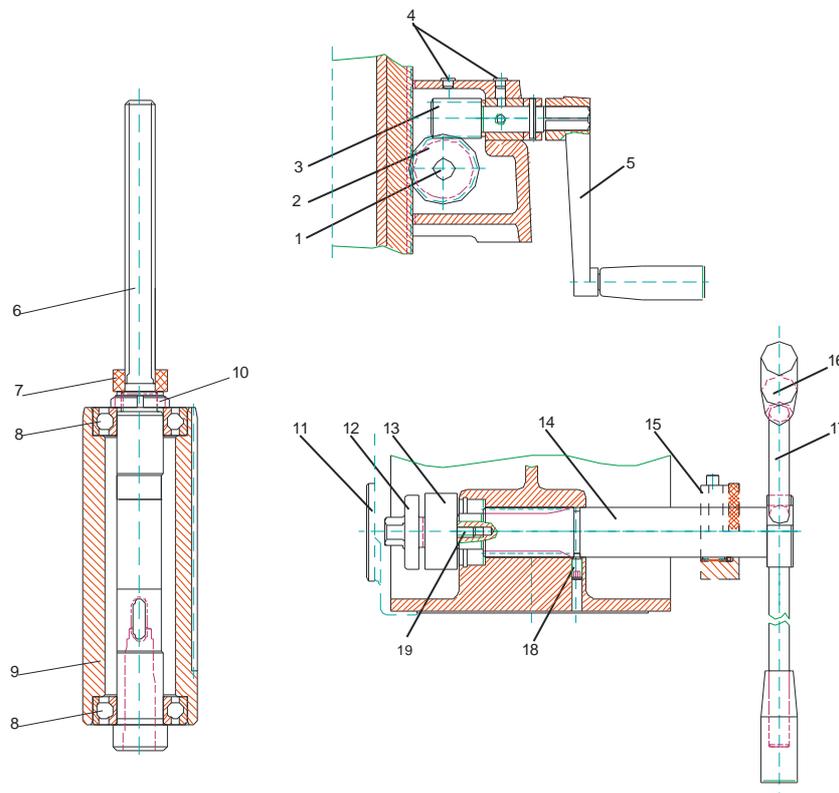


Fig. 2: SB/TB/TBZ P18 Plus

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 18 Plus	TB 18 Plus	TBZ 18 Plus
3	1	Motor holding bracket	223084	223084	223084
3	2	Motor 0,75 kW	212791	212791	212791
3	2	frequency converter	218376	218376	218376
3	3	Flange bearing	201401	201401	201401
3	4	Grooved ball bearing DIN 625 * 30x62x16 – 6205 2Z	006793	006793	006793
3	5	Running bush	218351	218351	218351
3	6	Spindle pulley	218421	218421	218421
3	7	Ribbed V-belt DIN 7867 * 8PJx1080 mm	010152	010152	010152

* Wear part

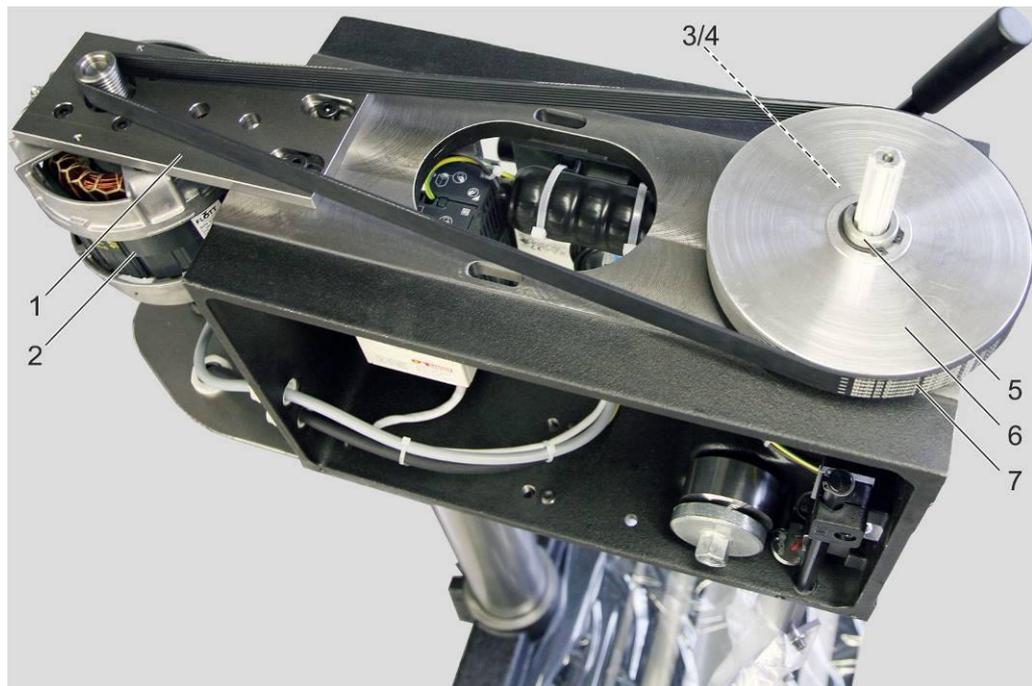


Fig. 3: SB/TB/TBZ P18 Plus

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 20 Plus SB FB Plus	TB 20 Plus	TBZ 20 Plus
1	1	Protective hood	218321	218321	218321
1	2	Control panel *	212581	212581	212581
		Knob *	212608	212608	212608
1	3	Emergency stop push-button *	010053	010053	010053
1	3	Toggle switch *	009461	009461	009461
1	3	Small front plate	218322	218322	218322
1	3	Cable harness *	218378	218378	218378
1	4	Head	223051	223051	223051
1	4	Adapter	218391	218391	218391
1	5	Replacement sight protection	218366	218366	218366
1	5	Drill guard bracket	290817	290817	290817
1	5	Clamping jaws (1 pair)	009603	009603	009603
1	5	Cylinder head screw M6x16-DIN 912	004845	004845	004845
1	6	Arm	201103	201103	–
1	7	Toothed rack	218402	218411	218411
1	8	Pillar	218401	218406	218406
1	9	Stand pillar	140102	–	–
1	10	Stand plate	140101	–	–
1	11	Table foot	–	201122	201143
1	12	Machine cabinet (option)	–	–	201160

* Wear part

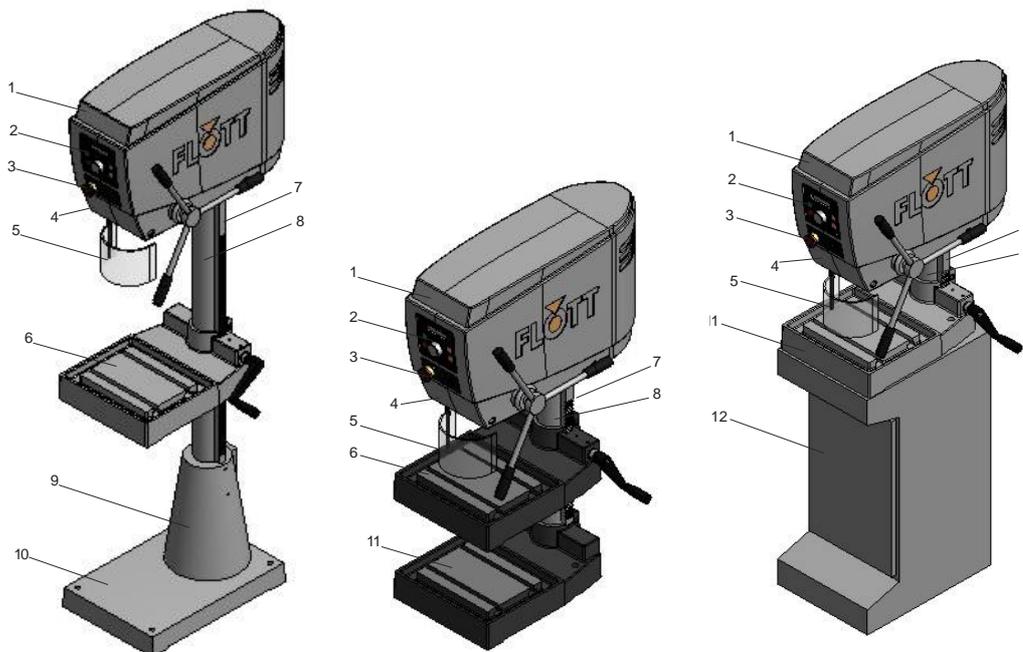


Fig. 1: SB/TB/TBZ P20 Plus

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 20 Plus SB 20 FB Plus	TB 20 Plus	TBZ 20 Plus
2	1	Bolt *	169243	169243	169243
2	2	Worm wheel *	169254	169254	169254
2	3	Worm complete * (incl. adjusting ring, bush and clamping sleeve)	200115	200115	200115
2	4	Funnel lubrication nipple * DIN 3405-D8	007534	007534	007534
2	5	Hand crank	009657	009657	009657
2	–	Clamping lever	009200	009200	009200
2	6	Spindle Mk2 *	201342	201342	201342
2	7	Bump stop *	201343	201343	201343
2	8	Grooved ball bearing DIN 625 * 25x52x15 – 6205 2Z	007137	007137	007137
2	9	Quill *	201341	201341	201341
2	10	Locknut self-locking M20x1.5	009797	009797	009797
2	11	Lamellar plugs	009731	009731	009731
2	12	Clamping flange	205664	205664	205664
2	13	Spiral spring *	205363	205363	205363
2	14	Pinion shaft *	218380	218380	218380
2	15	Drilling depth limiter compl. *	212545	212545	212545
2	16	Cylindrical knob *	009206	009206	009206
2	17	Drill lever	280390	280390	280390
2	18	Threaded pin DIN 915, M8x16 *	005809	005809	005809
2	19	Cylinder head screw DIN 912, M8x45 *	006554	006554	006554

* Wear part

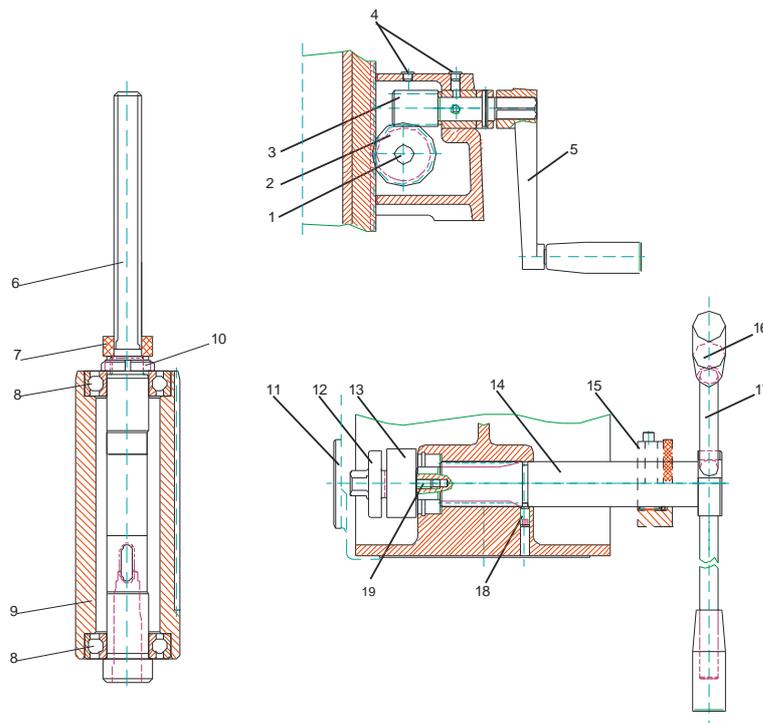


Fig. 2: SB/TB/TBZ P20 Plus (R1/R2)

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 20 Plus SB 20 FB Plus	TB 20 Plus	TBZ 20 Plus
3	1	Motor holding bracket	223084	223084	223084
3	–	Frequency converter 1.5 kW *	223091	223091	223091
3	2	Motor 1.5 kW	223131	223131	223131
3	3	Flange bearing	201401	201401	201401
3	4	Grooved ball bearing DIN 625 * 30x62x16 mm 6206-2Z	006793	006793	006793
3	5	Running bush *	218351	218351	218351
3	6	Spindle pulley	220136	220136	220136
3	7	Ribbed V-belt DIN 7867 * 8PJx1080 mm	010152	010152	010152

* Wear part

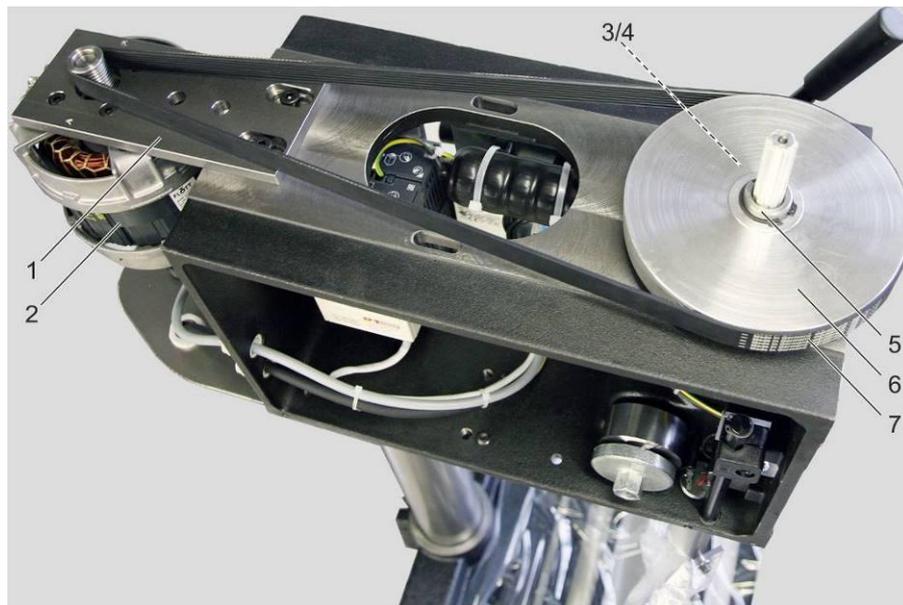


Fig. 3: SB/TB/TBZ P20 Plus

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 23 Plus R1/R2	TB 23 Plus R1/R2	TBZ 23 Plus R1/R2
1	1	Protective hood	218321	218321	218321
1	2	Control panel *	212581	212581	212581
		Knob *	212608	212608	212608
1	3	Emergency stop push-button *	008677	008677	008677
1	3	Toggle switch *	009461	009461	009461
1	3	Small front plate	218322	218322	218322
1	3	Cable harness	223092	223092	223092
1	4	Head	223051	223051	223051
1	4	Adapter	205316	205316	205316
1	5	Replacement sight protection *	218366	218366	218366
1	5	Drill guard bracket	290817	290817	290817
1	5	Clamping jaws (1 pair)	009603	009603	009603
1	5	Fillister head screws DIN 912, M6x16	004845	004845	004845
1	5	Micro limit switch *	008537	008537	008537
1	6	Arm	205103	205103	–
1	7	Toothed rack	205109	201144	201144
1	8	Pillar	205116	205121	205121
1	9	Stand pillar	205106	–	–
1	10	Stand plate	205105	–	–
1	11	Table foot	–	205143	–
1	12	Machine cabinet (option)	–	205160	205160
1	13	Main switch	208040	208040	208040
1	18	Air protection *	007908	007908	007908

* Wear part

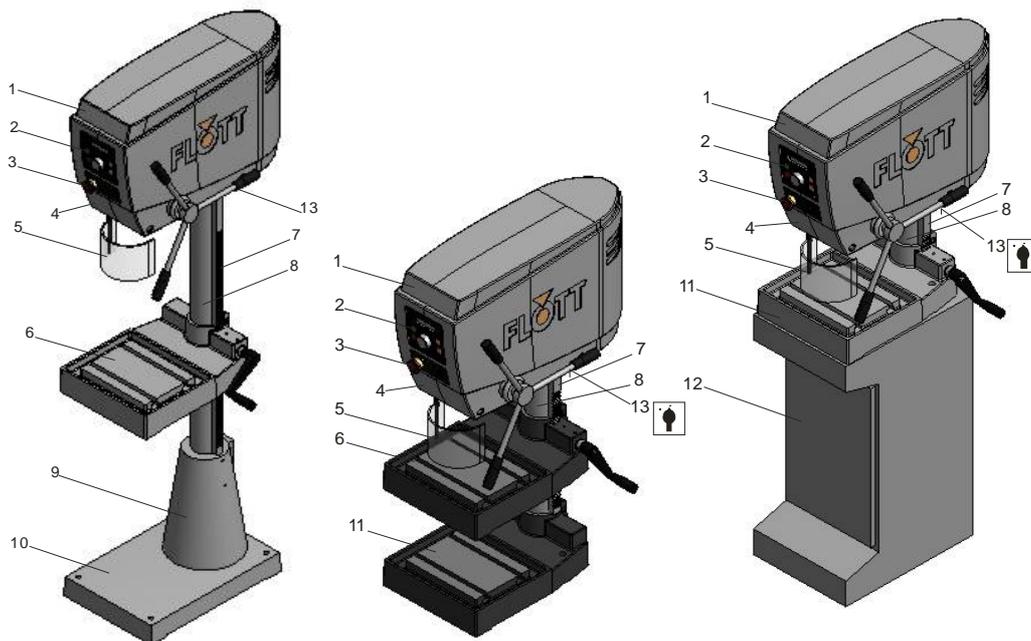


Fig. 1: SB/TB/TBZ P23 Plus (R1/2)

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 23 Plus R1/R2	TB 23 Plus R1/R2	TBZ 23 Plus R1/R2
2	1	Bolt *	169243	169243	169243
2	2	Worm wheel *	169254	169254	169254
2	3	Worm complete * (incl. adjusting ring, bush and clamping sleeve)	200115	200115	200115
2	4	Funnel lubrication nipple * DIN 3405-D8	007534	007534	007534
2	5	Hand crank	009657	009657	009657
2	–	Clamping lever	009200	009200	009200
2	6	Spindle Mk2 *	201342	201342	201342
2	7	Bump stop *	201343	201343	201343
2	8	Grooved ball bearing DIN 625 * 25x52x15 – 6205 2Z	007137	007137	007137
2	9	Quill *	201341	201341	201341
2	10	Locknut self-locking M20x1.5	009797	009797	009797
2	11	Lamellar plugs	009731	009731	009731
2	12	Clamping flange	205664	205664	205664
2	13	Spiral spring *	205363	205363	205363
2	14	Pinion shaft *	218380	218380	218380
2	15	Drilling depth limiter compl. *	212545	212545	212545
2	16	Cylindrical knob *	009206	009206	009206
2	17	Drill lever	280390	280390	280390
2	18	Threaded pin DIN 915, M8x16 *	005809	005809	005809
2	19	Cylinder head screw DIN 912, M8x45 *	006554	006554	006554

* Wear part

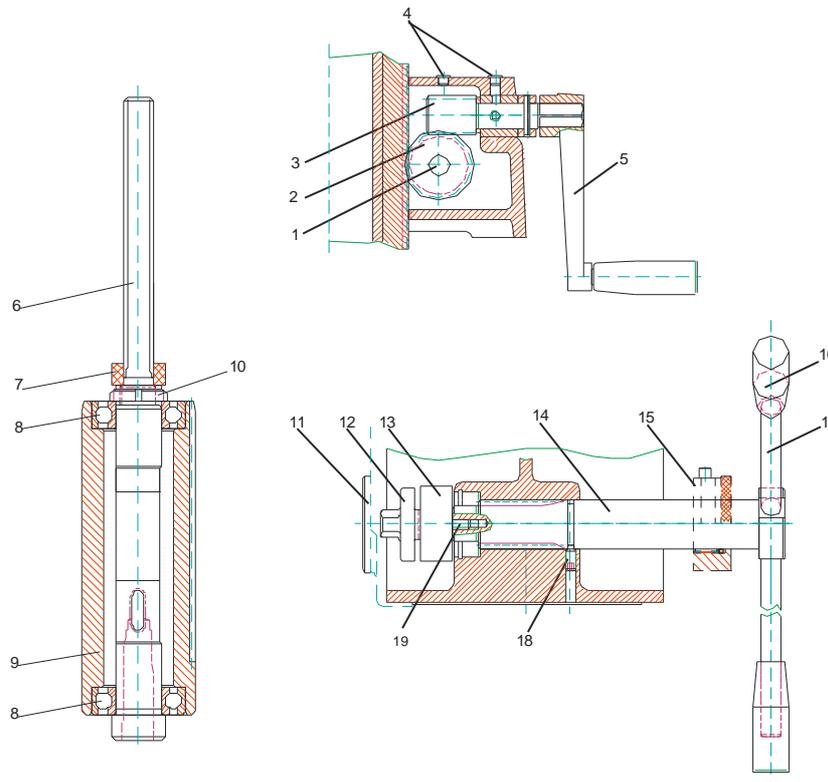


Fig. 2: SB/TB/TBZ P23 Plus (R1/R2)

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 23 Plus R1	TB 23 Plus R1	TBZ 23 Plus R1
3	1	Frequency converter 1.5 kW *	223091	223091	223091
3	1	Motor 1.5 kW	223131	223131	223131
3	2	Motor holding bracket	223084	223084	223084
3	3	Ribbed V-belt DIN 7867 * 8PJx660 mm	010103	010103	010103
3	4	Intermediate pulley D72.5/46.7	223074	223074	223074
3	5	Intermediate shaft	223071	223071	223071
3	6	Ribbed V-belt DIN 7867 * 8PJx610 mm	010170	010170	010170
3	7	Spindle pulley	218421	218421	218421
3	8	Running bush *	218351	218351	218351
3	9	Flange bearing	201401	201401	201401
3	9	Grooved ball bearing DIN 625 * 30x62x16 – 6205 2Z	006793	006793	006793

* Wear part

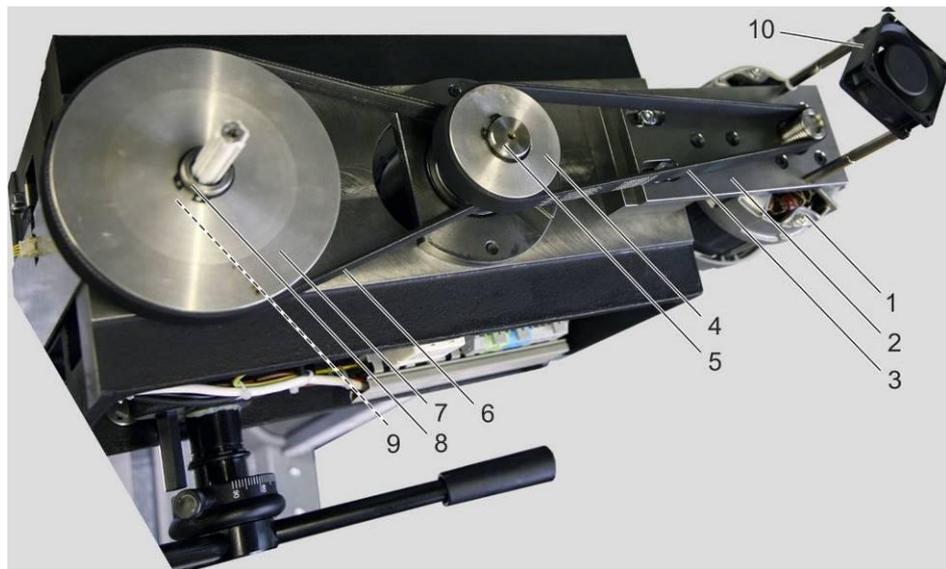


Fig. 3: SB/TB/TBZ P23 Plus (R1)

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 23 Plus R2	TB 23 Plus R2	TBZ 23 Plus R2
4	1	Motor holding bracket	223084	223084	223084
4	–	Frequency converter 1.5 kW *	223091	223091	223091
4	2	Motor 1.5 kW	223131	223131	223131
4	3	Flange bearing	201401	201401	201401
4	4	Grooved ball bearing DIN 625 * 30x62x16 mm 6206-2Z	006793	006793	006793
4	5	Running bush *	218351	218351	218351
4	6	Spindle pulley	218421	218421	218421
4	7	Ribbed V-belt DIN 7867 * 8PJx1080 mm	010152	010152	010152

* Wear part

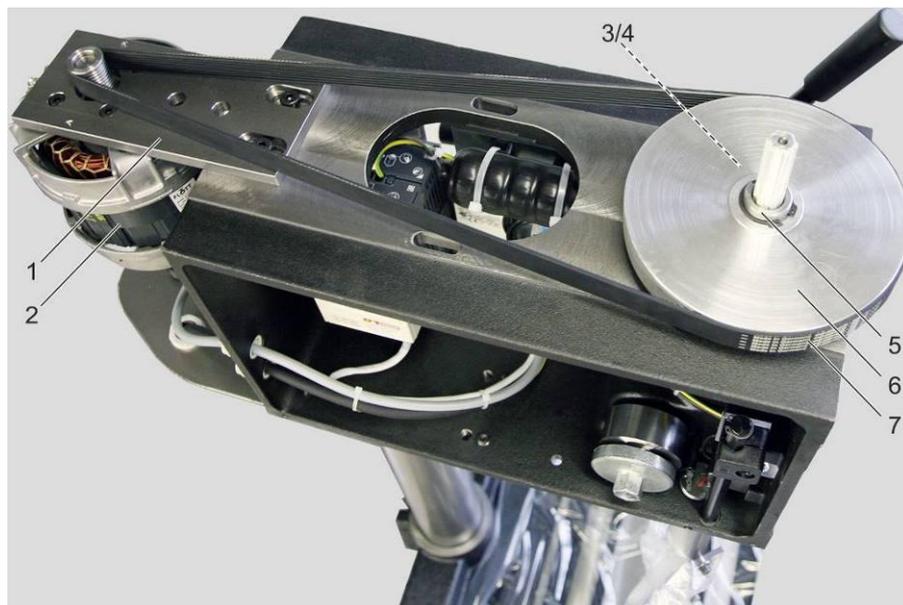


Fig. 4: SB/TB/TBZ P23 Plus (R2)

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 25 Plus	TB 25 Plus	TBZ 25 Plus
1	1	Protective hood	218321	218321	218321
1	2	Control panel *	212581	212581	212581
		Knob *	212608	212608	212608
1	3	Emergency stop push-button *	008677	008677	008677
1	3	Toggle switch *	009461	009461	009461
1	3	Small front plate	218322	218322	218322
1	3	Cable harness	223092	223092	223092
1	4	Head	223051	223051	223051
1	4	Adapter	205316	205316	205316
1	5	Replacement sight protection *	218366	218366	218366
1	5	Drill guard bracket	290817	290817	290817
1	5	Clamping jaws (1 pair)	009603	009603	009603
1	5	Fillister head screws DIN 912, M6x16	004845	004845	004845
1	5	Micro limit switch *	008537	008537	008537
1	6	Arm	205103	205103	–
1	7	Toothed rack	205109	201144	201144
1	8	Pillar	205116	205121	205121
1	9	Stand pillar	205106	–	–
1	10	Stand plate	205105	–	–
1	11	Table foot	–	205143	–
1	12	Machine cabinet (option)	–	205160	205160
1	13	Main switch	208040	208040	208040
1	18	Air protection *	007908	007908	007908

* Wear part

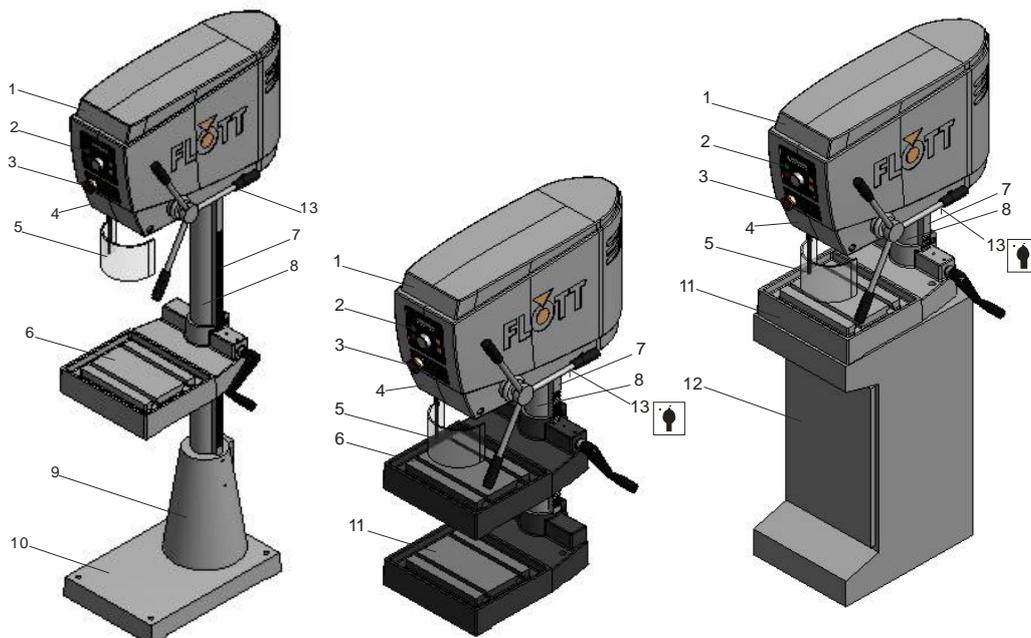


Fig. 1: SB/TB/TBZ P25 Plus

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 25 Plus	TB 25 Plus	TBZ 25 Plus
2	1	Spindle Mk3 *	225171	225171	225171
2	2	Pinole *	225172	225172	225172
2	3	Grooved ball bearing DIN 625 * 25x52x15 – 6205 2Z	006842	006842	006842
2	4	Locknut self-locking M24x1.5	009798	009798	009798
2	5	O-ring	009878	009878	009878
2	6	Grooved ball bearing DIN 625 * 30x62x16 – 6205 2Z	006793	006793	006793
2	7	Bolt *	169243	169243	169243
2	8	Worm wheel *	169254	169254	169254
2	9	Worm complete * (incl. adjusting ring, bush and clamping sleeve)	200115	200115	200115
2	10	Funnel lubrication nipple * DIN 3405-D8	007534	007534	007534
2	11	Hand crank	009657	009657	009657
2	–	Clamping lever	009200	009200	009200
2	12	Lamellar plugs	009731	009731	009731
2	13	Clamping flange	205664	205664	205664
2	14	Spiral spring *	205363	205363	205363
2	15	Pinion shaft *	218380	218380	218380
2	16	Drilling depth limiter compl. *	212545	212545	212545
2	17	Cylindrical knob *	009206	009206	009206
2	18	Drill lever	280390	280390	280390
2	19	Threaded pin DIN 915, M8x16 *	005809	005809	005809
2	20	Cylinder head screw DIN 912, M8x45 *	006554	006554	006554

* Wear part

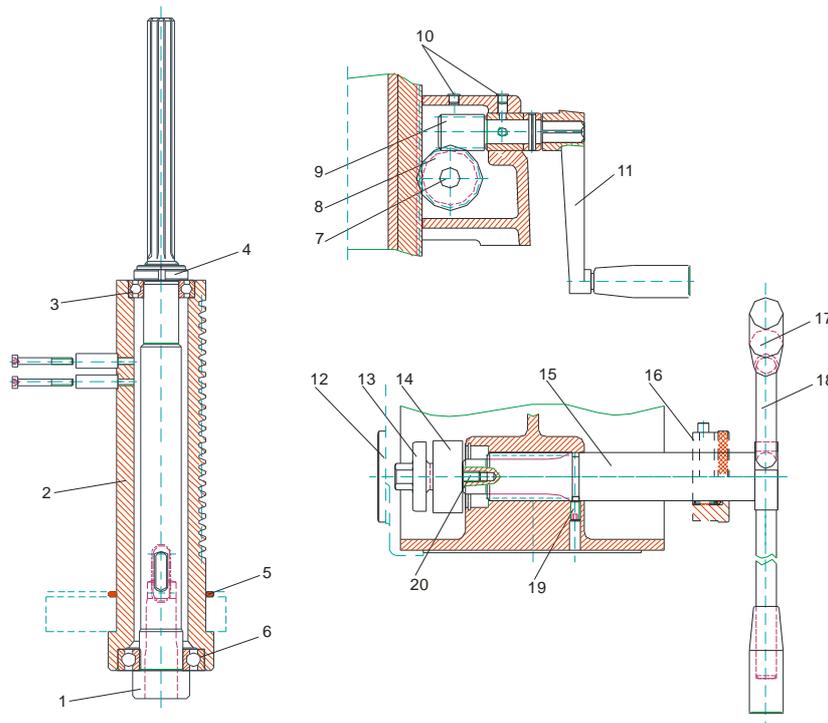


Fig. 2: SB/TB/TBZ P25 Plus

This does not apply to parts no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number		
			SB 23 Plus	TB 23 Plus	TBZ 23 Plus
3	1	Frequency converter 1.5 kW *	223091	223091	223091
3	1	Motor 1.5 kW	223131	223131	223131
3	2	Motor holding bracket	223084	223084	223084
3	3	Ribbed V-belt DIN 7867 * 8PJx1150 mm	010103	010103	010103
3	4	Intermediate pulley D72.5/46.7	223074	223074	223074
3	5	Intermediate shaft	223071	223071	223071
3	6	Ribbed V-belt DIN 7867 * 8PJx610 mm	010170	010170	010170
3	7	Spindle pulley	225177	225177	225177
3	8	Running bush *	225176	225176	225176
3	9	Flange bearing	201401	201401	201401
3	9	Grooved ball bearing DIN 625 * 30x62x16 – 6205 2Z	006793	006793	006793

* Wear part

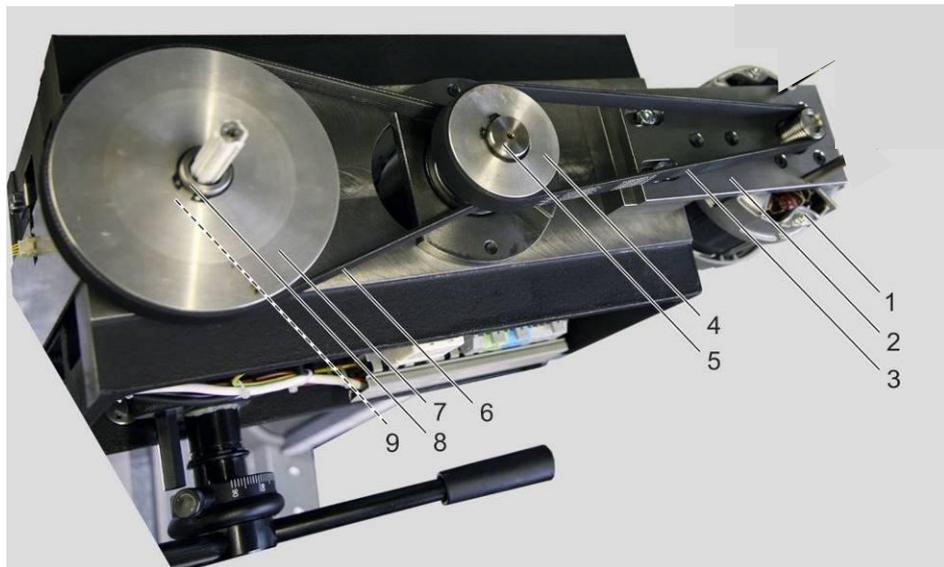


Abb. 3: SB/TB/TBZ P25 Plus

11 Dimensional Drawings and Wiring Diagrams

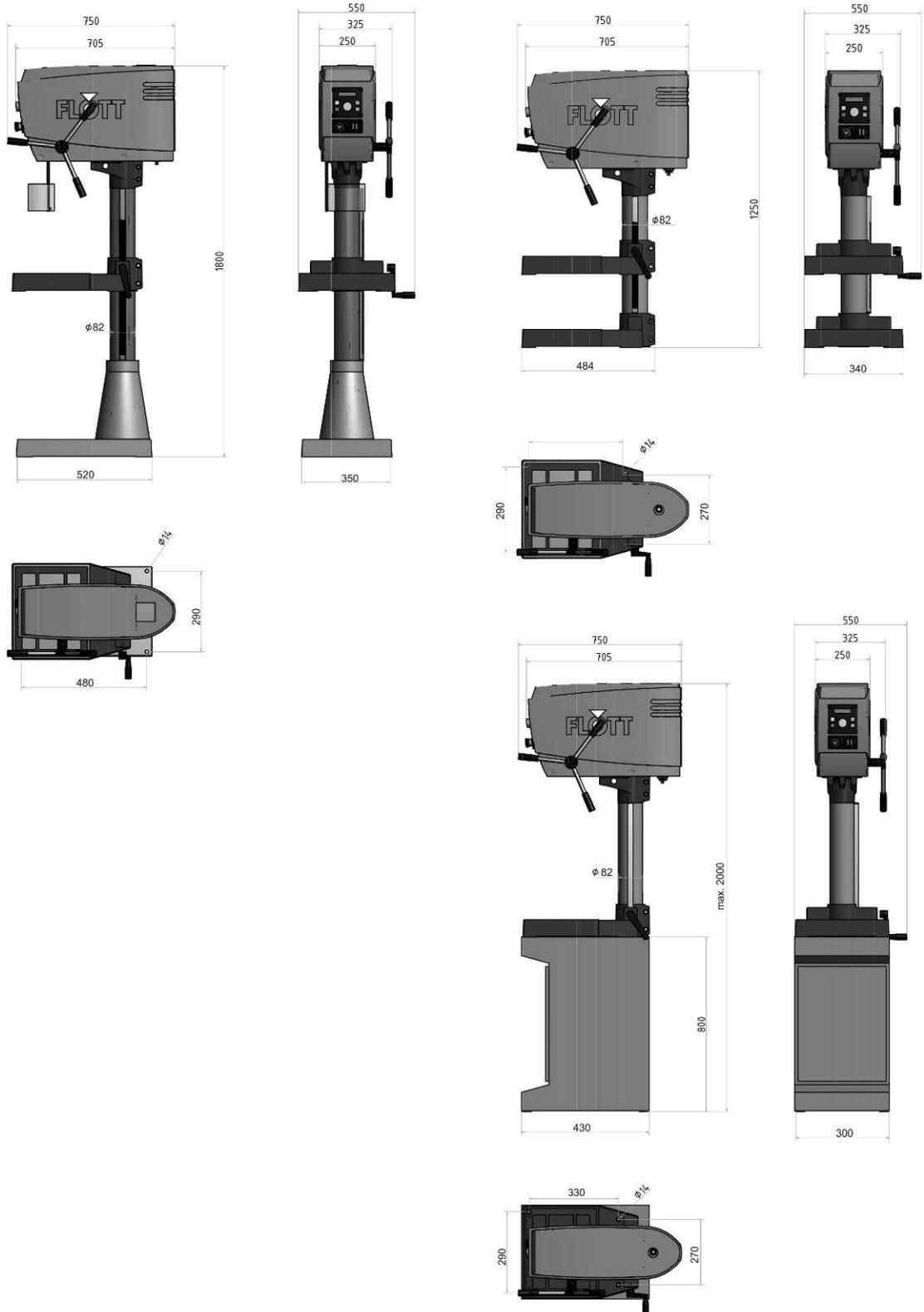


Fig.: SB 18/20 Plus, TB 18/20 Plus, TBZ 18/20 Plus

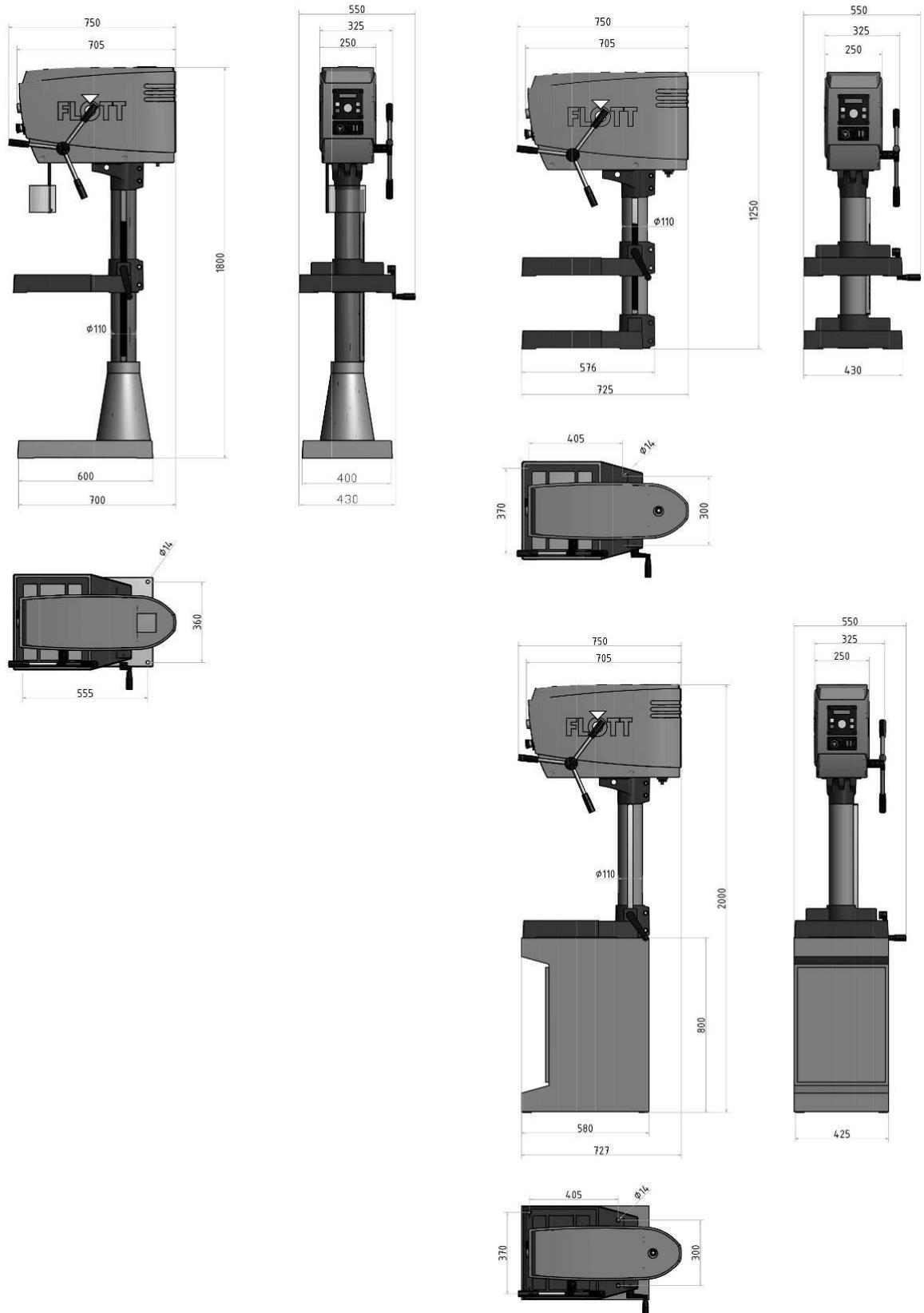


Fig.: SB 23/25 Plus, TB 23/25 Plus, TBZ 23/25 Plus

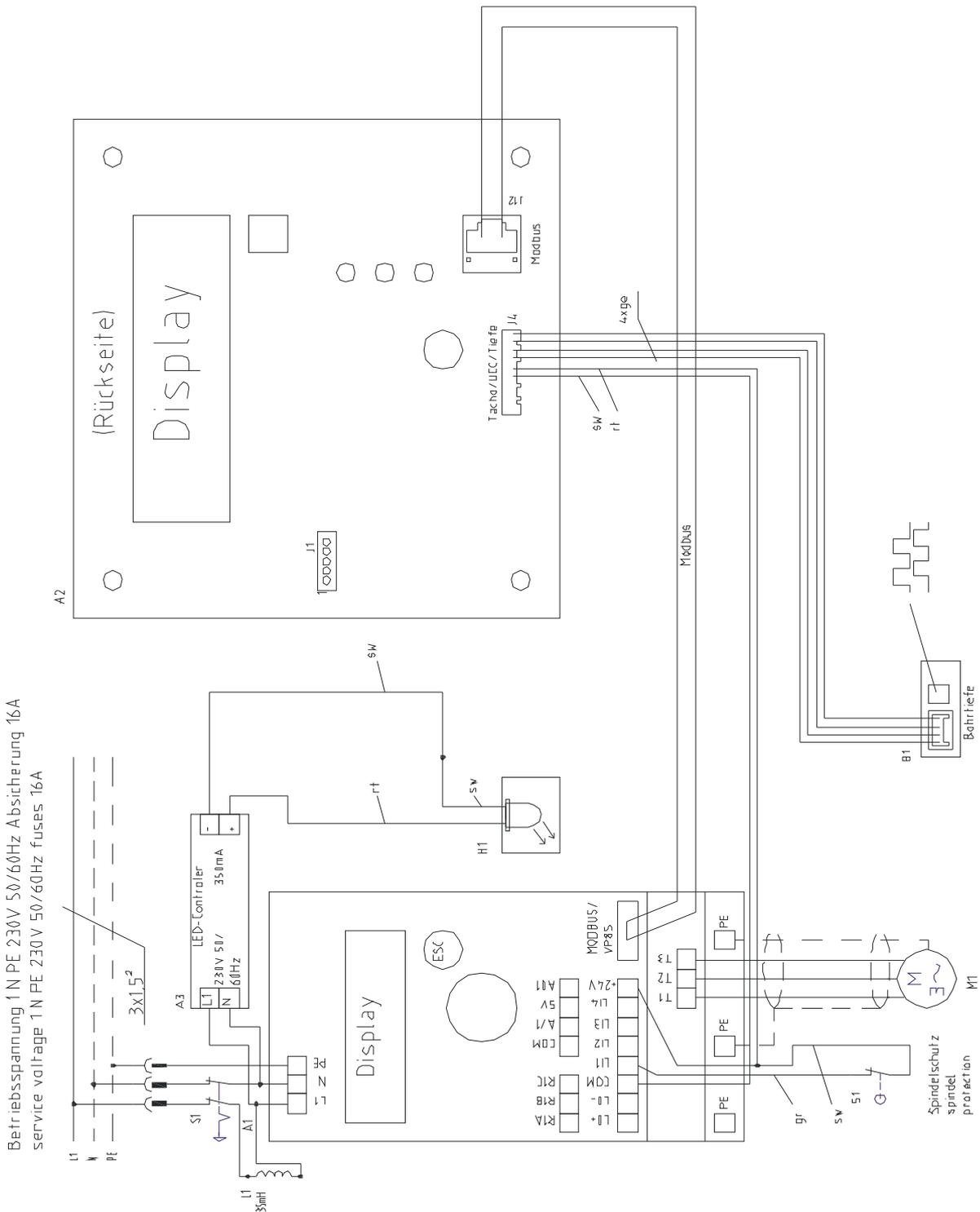


Fig.: Wiring diagram SB/TB/TBZ 18 Plus

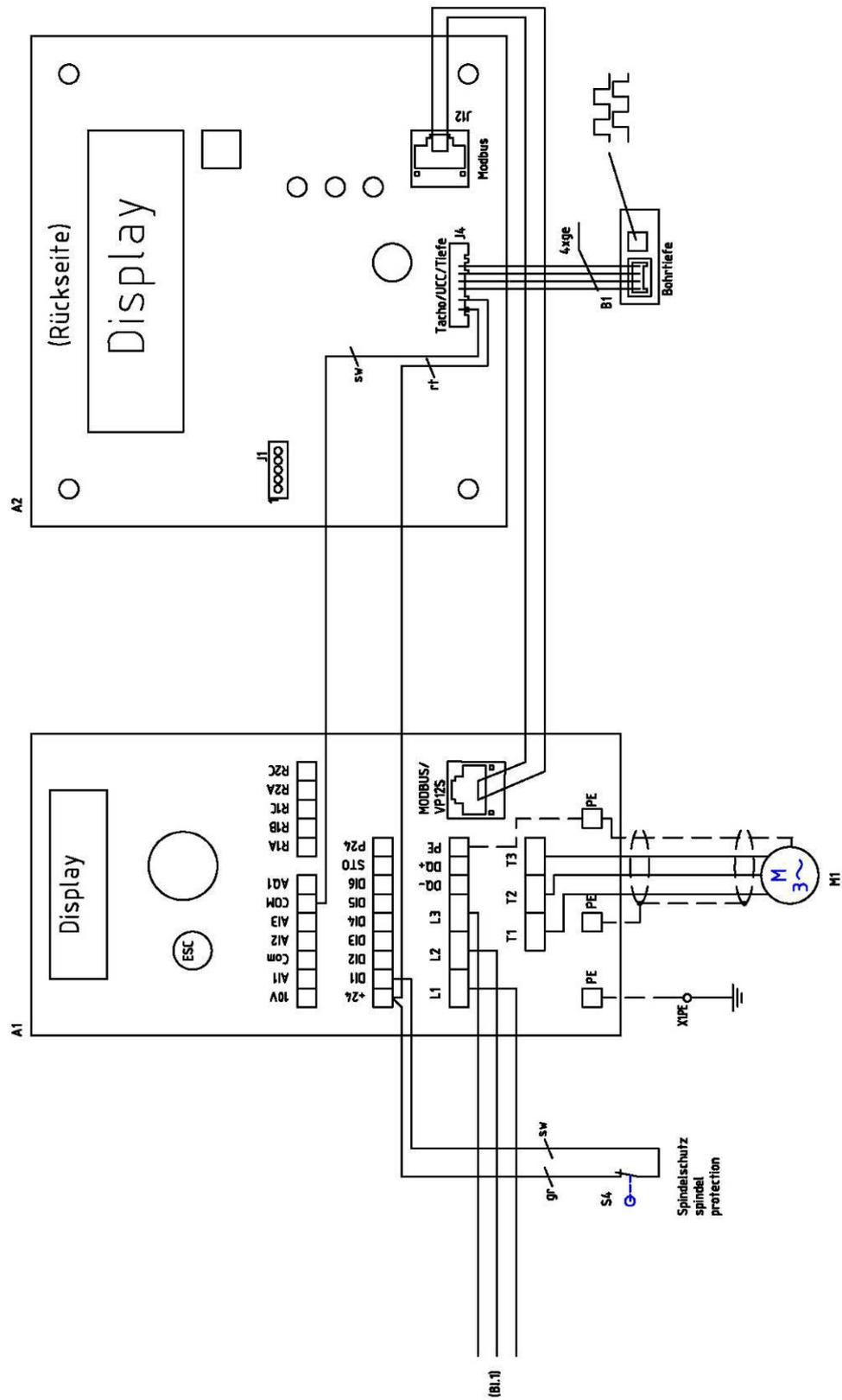


Fig.: Wiring diagram (part 2) SB/TB/TBZ 20/23/25 Plus

12 EC Declaration of Conformity



Hereby we, Arnz FLOTT GmbH Werkzeugmaschinen, Vieringhausen 131, D-42857 Remscheid, declare that the machine described below

- Model: Pillar drilling machine
- Type designation: SB 18/20/23 Plus, TB 18/20/23 Plus
TBZ 18/20/23 Plus
- Machine number
- Year of manufacture:

in this documentation complies with the following directives:

- Machinery: 2006/42/EC
- RoHS-II Directive: 2011/65/EU

Applied harmonised standards:

- EN 12100 Parts 1 and 2: 2010
- EN 12717: 2001 / A1: 2009
- EN ISO 13849-1: 2015
- EN 60204-1: 2006 / A1: 2009
- EN 50370-1:2005
- EN 61000-3-2: 2014 and EN 61000-3-2: 2013
- EN 55011: 2016 + A1: 2017

Note:

This machine is not subject to the requirements of Annex IV for machinery with particular hazards in accordance with Directive 2006/42/EC (see above). Therefore the relevant documents are stored at our premises. This EC Declaration of Conformity will become null and void if the machine is modified or converted without our consent.

Name: ppa. Dr. Karl Peter Becker
Position in the company: General Manager & Shareholder
(Person authorized to compile the technical documentation)

(Signature)

Remscheid, 12.12.2022

(Place/Date)

Technical documentation and other data have to be sourced from Arnz FLOTT GmbH Werkzeugmaschinen. The original text of this operation manual has been written in German and translated into English.

Notes

Notes

**High Quality –
made in Germany
since 1854.**

FLOTT
Werkzeugmaschinen

Arnz FLOTT GmbH
Werkzeugmaschinen

Vieringhausen 131
42857 Remscheid
Tel. +49 2191 979-0
Fax +49 2191 979-222
info@flott.de
www.flott.de



Beratung per WhatsApp
Einfacher geht's nicht
Telefon: +49 (162) 18 54 000

