

# BE TR IE BS AN LEI TU NG

**OPERATING  
MANUAL**

**FLOTT**  
Werkzeugmaschinen

SCAN ME



SB 30 NC Plus  
SB 40 NC Plus  
SB 40 NC FB Plus



**For your information!**

The original version of this operating manual was drafted in German. All versions of this operating manual in other foreign languages are exclusively translations of the original German operating manual.

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# 1 Introduction

Dear customer,

Many thanks for choosing this FLOTT quality product! By purchasing this machine you have also chosen a product that has an almost unique position on the machine market thanks to its performance, construction, user-friendliness and product quality. The outstanding FLOTT quality, in particular, gives you the security of being able to use this machine without any issues and in a highly efficient manner over a long period of time. The machine is therefore cost-effective and will always provide you with verifiable added value for your company and your customers!

## **FLOTT – High Quality. Built on tradition...**

In 1854, a small family company was set up in Remscheid which developed braces and breast drill machines of the highest quality and produced these for the German market. With these products, Arnz FLOTT Werkzeugmaschinen made industrial history and is often cited as a “pioneer” of drilling technology in industry circles. The company has long had an international reputation for its high performance thanks to its outstanding experience and product quality. Always close to its customers: “High quality – made in Germany”. With its partners in Europe, FLOTT is not only one of the companies with the richest traditions, but is also a leading manufacturer of state-of-the-art, high-quality drilling, sawing and grinding machines in Europe.

## **Committed to innovation thanks to tradition.**

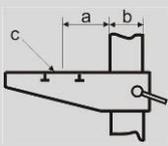
FLOTT never idles. As a future-oriented and user-oriented company, FLOTT continues to invest almost 5 % of its annual turnover in its own research and development projects. Permanent optimisation and, above all, intelligent and industry-tailored innovations in the field of drilling, sawing and grinding technology are testimony – proven by numerous patents, property rights, customer awards and design awards – to the innovative strength and pioneering spirit of the company. This means customers can rely on the fact that they are getting a perfectly-developed product in the field of drilling, sawing and grinding technology when they purchase a FLOTT machine. This is because the product always reflects the state of the art in manufacturing technology, taking the user ergonomics into consideration. With a great guarantee and additional benefits included in the scope of delivery: traditional top quality and service.

## **Great service creates customer satisfaction...**

With well-established training centres with modern facilities for courses in theory and practice at the FLOTT drilling academy, as well as mobile training and presentation units at the FLOTT locations in Remscheid and at the FLOTT sales agencies, we are able to meet all customer requirements and interests in a highly efficient manner. However, service also means that necessary repairs are carried out as quickly as possible, in order to reduce machine downtimes to a minimum. With its service partners distributed all over Germany and Europe, FLOTT offers a 24-hour repair and spare parts service. These are just some aspects of our FLOTT service concept. Please feel free to read more about this at [www.flott.de](http://www.flott.de) or make the most of the advice provided by our highly-qualified specialist retailers.

## 1.1 Column drill press

### 1.1.1 Technical data

Type		SB 30 NC Plus	SB 40 NC Plus
Order number R1		230.510	230.525/230.540
Order number R2		230.511	230.526/230.541
Order number R3		230.512	230.527/230.542
Order number FB (R3)		230.513	
Drilling capacity / normal drilling performance			
R1	[mm]	25/30	30/35
R2		23/28	25/30
R3		30/35	35/40
Thread cutting performance			
R1	[mm]	M24 x 2	M30 x 2
R2		M20 x 1.5	M24 x 2
R3		M36 x 2	M42 x 2
Spindle holder		Type	MK III
			MK IV
Drilling depth		[mm]	125
			160
		[mm]	a = 300
			a = 300
		[mm]	b = 125
			b = 125/140
		[mm]	c = 590 x 450
			c = 590 x 450
Mains voltage		[V]	400
Frequency		[Hz]	50/60
Motor power		[kW]	3.0
			4.0
Spindle speed, stepless		[rpm]	0 – 1,000
R1			0 – 1,600
R2			Stage 1: 0 – 400 and stage 2: 420 – 4000
R3			
Feed		[mm/min]	Manual/automatic: 0 – 1500
Weight without packaging		[kg]	400
			440/460
Weight incl. packaging		[kg]	420
			460/480
Permissible ambient temperature		[°C]	+10 to +40
Noise emissions		dB(A)	60

## 1.1.2 Column drill press type plate

The column drill press is identified by its type and type number. This information and further details can be found on the type plate which is affixed to the protective hood of every machine.

Arnz Flott GmbH Werkzeugmaschinen Vieringhausen 131 D-42857 Remscheid					
Servicenummer:					
Type	<input type="text"/>				
No.	<input type="text"/>				
V	<input type="text"/>	~	<input type="text"/>	Hz	<input type="text"/>
A	<input type="text"/>			kW	<input type="text"/>
<input type="text"/>			<input type="text"/>	<input type="text"/>	
Gewicht			<input type="text"/>	kg	



### Manufacturer:

Arnz FLOTT GmbH Werkzeugmaschinen  
Vieringhausen 131  
D-42857 Remscheid, Germany

Phone: (0 21 91) 979-0      Email: info@flott.de  
Fax: (0 21 91) 979-222      Web: www.flott.de

### 1.1.3 Proper use

The column drill press is only suitable for use for drilling, countersinking, grating and thread cutting metal, plastic and wood materials using suitable tools. The column drill press is designed to be operated by one person.

The intended use also includes the following:

- the machine, depending on machine type, must be anchored with the foundation or another suitable layer;
- compliance with the drilling performance stated in the technical data;
- only inserting tools which are suitable for purpose into the machine;
- securing the tools in the spindle properly;
- ensuring that the work piece to be processed is secured against rotation on the drilling table (e.g. with clamping or stop);
- compliance with inspection and maintenance work;
- use only original FLOTT spare parts; and
- compliance with all notes and details in this operating manual and those provided by the manufacturers of the tools.

### 1.1.4 Improper use

The column drill press may only be used as set out in the section on “Proper use”. Any other use is deemed improper use.

Examples of improper use include:

- drilling into unsuitable materials;
- use of the machine without the necessary safety equipment;
- use of unsuitable tools and coolants;
- unauthorised modifications or changes to the machine.

Any failure to comply can result in:

- injury or death of persons;
- damage to the machine;
- damage to other material assets.

**Without exception**, any improper use will transfer all risk to the person carrying out the improper use. Any liability claims against Arnz FLOTT GmbH Werkzeugmaschinen shall be excluded unless mandatory statutory provisions state otherwise.

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## 1.2 Legal provisions

### 1.2.1 Liability

Arnz FLOTT GmbH Werkzeugmaschinen makes reference to the validity of its general terms of business (see the website at <http://www.flott.de/de/flott/service/downloads/>). These provisions and the provisions contained therein limiting the liability of Arnz FLOTT GmbH Werkzeugmaschinen (in particular Nos. 8.5, 8.8, 9.1 – 9.3 and 10.) form part of this operating manual.

The information, data and instructions provided in this operating manual were up-to-date at the time of printing. We reserve the right to make technical changes in the course of further development of the machines. Details, figures and descriptions are non-binding. In particular, no claims or rights for machines delivered previously shall arise from the details, figures and descriptions in this operating manual.

No liability will be accepted for damage or operational disruption caused by:

- failure to comply with the operating manual;
- operator error;
- improper working on and with the machine;
- use of replacement and spare parts which are not originals and not supplied by Arnz FLOTT GmbH Werkzeugmaschinen;
- unauthorised modification of and changes to the machine by the operator or its staff.

The following are decisive when assessing the liability of Arnz FLOTT GmbH Werkzeugmaschinen vis-à-vis the user of the machine:

- with regard to the technical use of the machine, solely the details provided in this operating manual;
- otherwise, the individual agreement concluded between the operator and Arnz FLOTT GmbH Werkzeugmaschinen in conjunction with the associated general terms of business of Arnz FLOTT GmbH Werkzeugmaschinen;
- the general statutory provisions.

In the event that the user, either itself or via third parties, uses the machine outside the scope of the agreement concluded with Arnz FLOTT GmbH Werkzeugmaschinen or uses or commissions it as a reselling original purchaser, the liability of Arnz FLOTT GmbH Werkzeugmaschinen shall be limited, on the condition of compliance with the instructions set out in this operating manual, to liability pursuant to the Product Liability Law (Produkthaftungsgesetz) and pursuant to the general statutory provisions.

### 1.2.2 Warranty

Warranty claims are to be reported to Arnz FLOTT GmbH Werkzeugmaschinen immediately upon identification of the error or defect, specifying the machine number, machine type and serial number.

No warranty is provided for parts subject to wear. The warranty expires in the event of:

- improper use of the machine;
- improper working on and with the machine;
- use of prohibited tools and equipment; and
- use of replacement and spare parts which are not originals and not supplied by Arnz FLOTT GmbH Werkzeugmaschinen.

### 1.2.3 Copyright

This operating manual and all documents contained therein are protected by copyright. The reproduction and distribution of this manual (including of extracts) to third parties, as well as the transmission and use of its content, is not permissible or requires the express permission of Arnz FLOTT GmbH Werkzeugmaschinen.

Violations are punishable and shall oblige the individual(s) who have carried out the violation to pay compensation. All rights for the exercise of industrial property rights remain reserved.

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## 1.3 Operating manual

This operating manual contains details and instructions which enable the personnel who will be using the machine to work on and with the machine in a safe, proper and economical manner. Only when the content of the operating manual is understood and observed can

- risks be prevented;
- repair costs and downtime be reduced; and
- the reliability and service life of the machine be increased.

In order to ensure that you find what you are looking for in the operating manual more easily, the systems and rules which are used and definitions relating to content and design are explained and clarified using examples in the following sections.

### 1.3.1 Terminology

Some important terms are used in this operating manual and these terms are described below.

#### **column drill press (machine)**

The term column drill press is used in this operating manual to describe the entire machine. In order to simplify the text, only the term “machine” is used in the following.

#### **Spindle**

The term spindle is used to describe the rotating component in which the drill chuck can be clamped or the tool itself can be clamped directly.

#### **Work piece**

The work piece is the material to be processed in the form of a component.

#### **Tool**

In this operating manual the term tool is used to describe the processing tools inserted into the machine (drill, countersink, reamer and tap) which are used to process the work piece.

#### **Operator**

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

#### **Target group**

The target group is a certain group of people towards whom the information provided in this operating manual is aimed.

#### **Operating personnel**

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Operating personnel refers to persons who have been **authorised to use** the machine and **provided with training on** the operation of the machine. The operating personnel may carry out basic maintenance work, e.g. cleaning the machine.

### **Authorised personnel**

Authorised personnel refers to persons who have been authorised to operate the machine properly by the operator.

### **Trained personnel**

Trained personnel refers to persons who

- have been briefed and, where necessary, instructed on the tasks which they have been assigned;
- have been briefed on the potential dangers associated with improper use; and
- have been briefed on the necessary safety equipment, protective measures, accident prevention provisions, valid provisions and operating conditions.

### **Specialist personnel**

Specialist personnel include persons whose specialist training, knowledge and experience allow them to assess and carry out the work they have been assigned in a proper manner. Specialist personnel are aware of the accident prevention provisions, the relevant provisions and operating conditions.

### **Personnel of Arnz FLOTT GmbH Werkzeugmaschinen**

Personnel of Arnz FLOTT GmbH Werkzeugmaschinen are persons who are specialist personnel **and** employees of Arnz FLOTT GmbH Werkzeugmaschinen.

### **residual risks**

Residual risks are non-obvious risks created by the use of the machine.

Example:

- Risk of burns associated with hot machine parts and components after the machine has been put out of operation.

### **Protective clothing**

Protective clothing is personal protective equipment which protects the body from the risks associated with the work process.

The protective clothing must comply with the **Occupational Safety Act (Arbeitssicherheitsgesetz)**.

The times at which protective clothing must and should be worn are regulated in the valid local accident prevention provisions.

## 1.3.2 Visual representations and distinctions in text

The following pictograms, symbols and typographical distinctions are used in this operating manual to stress important information.

### Pictograms



#### General danger

Denotes safety instructions that must be observed and which cannot be assigned a special pictogram (e.g. one of the following pictograms).



#### High electrical voltages

Denotes the risk of electric shock.



#### Hot parts

Denotes the risk of burns in the event of contact with machine parts and components.



#### Hand injuries

Denotes the risk associated with hands being pulled in or crushed or any other hand injuries.



#### Environmentally hazardous substances

Denotes the risk associated with chemicals if these substances do not meet the valid environmental protection laws.



#### Safety-relevant instruction

Denotes information relating to safe working on and with the machine.



#### Use ear protectors



#### Wear safety goggles



#### Wear safety gloves



#### Wear protective clothing

### symbols

This operating manual uses three different symbols:

- this symbol marks an individual instruction. Where there is more than one instruction, these are numbered sequentially.
- this symbol marks lists which contain content of equal importance.
  - This symbol marks lists of sub-points which are secondary to the lists and which also contain content of equal importance.

### **Typographical distinctions**

Within a safety instruction, information about the nature of the danger appears in italics (see page 16, Section *Examples of safety instructions*).

## **1.3.3 Structure and design of the Safety instructions**

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

### **Elements of a safety instruction**

A safety instruction consists of multiple elements:

- a pictogram;
- a signal word which denotes the level of the danger;
- a note on the nature of the danger; and
- a note about preventing the danger.

The following signal words highlight the level of the danger:

#### **Hazard**

Indicates an imminent hazard for persons.

Possible consequences: death or very serious injuries

#### **Warning**

Indicates a possible hazard for persons.

Possible consequences: death or very serious injuries

#### **Attention**

Indicates a possible hazard for persons or material assets.

Possible consequences: minor injuries for persons or damage to items

#### **Note**

Indicates a possible harmful situation for items or the environment.

Possible consequences:

- the machine itself is damaged;
- items in the vicinity of the machine are damaged;
- the environment is damaged.

### Examples of safety instructions



#### Warning

*Risk resulting from improper use of the machine.*

The machine may only be operated by trained and authorised personnel. The machine may only be operated when in perfect condition. All safety equipment must be available and fully functional.



#### Note

Prior to operating the machine, check that screws

- are firmly in place;
- have no visible external damage.

## 2 Safety information

### 2.1 General safety instructions

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

However, the machine may still be associated with hazards in the event that

- unauthorised and unqualified personnel work on and with the machine; and
- the machine is used improperly.

In such cases, there is a risk for

- persons;
- the machine; and
- other material assets of the operator.

#### 2.1.1 Operating manual

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

- DGUV Provision 1 – Principles of prevention
- DGUV R 100-500 – Operation of work equipment

This operating manual is intended, in particular, to enable safe working on and with the machine. It contains safety instructions which must be observed.

In addition to the fundamental safety instructions in this chapter, you must also observe the specific safety instructions in the other chapters. These provide you with specific safety instructions and warnings about hazards in relation to certain instructions.

The operating manual must

- be read and understood by all persons who work on and with the machine before they commence work;
- always be available at the site where the machine is used, in the place intended for this purpose; and
- always be complete and in a perfectly legible condition.

If you do not understand this operating manual or individual parts thereof, you should not commence your work. Ask the specialist personnel

- of the operator or
- of Arnz FLOTT GmbH Werkzeugmaschinen

before entering a potentially dangerous situation.

#### 2.1.2 Obligations of the operator

The operator, in particular, must take into account a number of obligations with respect to its staff.

The operator is obliged

- to supplement the operating instructions with instructions based on the national regulations for accident prevention and environmental protection;
- to inform personnel of all relevant regulations, instructions and laws as required;
- to check that all relevant regulations, instructions and laws are adhered to;
- to instruct the staff how to work on and with the machine;
- to clearly define the responsibilities for operation, maintenance and repair of the machine;
- to check whether the specified responsibilities are complied with;
- to verify at regular intervals whether personnel are aware of potential hazards and are operating the machine in compliance with the safety standards set out in the operating manual; and
- to ensure that personnel have read and understood the operating instructions, in particular the chapter on safety. The operator of the machine may have personnel confirm this in writing.

### 2.1.3 Safety of the machine

For all work on and with the machine, please observe:

- the respective valid provisions;
- the applicable trade association guidelines (DGUV);
- the valid provisions and applicable environmental protection laws.

Only operate the machine when it is in perfect condition. This includes making sure that all the safety devices on the machine are present and functional. In the event of any functional issues or errors, the machine must immediately be decommissioned and the responsible party of the operator must be informed of the situation.

The machine may only be recommissioned once it has been restored to perfect functionality.

Do not dismantle or put out of operation any safety devices. In the event that safety equipment does need to be dismantled, e.g. for maintenance or repair work, this must be reassembled immediately once the work has been completed. Check that all safety equipment is working perfectly before operating the machine.



#### Note

In principle, changes, additions and modifications to the machine which have a negative effect on safety levels are prohibited. These require the written permission of Arnz FLOTT GmbH Werkzeugmaschinen.

Use only original spare parts if you need to replace machine components. Only original spare parts allow the functionality and safety of the machine to be maintained.

## 2.1.4 The personnel carrying out the work

Only authorised and trained personnel may work on and with the machine. Unauthorised personnel may not operate the machine.

Personnel undergoing training or instruction or who are undertaking a programme of education may only work on the machine under the continuous supervision of an experienced, authorised person.

Young people under 18 years of age may only work on the machine

- within the scope of their training;
- after detailed training has taken place; and
- under the direction and supervision of specially authorised persons.

Works on the electrical equipment or the machine equipment may be carried out only by specialist personnel.

The responsible supervisor must provide the operating personnel with training regarding safe working at regular intervals, and at least once per year. Records are to be kept of the training and these records are to be signed by those who have received training.

The operating personnel must immediately report changes in the working characteristics of the machine to their responsible supervisor. This applies, above all, in cases where the safety of the machine is no longer guaranteed.

Personnel may not wear their hair down or wear loose clothing or jewellery, including rings, when working on the machine.

Personnel must wear personal protective equipment insofar as this is necessary or required by the regulations.

## 2.1.5 The workplace

Only use workstations intended for the operation or maintenance of the machine. Workstation must be kept clean, dry and tidy. The machine must always be easily accessible from all sides.

No flammable or explosive substances may be stored in the vicinity of the workstations. The work space must be ventilated so as to ensure that no harmful or highly flammable mixtures or gases are allowed to accumulate in dangerous quantities. If necessary, a suitable ventilation system must be installed.

In order to ensure that you can act immediately and properly in the event of accidents and operational disruptions, the following must be to hand at your workstation at all times:

- officially approved fire extinguisher
- first-aid kit

## 2.2 Safety information for using the machine



### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



### **Use safety gloves**

Always wear the required safety gloves for all work on and with the machine!



### **Use protective clothing**

Always wear the required tight-fitting protective clothing for all work on and with the machine!

### 2.2.1 Transport to the installation site



#### **Warning**

*Risk of the object being transported falling.*

- The machine may only be transported by specialist personnel.
- Use only transport devices and transport aids which
  - comply with the safety provisions; and
  - are designed for the loads in question.
- The machine may only be lifted and transported at the designated points.
- Before transportation on the company premises, it must be ensured that all transport routes are clear and as level as possible.



#### **Note**

*Damage to the machine caused by frost, heat and damp.*

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

## 2.2.2 Commissioning, operation, decommissioning



### Hazard

*Risk associated with electrical voltage.*

The machine (class A) is intended for use in an industrial environment pursuant to EN55011. In the event of use in other environments, appropriate measures may need to be taken by the operator.



### Warning

*Risk associated with improper working on and with the machine. Risk resulting from improper use of the machine.*

- Only authorised and trained personnel may use the machine.
- The machine may only be operated when in perfect condition. All safety devices on the machine must be fitted and operational. In the event of any defects or functional issues, the machine must immediately be decommissioned and protected against reactivation.
- Recommission the machine only once all defects or functional issues have been remedied and the machine is working perfectly.



### Warning

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.



### Warning

*Risk associated with work pieces which have not been secured.*

In the event that a tool suddenly becomes jammed in the work piece, a work piece which has not been secured may move around and cause injuries.

Secure the work piece which is to be processed against rotation by clamping it on the drilling table or by using a suitable stop.



**Attention**

*Risk associated with tools or other objects lying around.*

Ensure that there are no tools or other objects in the work area of the machine, in particular in the field of action of the drill spindles.



**Attention**

*Risk associated with insufficient lighting.*

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



**Attention**

*Risk associated with chips with sharp edges.*

Do not use bare hands to remove the chips which are created. Blowing them out with compressed air is also not suitable, as the chips can very easily be blown into the eyes. Always use a suitable tool for this purpose (chip hook and hand brush).



**Attention**

*Danger due to overuse of tools.*

Observe the tool manufacturer's instructions regarding the permissible technical data (of the material being processed, rpm, feed, cooling agent, maintenance and care). Overuse of tools may lead to breakage and thus to damage to the tool and the machine.



**Note**

Check that all screws on the machine

- are firmly in place;
- have no visible external damage.

## 2.2.3 Maintenance and repair



**Hazard**

*Risk associated with hot machine parts and components.*

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



**Hazard**

*Risk associated with improper maintenance of the machine.*

- Cleaning and maintenance work on the machine may only be carried out by authorised and trained personnel.
- In order to ensure that the machine remains safe to operate and has a long service life, it must be ensured that the maintenance work and intervals specified in this operating manual are observed.
- Decommission the machine and prevent it from being recommissioned.
- Do not dismantle any safety devices on the machine. If it is necessary to dismantle safety devices for maintenance, you must reassemble the safety equipment afterwards and check that it is working properly.
- Screw connections which have been loosened for maintenance must always be retightened.



**Hazard**

*Risk associated with electrical voltage.*

Maintenance work on electrical components may only be carried out by authorised personnel (qualified electricians). Ensure that the machine's electrical equipment is de-energised for the maintenance period.



**Hazard**

*Risk associated with electrical voltage.*

Opening the control cabinet and removing covers under which live parts are located may only be carried out by an authorised electrician. Existing covers may only be removed once it has been ensured that the covered part is de-energised.

## 2.2.4 Disposal



**Note**

*Danger to the environment resulting from improper disposal.*

- Dispose of all equipment, auxiliary materials and spare parts which have been used in a safe and environmentally friendly manner. Observe the respective provisions and laws on environmental protection.
- Return machines which are no longer in use to the manufacturer for final disposal.

## 2.3 Machine safety equipment

Observe the figure in Chapter 3.2 *Overview of the machine* on page 26 with regard to the safety equipment.

### Protective cover

The protective cover prevents people from reaching into the rotating drive unit and electrical components. The protective cover may only be removed from the machine by specialist personnel for maintenance and repair purposes.

When operating the machine, it is essential that the protective cover is fitted properly.

### Drilling protection

The telescopic drilling protection is located right in front of the tool that is inserted into the spindle and protects the operator from flying chips and from contact with the drill chuck and/or tool.

The drilling protection can be moved to the side manually, which deactivates a circuit breaker so the machine cannot be started up and/or stops the rotation and the feed motion at the same time in automatic mode. Only when the drilling protection moves back into its protective position and the circuit breaker is activated can the machine be started up.

### Clamping lever on the drilling table

The clamping lever on the drilling table serves to lock and/or secure the height-adjustable drilling table. If the drilling table is moved to the desired processing height with the crank, it must be secured in this position using the clamping lever.



### EMERGENCY STOP button

The EMERGENCY STOP button on the control unit can be used to stop the motor-drive mechanism, and thus the rotary movement of the spindles, immediately in the event of imminent danger.

The EMERGENCY STOP button is self-locking. The machine can therefore only be operated again once you have eliminated the reason for the operational disruption and unlocked the EMERGENCY STOP button.

## 3 Technical description

### 3.1 Function description

FLOTT has set high standards for itself with the development of the PLUS series. The goal was not to develop another type of drilling machine, but rather to create drilling technology that is years ahead of its time. The innovative ergonomics and design will secure FLOTT's position in the market as an outstanding drilling technology brand.

Depending on the model, the column drill press consists of a stable machine base, a stable column, a swivelling and height-adjustable drilling table and the drive and control unit.

The machine is driven by a three-phase motor controlled by a frequency converter which rotates the sleeve with the help of a V-ribbed belt and pulleys. The complete drive unit and the control panel are located under the protective cover, which is secured with screws.

The drill chuck is placed onto the spindle, which holds the tool (drill, counter-sink, reamer or tap). 2 LEDs at the side next to the spindle ensure that the work piece is illuminated well.

The drilling table serves the purpose of ensuring that the work piece being processed is secured. The T-slots integrated into the drilling table can be used to secure jaws or a vice with T-slot nuts. These aids serve to protect the work piece from torsion. The height of the drilling table can be adjusted with the toothed rack and crank.

The machine is operated via the control panel with digital display, the ancillary panel with touchscreen, the "manual/automatic" switch lever and the drill handle. The control panels can be used to set the spindle speed, the zero point and the drilling depth. In addition, the machine has an electromechanical drilling depth stop which can be used to limit the drilling depth during manual mode. In manual mode, the operator uses the drill handle to move the rotating spindle in the direction of the work piece and can process this accordingly.

In automatic mode, the feed takes place via a separate drive unit which is controlled fully automatically via the integrated processor and works in an infinitely variable manner independent of the spindle speed. The programming in automatic mode takes place via touchscreen entry on the ancillary panel.

Options such as a foot switch, minimum quantity lubrication, cooling, two-hand operation, additional light and the automatic control of additional devices, etc. are integrated ex works depending on customer requirements and may not be covered in full in this operating manual for series machines.

### 3.2 Overview of the machine

The individual exterior components are shown in the following example illustration, which may vary depending on the machine type.

1	Machine base	9	Spindle
2	Column	10	EMERGENCY STOP button
3	Arm / drilling table	11	Main switch
4	Tension lever	12	Control panel
5	Crank	13	Protective cover
6	Gear rack	14	Ancillary panel
7	Drill handle	15	Adapter
8	Drilling protection	16	Switch lever for automatic / manual mode

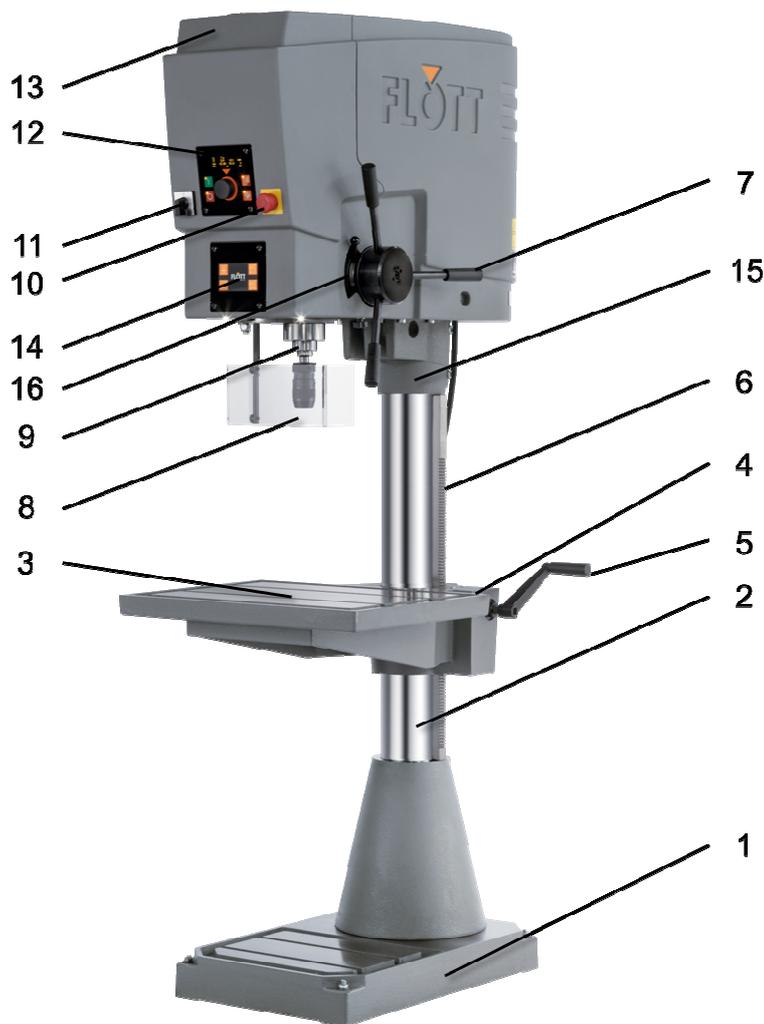


Fig.: Machine type: SB 40 NC Plus (with option of "processed base plate")

## 4 Installing the machine

The machine is generally delivered packaged on a small pallet. Consider the weight of the machine and, where necessary and/or advisable, use transport devices or a second person.

Also observe the drawings and plans in this operating manual in this regard (see Chapter 11 *Technical drawings and plans*, Page 115).



### Warning

*Risk of the object being transported falling.*

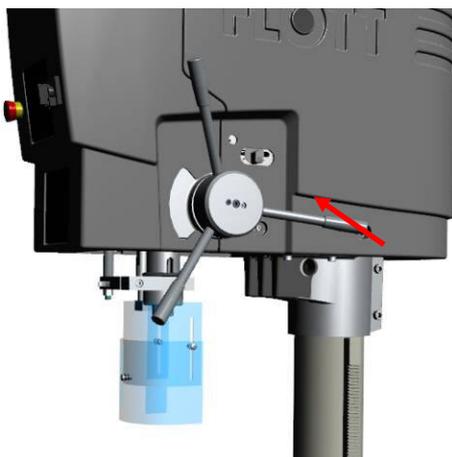
- The machine may only be transported by authorised personnel.
- Only use transport devices and transport aids which meet the relevant safety requirements and have sufficient load carrying capacity.
- The machine may only be secured, lifted and transported at the designated points.
- Protect the machine during transport against tilting and sliding using suitable transport aids.



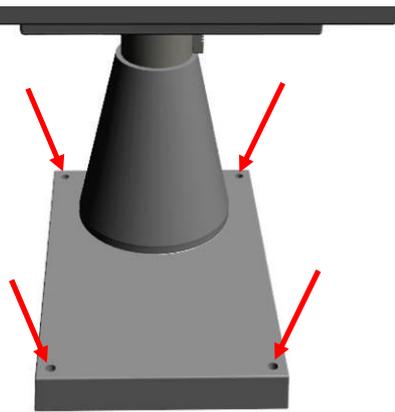
### Attention

*Risk associated with swinging loads.*

- The machine must be transported without swinging. All contact with obstacles must be avoided.
- Ensure that no persons are located in the hazard area and/or under the machine during transportation.



1. Insert a suitable metal rod through the hole in the adapter and attach lifting straps to each end.
2. Attach the lifting straps to the ends of the metal rod.
3. Use a suitable lifting device to lift the machine carefully by the lifting straps and transport it to the desired installation location.  
Ensure that the machine is lifted vertically and not pulled to the side at any angle.
4. Carefully lower the machine to the ground and remove the lifting straps and metal rod.
5. Align the machine in its final position.
6. Mark the drill holes for securing the machine base.



7. Adjust the machine slightly and drill the holes (with 2 or 4 clearance holes or dowel holes for M12, depending on the version).
8. Place suitable dampers under the machine base (rubber mat or rubber damper) to absorb any vibration created during operation.
9. Align the machine again.
10. Secure the machine base to the foundation or to a machine table using suitable M12 connection screws.



### Note

Ensure that the machine base is not tensioned by the fixing screws. A tensioned machine base can cause unwanted vibration of the drive unit.

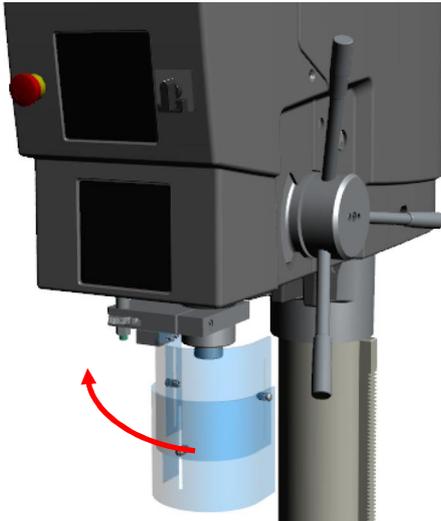
11. Tighten the screws by hand so the machine base is not too tight.

## 5 Before using the machine

### 5.1 Assemble accessories and optional components

Depending on the order, the machine will be delivered without the machine vice and drill chuck. These optional components must be installed professionally by the operator after the machine has been installed.

#### 5.1.1 Mounting the drill chuck



1. Swivel the drilling protection to the left side manually. This activates the drilling circuit breaker and prevents the machine from starting up.

2. Check that the drill chuck cone and spindle cone are free from dirt and grease.
3. If necessary, spray a little spray oil onto the cone of the drill chuck and spindle.



#### Warning

*Risk that the spindle or drill chuck becomes damaged.*

Never use a metal hammer to hit the drill chuck itself. Use a rubber hammer or place a wooden board between the hammer and drill chuck.

4. Open the drill chuck as far as possible.
5. Place the drill chuck vertically under/into the spindle.
6. Secure the drill chuck on the spindle by hitting the drill chuck gently with a rubber hammer from below. This locks the drill chuck in place in the spindle.
7. Check that the drill chuck is positioned securely by gently shaking and pulling it.

Find out how to dismantle a drill chuck in Chapter 9 *Machine maintenance*, Page 94.

## 5.1.2 Mounting the tool

Depending on which process is to be carried out on the work piece, the correct tool (drill, countersink, reamer or tap) must be inserted into the drill chuck.



### Note

*Please ensure that you observe*

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

These must always be observed in order to ensure safe working on and with the machine and to achieve the desired processing result.

1. Open the drill chuck manually or using a drill chuck key until it is easy to insert the tool into the drill chuck.
2. Insert the tool into the drill chuck and secure it.
3. Clamp the tool in the drill chuck by
  - securing it by hand for a rapid clamping drill chuck
  - securing it using a drill chuck key for a gear rim drill chuck.
 The tool is thus securely clamped in the three jaws.



*Rapid clamping drill chuck*



*Gear rim drill chuck*

### 5.1.3 Setting and operating the drilling protection

The drilling protection performs an important safety function for the machine. The drilling protection must be swivelled to the stop in the direction of the tool for the machining process.

#### Setting the drilling protection glass

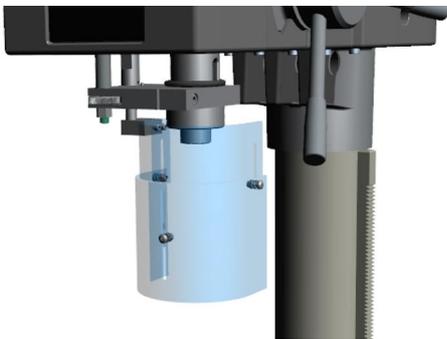


##### Warning

*Risk associated with drilling protection which has been set up incorrectly.*

If the height of the drilling protection is set incorrectly, hot drill chips may fly around. This can cause serious injury.

Therefore, ensure that the drilling protection is positioned above the knurled screw at the right height for the work piece before each processing step.



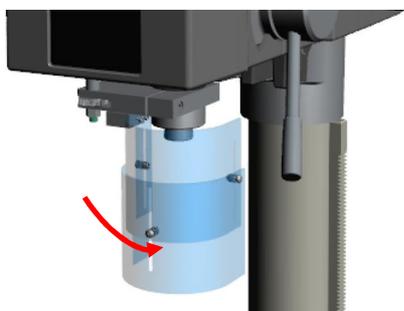
#### Swivelling the drilling protection into the protection position

The drilling protection is fitted with a circuit breaker in the machine housing. The circuit breaker is only activated when the drilling protection is swivelled into its protective position and only then is the machine released for operation by the control unit.



##### Wear safety goggles

Always wear the required safety goggles for all work on and with the machine!



- Swivel the drilling protection into its protective position in front of the tool before starting the machine.

## 5.1.4 Mounting the machine vice

The drilling table serves the purpose of ensuring that the work piece being processed is secured. The T-slots integrated into the drilling table can be used to secure jaws or a vice with T-slot nuts. These aids serve to protect the work piece from torsion.

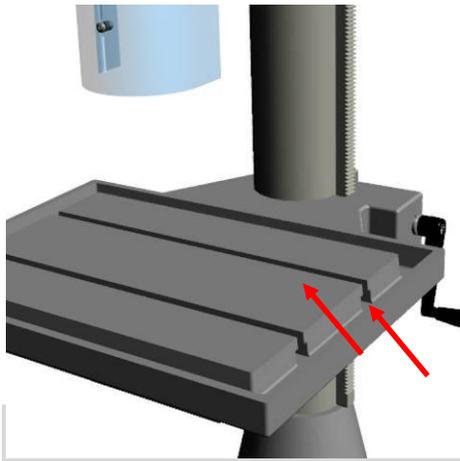


### Warning

*Risk associated with work pieces which have not been secured.*

In the event that a tool suddenly becomes jammed in the work piece, a work piece which has not been secured may move around and cause injuries. Secure the work piece which is to be processed against rotation by clamping it on the drilling table or by using a suitable stop.

The method for securing a machine vice on the drilling table is described in the following.



1. Slide the machine vice with the T-slot nuts into the T-slots on the drilling table. Make sure that it is positioned centrally under the spindle. Tighten the T-slot nuts by hand to secure the machine vice on the drilling table.

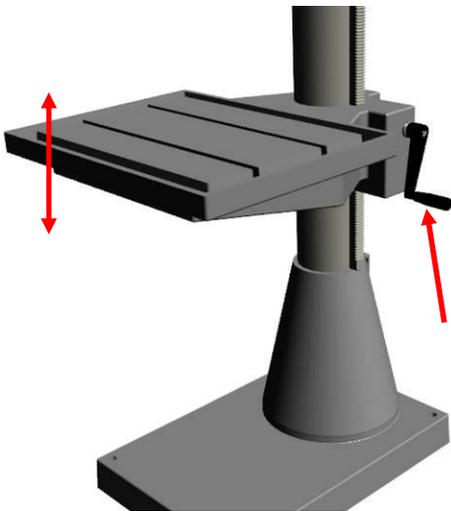
The vice or the work piece in the vice must be aligned in relation to the tool for each process step.

## 5.2 Adjusting the height of the machine table

The height of the machine table is fully adjustable via a crankshaft drive and the toothed rack. Height adjustment is always necessary when the gap between the drill spindle and the work piece needs to be changed.



1. Release the clamping lever(s) on the drilling table on the reverse side of the machine.



2. Adjust the drilling table to the desired height by turning the crank
  - clockwise and then lifting the drilling table;
  - anti-clockwise and then lowering the drilling table.



3. Re-tighten the clamping lever(s) by hand to secure the drilling table at the set height.

## 5.3 Connecting the electrical aspects of the machine



### Warning

*Risk associated with a faulty electrical connection.*

When connecting the machine, observe the electrical connection values in the operating manual and on the type plate.

- If the connection voltage is too high, this may cause injury to the operator and damage to the machine.
- If the connection voltage is too low, this may damage the machine motor.

If the local and national regulations require upstream protection with an over-current protection system, you must use a type A device for single-phase converters and a

type B device for three-phase converters in accordance with IEC Guideline 60755. This device shall have the following characteristics:

- filtering of high-frequency currents;
- a delay which prevents tripping on the basis of capacities and fault capacities when the device is switched on. This delay is not possible for 30 mA devices. In this case, select devices which are not sensitive to unintentional tripping.

1. Ensure that

- there is a protective conductor terminal;
- there is a 16 A mains fuse;
- the residual current (leakage current) is  $< 7.5$  mA.
- Note: Due to the design, leakage current  $> 3.5$  mA is caused by an EMC filter. See also the following points from DIN VDE 0701-0702: 5.5 Measuring the protection conductor current and Annex D to 5.5 Measuring the protection conductor current

2. Insert the CEE mains plug into a suitable mains socket.

3. Turn the main switch to I to switch on the power supply to the machine.



## 5.4 Checks prior to commissioning

A few checks must be carried out before operating the machine. These checks are to ensure the safety and work preparation of all persons working on the machine.

Ensure you use the greatest level of care and attention when carrying out these checks in order to avoid unnecessarily endangering other people or the machine.

### Workplace

- Ensure that your workplace
  - is always clean and dry, especially in places which metal or slag may reach in a liquid state;
  - insofar as this is located in areas in which flames and spraying molten masses are to be expected, has entrances and exits which allow the danger area to be left quickly and safely;
  - offers sufficient space around the machine; and
  - has sufficient lighting which has been adapted for the workplace.

### Personal protective equipment

Since, as operating personnel, you carry out a wide range of activities, you should always wear the minimum amount of protective equipment.

- For all work on and with the machine, please wear:
  - safety goggles
  - ear protection, where necessary
  - safety shoes and
  - work clothing

### Safety devices

- Ensure that
  - no persons are located in the machine safety zone;
  - only authorised personnel are located near the machine;
  - all safety equipment is present and functional (see Chapter 2.3 *Machine safety equipment*, Page24).

## 6 Operating the machine

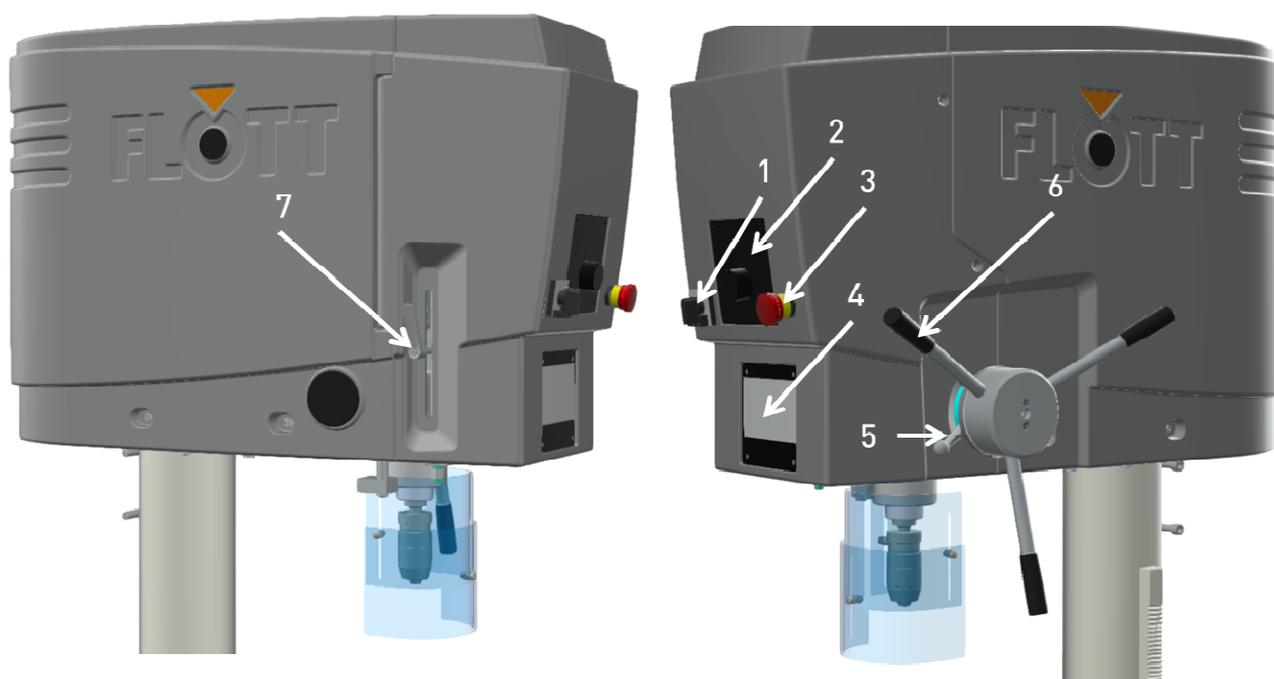


Before all work on and with the machine, read and observe the safety information in this operating manual (see Chapter 2.2 *Safety information for using the machine*, Page 20).

### 6.1 Machine controls

The machine has 6 main controls which the operator uses to operate the machine:

- Main switch (1)
- Control panel (2)
- EMERGENCY STOP button (3)
- Ancillary panel (4)
- Switch lever manual/auto (5)
- Drill handle (6)
- Fixed stop (7)



Item	Figure	Type	Function
1		Main switch	Switches the power supply of the machine on and off.
2		Push button Stop	Switches the machine drive off. <ul style="list-style-type: none"> <li>• The button light is off when the control system requires an entry (e.g. speed).</li> <li>• The light is illuminated when the drive is switched off.</li> <li>• The light flashes when the drive is switched on.</li> </ul>
2		Push button Start	Switches the machine drive on. The spindle starts to rotate. <ul style="list-style-type: none"> <li>• The light is off when the control system requires an entry (e.g. speed).</li> <li>• The light is illuminated when the drive is switched on.</li> <li>• The light flashes when the drive is switched off.</li> </ul>
2		Turn/push button	Must be turned and/or pressed as required. The button is used to <ul style="list-style-type: none"> <li>• set and confirm machine values</li> <li>• confirm error messages</li> <li>• switch on the display in standby mode</li> <li>• select menu points on the control system</li> </ul>
2		Push button Operating mode	Switches between the <i>drilling</i> or <i>tapping</i> operating modes (applies to manual and automatic mode). <ul style="list-style-type: none"> <li>• The light at the top left is illuminated when the <i>drilling</i> operating mode is selected.</li> <li>• The light at the bottom right is illuminated when the <i>tapping</i> operating mode is selected.</li> </ul>
2		Push button Zero point	Sets a specified zero point (e.g. for work piece surface). <ul style="list-style-type: none"> <li>• The light is illuminated when a zero point has been saved.</li> <li>• The light flashes when no zero point has been saved.</li> </ul>
3		EMERGENCY stop button	This button is used as an EMERGENCY STOP button in all situations and stops the drive and machine movement immediately.
4		Ancillary panel	<ul style="list-style-type: none"> <li>• Manual mode: Touchscreen interfaces for light, coolant pump, relay 1 and relay 2</li> <li>• Automatic operation: Programming of automatic functions (drilling, tapping, countersinking, flow drilling etc.)</li> </ul>

Item	Figure	Type	Function
5		Switch lever	The switch lever is used to switch between manual mode (lever points to the top and forwards) and automatic mode (lever points to the bottom and forwards). In automatic mode, the drill handle is mechanically decoupled from the pinion shaft for safety reasons.
6		Drill handle	The drill handle lever is used by the operator to move the spindle up and down during processing.  In automatic mode, the drill handle is decoupled from the feed drive mechanically by activating the switch lever for safety reasons.
8		Fixed stop	During the drilling process, this is used to set a (regular and recurring) drilling depth mechanically with the fixed stop.  Attention: Never operate the machine if the fixed stop has been removed! There is a risk of damage to the feed drive!

### EMERGENCY STOP button (impact button)



The EMERGENCY STOP button on the control panel serves as a safety switch for the operating personnel during their work on and with the machine.

The EMERGENCY STOP button can be used to immediately stop all the drives and movements of the machine in the event of an imminent risk, regardless of which operating mode and/or function is currently selected.

In the event of an interruption due to EMERGENCY STOP, the machine and the movements triggered by actuation buttons are immediately brought to a standstill, i.e. stop moving. The drive motor is slowed in a controlled manner and set to safe torque off (STO = Safe Torque Off) (stop category 1 according to IEC 60204-1).

In order to carry out an immediate machine stop, simply press the EMERGENCY STOP button.



### Note

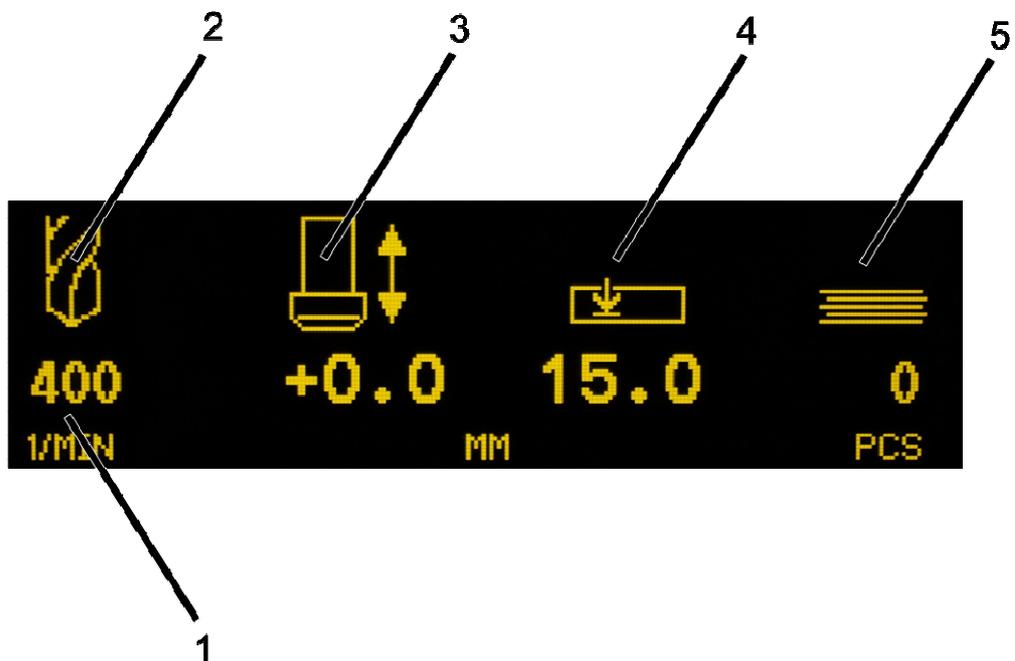
The EMERGENCY STOP button should not, however, be used to shut down the machine under normal circumstances (normal shutdown), as this will immediately interrupt the controlled movement of the machine. Only press the EMERGENCY STOP button in the event of a hazardous situation.

The EMERGENCY STOP button is self-locking. The machine can therefore only be operated again once you have eliminated the reason for the operational disruption and unlocked the EMERGENCY STOP button.

### Digital display

The display is integrated into the control panel and displays

- error messages (overrides all other displays)
- (1) spindle speed
- (2) active operating mode (threading or tapping)
- (3) drilling depth as an actual value
- (4) drilling depth as a target value
- (5) batch counter for the drill holes which have already been made



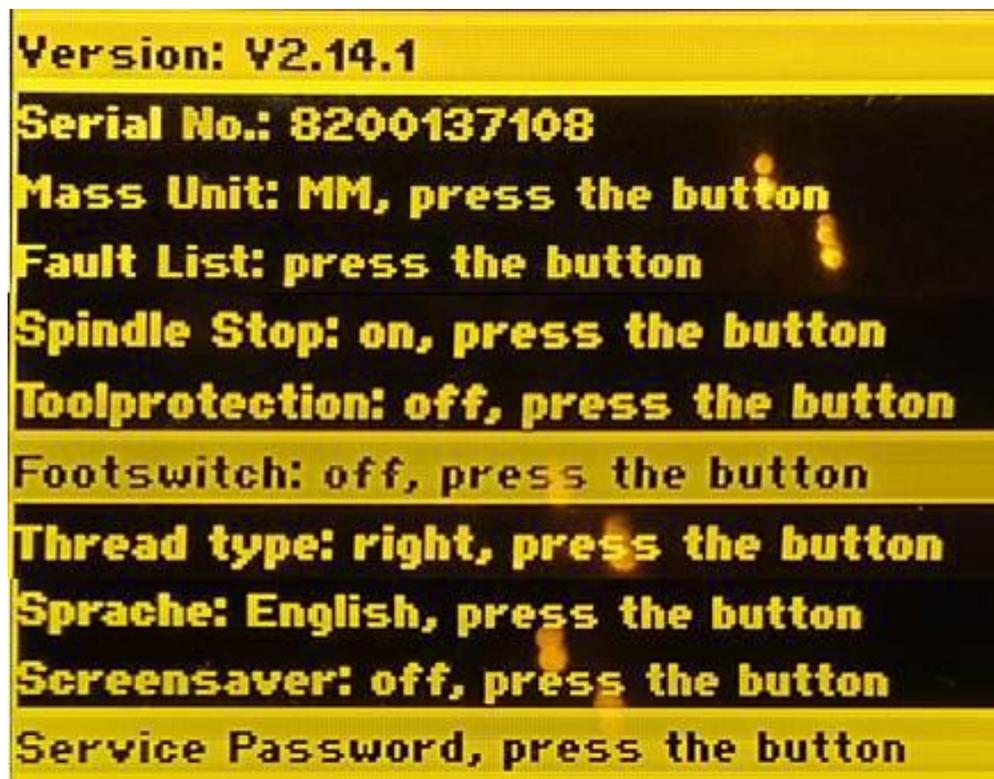
## 6.2 Accessing the operator menu on the control system

The control system has various operator menus which are shown on the display and can be used to set parameters. In order to do this, the machine must be in the *stop* operating mode.

The control panel and the ancillary panel communicate with each other. Changes in the operator menu are simultaneously carried over to the settings on the ancillary panel and vice versa. Settings made on the base panel in the operator menu are effective in both manual and automatic mode.



1. Press both push buttons at the same time to switch to the user menu. The user menu will then appear in the display and can be identified using the ring spanner symbol.



2. Select the desired sub-menu by slowly turning the turn/push button to highlight the sub-menu (yellow background). Please note the information in the following table.
3. Select the desired parameter from the sub-menu by pressing the turn/push button.
4. Make your selection in the sub-menu which appears by moving the yellow bar to the desired function and confirm by pressing the turn/push button.

Examples for the selection of the unit, spindle stop and tool protection below:



5. Press the red push button to exit the user menu.  
The normal display is then shown.



Sub-menu	Function	Setting
Version	Shows the software version in use on the control system.	Display only, no setting possible.
SerNo.	Displays the serial number of the control panel.	Display only, no setting possible.
Unit	Specifies the measuring unit of the machine for the zero point and the drill depth.	<ul style="list-style-type: none"> <li>● Unit of measurement mm</li> <li>● Unit of measurement inches</li> </ul>
Error list	Displays all errors which have occurred.	Display only, no setting possible.
Spindle stop	Defines whether the spindle is switched off after a drilling process in the upper position (can also be switched on/off via the touchscreen control panel).	<ul style="list-style-type: none"> <li>● Spindle stop off.</li> <li>● Spindle stop on.</li> </ul>
Tool protection	Defines whether the machine should be prevented from starting up with the tool in the work piece (depth positive).	<ul style="list-style-type: none"> <li>● Tool protection on</li> <li>● Tool protection off</li> </ul>
Foot switch	Defines whether a foot switch should be used (foot switch must be factory-made).	<ul style="list-style-type: none"> <li>● Foot switch on</li> <li>● Foot switch off</li> </ul>
Thread type	Selection between right-hand thread and left-hand thread.	<ul style="list-style-type: none"> <li>● Thread right</li> <li>● Thread left</li> </ul>
Language	Defines the display language.	<ul style="list-style-type: none"> <li>● German</li> <li>● English</li> </ul>
Screensaver	Defines whether the Screensaver (Standby) is enabled or disabled (affects the OLED lifetime)	<ul style="list-style-type: none"> <li>● Screensaver on</li> <li>● Screensaver off</li> </ul>
Service password	Enables entry of the service password for FLOTT service technicians only.	

## 6.3 Manual mode

### 6.3.1 Drilling a through hole



#### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



#### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.

1. Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).

The drill is then clamped and the machine is set to the required height.



#### **Attention**

*Risk associated with repeated loads.*

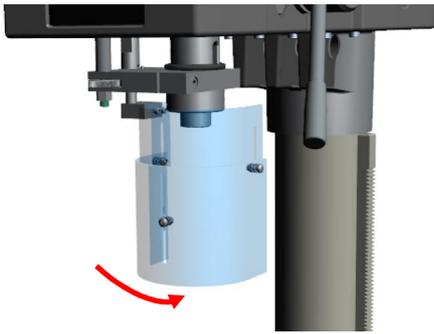
Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.

2. Clamp the work piece in the assembled vice.
3. Turn the main switch to I to switch on the power supply to the machine. The Flott logo will be displayed.



- 4.





- Swivel the drilling protection into its protective position in front of the tool before starting the machine. This activates the circuit breaker and releases the machine for operation.



- If necessary:  
Press the push button to select the *drilling* operating mode. The light at the top left is illuminated when the *drilling* operating mode is selected.



- Choose the necessary speed according to the drill and work piece being used by slowly turning the turn/push button
  - to set the speed (1/min) and
  - pressing the button to transfer the speed to the control system.
  - You can view the speed which has been set on the display.



- Press the push button to start the machine. The light is illuminated when the drive is switched on and the spindle is rotating.



- Push the drill handle down to slowly guide the drill towards the work piece. Drill the through hole in the work piece.
- Then guide the drill handle back up into its starting position.

- Press the push button to stop the machine. The light is illuminated when the drive is switched off.

This signals the end of the machining process.

## 6.3.2 Carrying out drilling with a fixed stop

In the event that a small series of drill holes needs to be made with the same drilling depth measurement, the fixed stop can be used.

The mechanical fixed stop is used during the drilling process to set the drilling depth using a mechanical restriction.



### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.

1. Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).

The drill is then clamped and the machine is set to the required height.



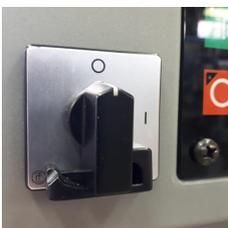
### **Attention**

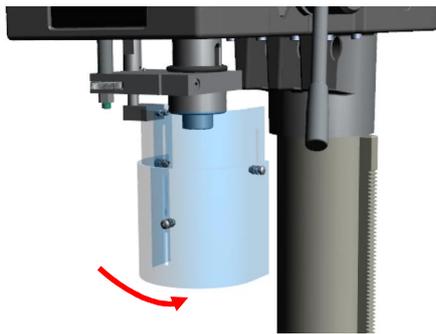
*Risk associated with repeated loads.*

Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.

2. Clamp the work piece in the assembled vice.

3. Turn the main switch to I to switch on the power supply to the machine. -> The Flott logo will be displayed.





4. Swivel the drilling protection into its protective position in front of the tool before starting the machine. This activates the circuit breaker and releases the machine for operation.



5. If necessary:  
Press the push button to select the *drilling* operating mode. The light at the bottom right is illuminated when the *drilling* operating mode is selected.



6. Choose the necessary speed according to the drill and work piece being used by slowly turning the turn/push button
  - to set the speed (1/min) and
  - pressing the button to transfer the speed to the control system.
  - The speed which has been set is shown on the display.



7. Push the drill handle down to slowly guide the drill towards the work piece. Drill the first blind hole in the work piece. Hold the drill handle in the lowest position of the drill hole.



8. Release the lever on the fixed stop and push the fixed stop to the lowest position.



9. Tighten the fixed stop lever in this position by hand. The fixed stop will now limit the drill depth for all subsequent drill holes.



10. Move the drill handle back up to its starting position.



**Note**

Please note that drilling with the fixed stop only enables an approximate drill depth to be set. You should use the drill depth setting on the control system to set this more precisely.

11. All subsequent drill holes can now be made using the fixed stop to limit the drill depth.
12. Release the lever on the fixed stop and push the fixed stop to the top position if you no longer require the drill depth limitation.



13. Tighten the fixed stop lever in this position by hand.



14. Press the push button to stop the machine.  
The light is illuminated when the drive is switched off.

This signals the end of the machining process.

### 6.3.3 Carrying out drilling with depth setting

The depth setting on the control system is only connected to an acoustic signal, so there is no mechanical or technical limitation of the drill hole depth. As the drilling process is carried out manually using the drill handle, it is therefore possible to continue drilling after the signal has been heard.



#### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



#### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.

1. Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).

The drill is then clamped and the machine is set to the required height.

2. Clamp the work piece in the assembled vice.

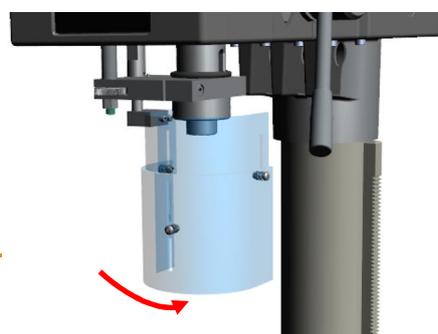


#### **Attention**

*Risk associated with repeated loads.*

Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.

3. Turn the main switch to I to switch on the power supply to the machine.



4. Swivel the drilling protection into its protective position in front of the tool before starting the machine.

This activates the circuit breaker and releases the machine for operation.



5. If necessary:  
Press the push button to select the *drilling* operating mode.  
The light at the top left is illuminated when the *drilling* operating mode is selected.



6. Choose the necessary speed according to the drill and work piece being used by slowly turning the turn/push button
- to set the speed (1/min) and
  - pressing the button to transfer the speed to the control system.
  - The speed which has been set is shown on the display.
  - Tip: You can also use the turn/push button to vary the speed and drill depth whilst the machine is running. Switch between the drill depth and speed setting by pressing the button.



7. Push the drill handle down to slowly guide the drill tip to the work piece surface.



8. Press the push button to transmit the zero point to the control system.  
The light is illuminated when the zero point has been saved in the control system.  
The zero point which has been set is shown on the display.



9. Set the required drill depth by slowly turning the turn/push button



- to set the drill depth (mm)
- or
- guide the drill handle to the desired drill depth and
- press the button to transfer the drill depth to the control system.
- The drill depth which has been set is shown on the display.
- Tip: You can also use the turn/push button to vary the speed and drill depth whilst the machine is running. Switch between the drill depth and speed setting by pressing the button.



10. Press the push button to start the machine.



The light is illuminated when the drive is switched on and the spindle is rotating.



Push the drill handle down to slowly guide the drill towards the work piece.

Drill the through hole or blind hole in the work piece.

A signal sounds once the pre-set drill depth has been reached.

The drill depth is also shown on the display.

11. Move the drill handle back up to its starting position.



12. Press the push button to stop the machine.

13. The light is illuminated when the drive is switched off.

This signals the end of the machining process.

### 6.3.4 Thread cutting with depth setting

Thread cutting takes place with the help of a tap which is suitable for the pre-drilled drill hole. Once the pre-set thread cutting depth has been reached, the direction of rotation of the spindle automatically switches to anticlockwise rotation to guide the tap out of the thread which has been created.

In the case of MV versions, thread cutting cannot be carried out with the mechanical feed for safety reasons. Once the *thread cutting* operating mode has been selected, the mechanical propulsion remains switched off.



#### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



#### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.

1. Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).

The tap is then clamped and the machine is set to the required height.

2. Clamp the work piece in the assembled vice.



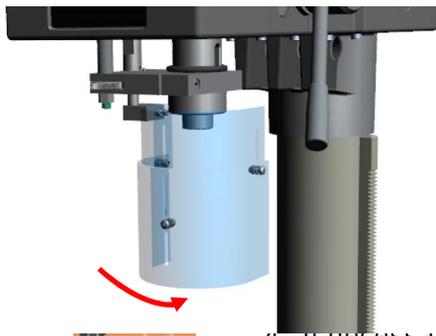
#### **Attention**

*Risk associated with repeated loads.*

Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.

3. Turn the main switch to I to switch on the power supply to the machine.





ing protection into its protective position in front of the tool be-  
re machine.

the circuit breaker and releases the machine for operation.



4. If necessary:

Press the push button to select the *thread cutting* operating mode.

The light at the bottom right is illuminated when the *thread cutting* operat-  
ing mode is selected.



5. Choose the necessary speed according to the tap and work piece being  
used by slowly turning the turn/push button

- to set the speed (1/min) and
- pressing the button to transfer the speed to the control system.
- The speed which has been set is shown on the display ( $N_{max} = 800$  1/min).
- Tip: You can also use the turn/push button to vary the speed and drill  
depth whilst the machine is running. Switch between the drill depth and  
speed setting by pressing the button.



6. Push the drill lever down to slowly guide the tap tip to the work piece sur-  
face.



7. Press the push button to transmit the zero point to the control system.

The light is illuminated when the zero point has been saved in the control  
system.

The zero point which has been set is shown on the display.



8. Set the required thread cutting depth by slowly turning the turn/push but-  
ton

- to set the thread cutting depth (mm)  
or
- guide the drill lever to the desired thread cutting depth and
- press the button to transfer the thread cutting depth to the control sys-  
tem.
- The thread cutting depth which has been set is shown on the display.
- Tip: You can also use the turn/push button to vary the speed and drill  
depth whilst the machine is running. Switch between the drill depth and  
speed setting by pressing the button.



9. Press the push button to start the machine.

The light is illuminated when the drive is switched on and the spindle is



rotating.



**Note**

Use the drill handle to adjust the spindle slightly when cutting a thread. This prevents any tensile force from being applied to the thread. This is particularly important for soft materials.



10. Push the drill handle down to slowly guide the tap towards the work piece. Cut the thread in the pre-drilled hole on the work piece. Once the pre-set thread cutting depth has been reached, the direction of rotation of the spindle automatically switches to anticlockwise rotation and the tap is guided out of the thread which has been created.
11. Move the drill handle back up to its starting position. Once the tap emerges from the work piece (drill depth display -0.3 mm), the direction of rotation of the spindle switches to clockwise rotation.
12. Press the push button to stop the machine. The light is illuminated when the drive is switched off.



This signals the end of the machining process.

## 6.3.5 Changing the drilling parameters

### Changing the speed

The spindle speed can be changed at any time during processing.



- Adjust the speed accordingly by slowly turning the turn/push button
  - to set the speed (1/min) and
  - pressing the button to transfer the speed to the control system.
  - The speed which has been set is shown on the display.
  - Note: On R3 machines, the speed can only be changed within the active gear stage when the drive motor is running (level 1: 0-400 rpm, level 2: 420-4000 rpm)

### Changing the zero point

The zero point (work piece surface) can be changed at any time during processing.



1. Push the drill lever down to slowly guide the tool tip to the work piece surface.
2. Press the push button to transmit the zero point to the control system. The light is illuminated when the zero point has been saved in the control system. The zero point which has been set is shown on the display.
- 3.

### Changing the drilling or thread cutting depth



1. Turn the turn/push button until the drilling depth parameter flashes.
2. Set the required drilling/thread cutting depth by slowly turning the turn/push button
  - to set the drilling/thread cutting depth (mm) or guide the drill lever to the desired drilling/thread cutting depth and
  - press the button to transfer the drilling/thread cutting depth to the control system.
  - The drilling/thread cutting depth which has been set is shown on the display. The speed adjustment on the control system is then active again.
  - Tip: You can also use the turn/push button to vary the speed and drill depth whilst the machine is running. Switch between the drill depth and speed setting by pressing the button.

### Setting the spindle stop

In principle, the control system can be used to define whether the spindle

- remains switched on continuously after the machine has been started up (until the machine is switched off); or
- is automatically switched off after the drilling process comes to an end and the spindle reaches the top position.

This may be advisable for safety reasons, for example.

The spindle stop is switched off in the default settings and can be set accordingly in the user menus. Observe

Chapter 6.7 *Accessing the operator menu on the control system* on Page 40.

### Setting the batch counter

The control system is equipped with a batch counter. The batch counter counts the number of drill holes which have been made only when the machine is running. It always begins with a batch count of 0 when the machine is started up. Once the pre-defined drilling depth has been achieved for one drill hole, the batch count goes up by a value of 1.



#### Note

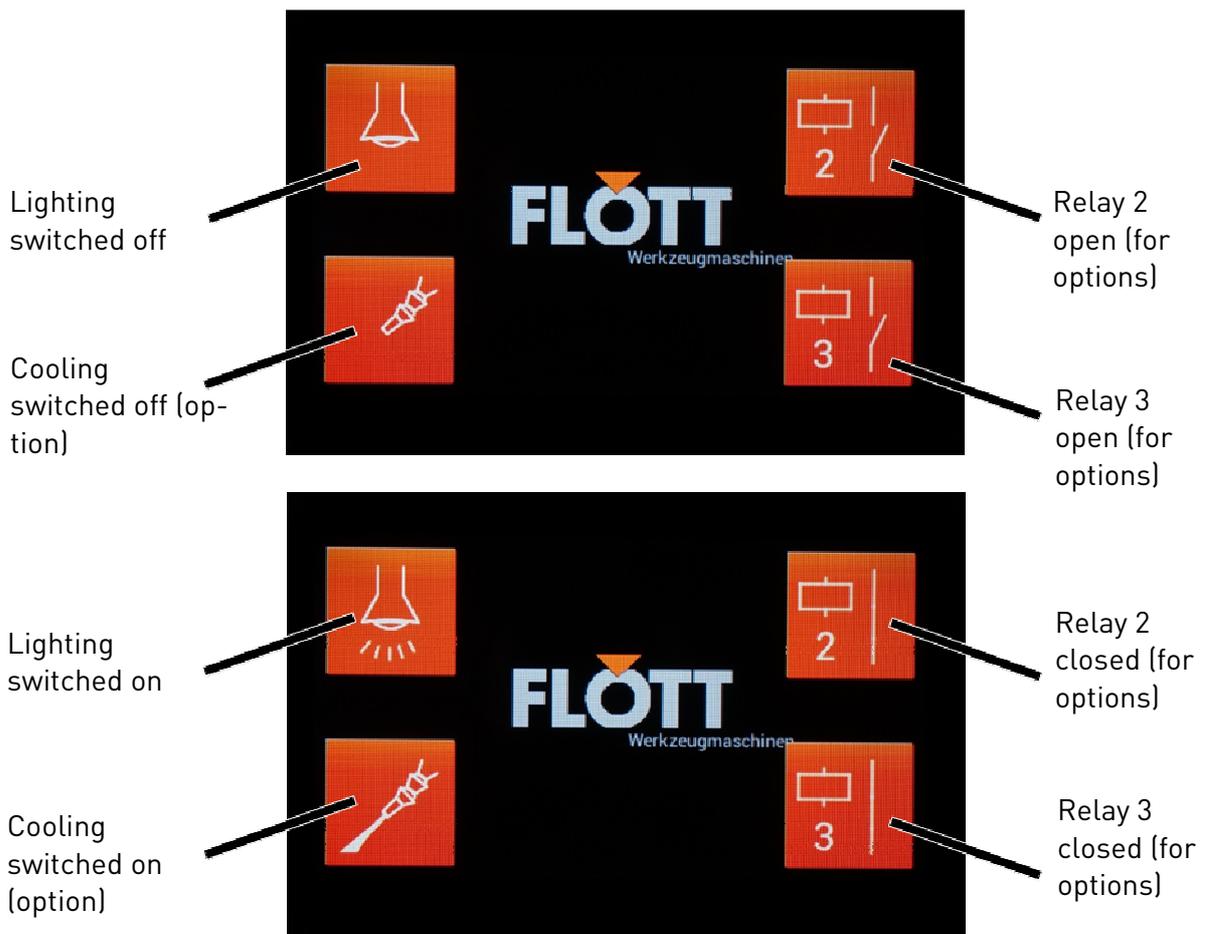
Once the batch counter has been reset to 0, the zero point is also reset. Therefore, check the zero point for additional drill holes and reset this where necessary.



- Press and hold the push button for at least 3 seconds when the machine is not running to set the batch counter to 0. This also resets the zero point, which may then need to be set again.

### 6.3.6 Functions of the ancillary panel in manual mode

In manual mode (switch lever up), the basic functionalities of the machine can be selected by touching the corresponding button fields on the ancillary panel (touchscreen operation):



## 6.4 Automatic mode

The machine's automatic mode supports you with a variety of processing tasks thanks to its intelligent and application-oriented programme selection. The parameters set in the control system guarantee the respective optimum machine parameters for safe and effective material processing when the wizard is used. The "drilling" and "tapping" operating modes which are also available in manual mode are supplemented with a fully-automated spindle feed in automatic mode.

Further processing programmes supplement these operating modes, including freely configurable stage programming which offers the user all the options to help find the perfect solution to their processing tasks.

### 6.4.1 Switching between manual and automatic mode

1.



- Machine is already switched on: continue to 2
- Machine is switched off:  
switch the machine on by turning the main switch clockwise to position "I".

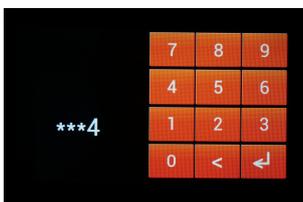
2.



Grasp the knob on the switch lever and move it downwards until it reaches the bottom stop. The lever position is evaluated by the control system. If the lever is not moved to the very bottom, the machine will not switch over to automatic mode.

Note: If the switch lever is somewhat difficult to move, there is a technical issue caused by the mechanical disengagement of the drill handle. In this case, please move the drill handle gently so that the toothing fits together correctly.

3.



In the event that automatic mode is locked, you can release the machine by entering the auto lock code ("1234" on delivery)

If you have forgotten the code or do not know it, please contact the Flott service team.

4.



Guide the switch lever up to switch back to manual mode (e.g. to quickly set a zero point, etc.)

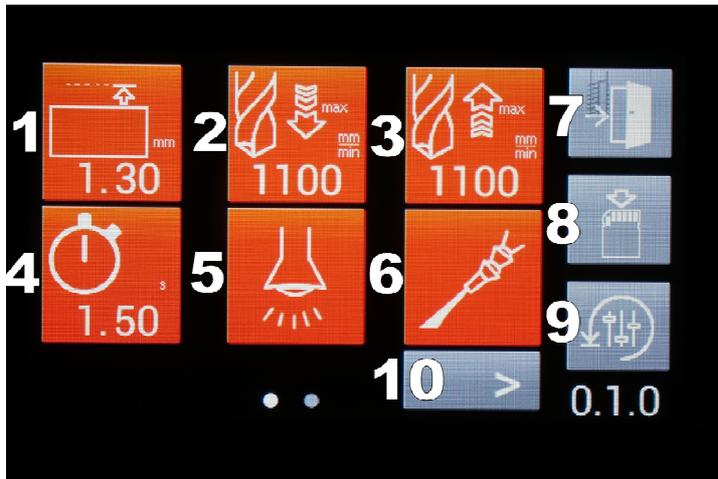
Note: Switching back to manual mode should be carried out with the sleeve retracted where possible, otherwise this causes pressure on the extension spring.

## 6.4.2 Structure of automatic mode

Index	Content	Identical to	Page
0.1.0	Setup Page 1		60
0.1.1	Safety distance		61
0.1.2	Rapid feed forwards/down		61
0.1.3	Rapid feed back/up		
0.1.4	Free cutting time		61
0.1.5	(Lighting – no separate page)		
0.1.6	(Coolant/relay 1 – no separate page)		
0.2.0	Setup Page 2		60
0.2.1	(Spindle stop – no separate page)		
0.2.2	Lock code setup		62
	Auto lock active/inactive		
	Read-only lock active/inactive		
	Change auto lock code		
	Change read-only lock code		
0.2.4	Display setup		62
(0.2.5)	Stage programming	3.0.0	74
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1.0.0	Drilling home screen		65
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1.0.3	Feed entry		66
1.1.0	Info/save/load/QR code drilling		67
1.2.1	Drilling wizard drill diameter		72
1.2.2	Drilling wizard material selection (soft – hard)		72
2.0.0	Threads home screen		68
2.0.1	Forwards speed entry		69
2.0.2	Depth entry		69
2.0.3	Backwards speed entry		70
2.0.4	Thread pitch entry		70
2.0.5	(Right-hand and left-hand rotation – no separate page)		
2.1.0	Info/save/load thread cutting		71
2.2.1	Threads wizard thread diameter		72
2.2.1	Threads wizard material selection (soft – hard)		72
3.0.0	Stage programming overview		74
3.0.1	Stage programming overview operating mode Page 1		75
3.0.2	Stage programming overview operating mode Page 2		75
3.0.3	Programme channels 1-6		82
3.0.4	Programme channels 7-12		
3.0.5	Programme channels 13-18		
3.0.6	Programme channels 19-24		
3.0.11 - 3.0.34	Memory locations 1-24 (overview)		83

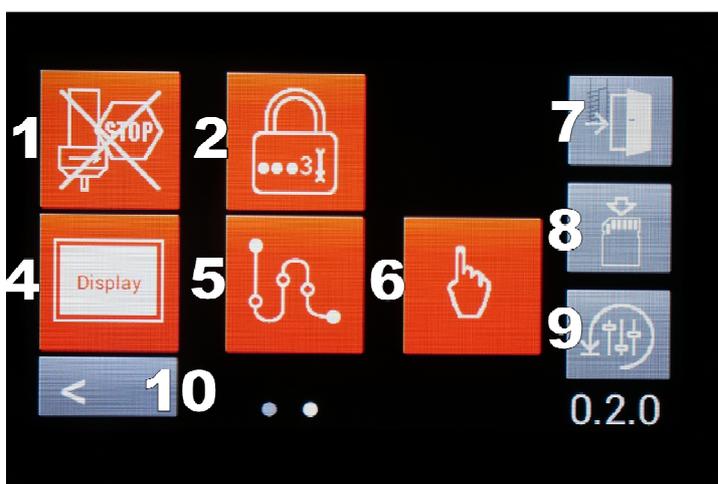
3.1.0		Stage programme drilling	1.0.0	
	3.1.1	Speed entry	1.0.1	
	3.1.2	Depth entry	1.0.2	
	3.1.3	Feed entry	1.0.3	
		Info/save/load/QR code	1.1.0	
3.2.0		Stage programming thread cutting	2.0.0	
	3.2.1	Speed entry	2.0.1	
	3.2.2	Depth entry	2.0.2	
	3.2.3	Backwards speed entry	2.0.3	
	3.2.4	Thread pitch	2.0.4	
	3.2.5	Right-hand/left-hand rotation	2.0.5	
		Info/save/load/QR code	2.1.0	
3.3.0		Stage programme grating		76
	3.3.1	Grating speed		
	3.3.2	Depth entry		
	3.3.3	Forwards feed entry		
	3.3.4	Backwards feed entry		
		Info/save/load/QR code		
3.4.0		Stage programme free step		77
	3.4.1	Speed entry		
	3.4.2	Depth entry		
	3.4.3	Feed entry		
	3.4.4	Options		
	3.4.5	Free cutting time		
		Info/save/load/QR code		
3.6.0		Stage programme countersinking		76
	3.6.1	Depth entry		
	3.6.2	Feed entry		
	3.6.3	Speed entry		
		Info/save/load/QR code		
3.7.0		Stage programming deep hole drilling		76
	3.7.1	Speed entry		
	3.7.2	End depth entry		
	3.7.3	Feed rate entry		
	3.7.4	Forwards feed entry increment		
	3.7.5	Backwards feed entry increment		
	3.7.6	Free cutting time entry		
		Info/save/load/QR code		
3.8.0		Stage programme flow drilling		77
	3.8.1	Speed entry 1		
	3.8.2	Depth entry 1		
	3.8.3	Feed entry 1		
	3.8.4	Speed entry 2		
	3.8.5	Depth entry 2		
	3.8.6	Feed entry 2	Info/save/load/QR code	

### 6.4.3 Default settings in automatic mode



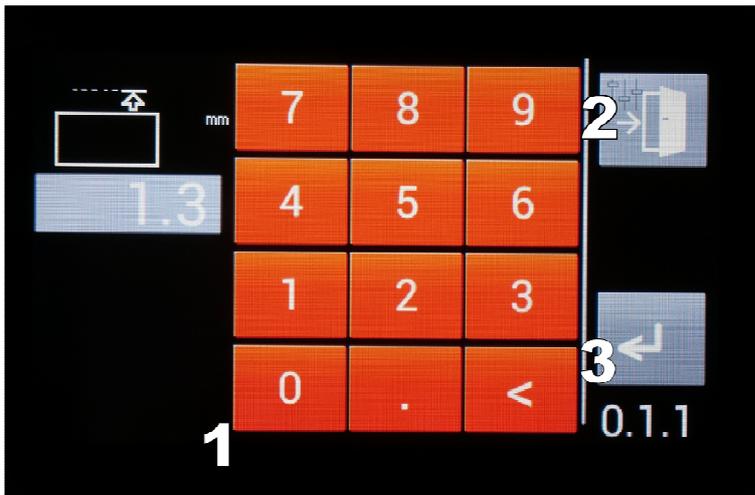
Setup Page 1:

- 1: Safety distance (mm)
- 2: Rapid feed, downwards (mm/min)
- 3: Rapid feed, upwards (mm/min)
- 4: Free cutting time (seconds)
- 5: Lighting (here: on)
- 6: Coolant pump (here: on) -> automatically added in the programme sequence
- 7: Exit (exit setup)
- 8: Save settings (hold down for at least 2 seconds until the signal sounds)
- 9: Back to factory settings
- 10: Go one page forward



Setup Page 2:

- 1: Spindle stop (here: off)
- 2: Lock code
- 4: Display settings
- 5: Stage programming
- 6: Inching mode
- 7: Exit (exit menu)
- 8: Save settings (hold down for at least 2 seconds until the signal sounds)
- 9: Back to factory settings
- 10: Return to previous page

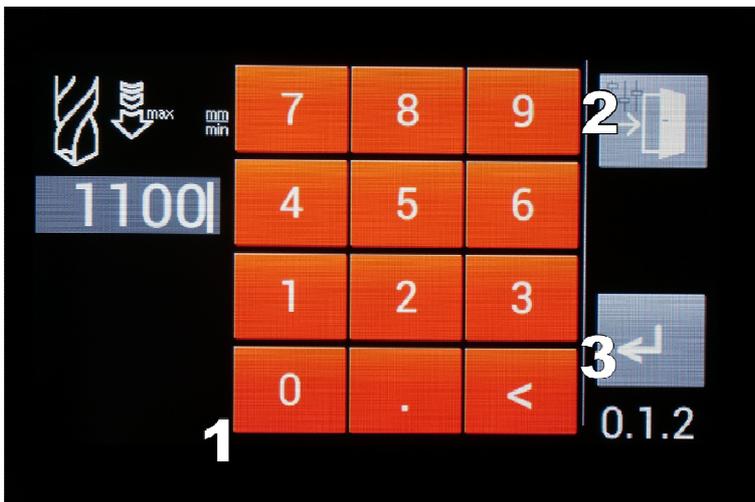


**Safety distance:**

Enter the desired safety distance relative to the defined zero point.

In automatic mode, this position switches from rapid feed to the feed speed of the processing stage, i.e. decelerates

- 1: Button field for value entry
- 2: Exit (back to 0.1.0)
- 3: Enter: accept value

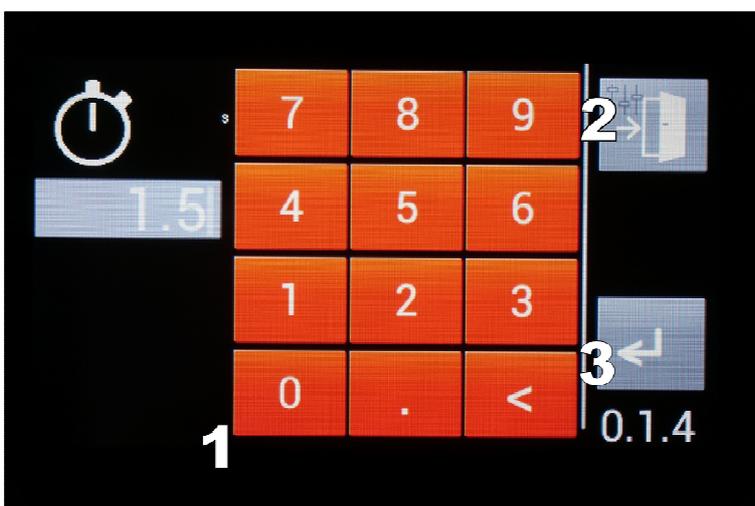


**Rapid feed, forwards:**

Enter the desired rapid feed in mm/min (0-1500 mm/min)

Input the settings for "rapid feed, backwards" (0.1.3) in the same way.

- 1: Button field for value entry
- 2: Exit (back to 0.1.0)
- 3: Enter: accept value

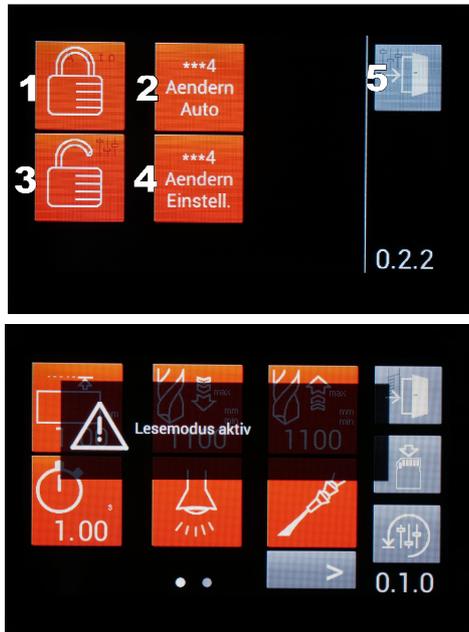


**Free cutting time:**

Enter the duration (0-10 seconds) for which the spindle should remain in the end position before going back to the starting position in the work piece.

e.g. large counterbore, etc.

- 1: Button field for value entry
- 2: Exit (back to 0.1.0)
- 3: Enter: accept value



Lock code overview

1: Lock automatic mode (here: locked)

2: Change auto lock code

3: Lock “read mode” (here: un-locked)

4: Change “read mode”

- Automatic lock:

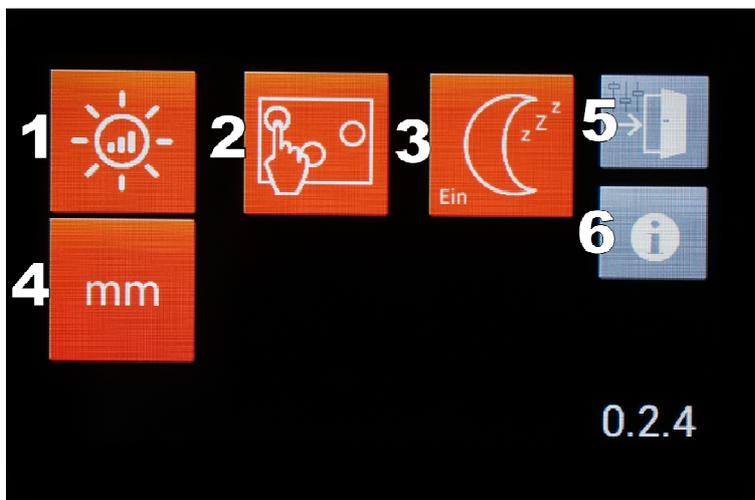
Requires the machine to be un-locked by entering a code each time it switches to automatic mode

- “Read mode”:

Locks to prevent any parameters or settings from being changed

Factory code: “1234” respectively

Important: In order to store the code settings permanently (after restarting the machine), save the default settings after setting the desired code (see Page 63)!



Display setup:

1: Screen brightness (3 levels – press the button multiple times)

2: Calibrate touchscreen (adjusts the screen to the user’s viewing angle)

3: Screen saver (here: on)

4: Unit selection between mm and inches (here: mm)

5: Exit: exits the page

6: Firmware info: shows the ver- sion statuses of the machine



Display of firmware versions of the machine components

#### 6.4.4 Inching mode (manual-automatic)

Inching mode enables the precise movement of the spindle and feed at the touch of a button (e.g. for set-up work, setting the zero point, changing tools, etc.)



##### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



##### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.

*Danger of crushing injuries.*



The sleeve feed is power-operated in automatic mode. During automatic mode, you must not reach into the working area between the drilling spindle and table and/or clamped tool.

Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).

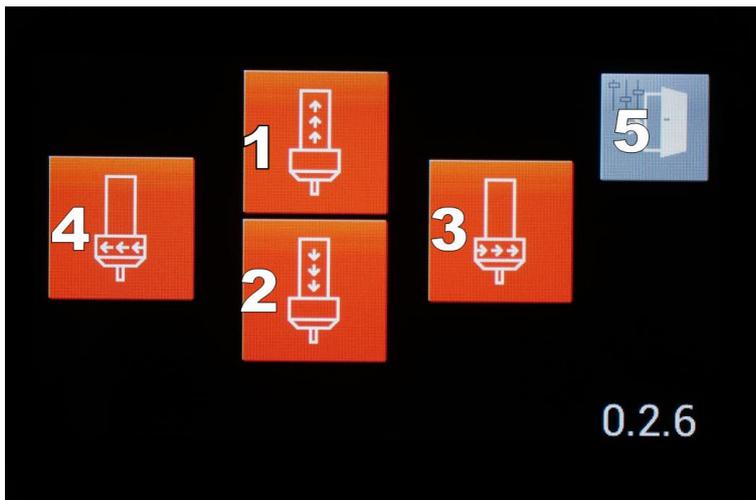
The drill is then clamped and the machine is set to the required height.



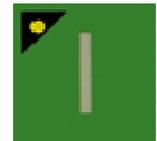
##### **Attention**

*Risk associated with repeated loads.*

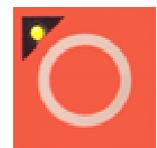
Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.



Important: Must be released by pressing the "1" button! (Button 5 is then hidden.)



Deactivate inching mode with "0".



1: Move the sleeve upwards

2: Move the sleeve downwards

3: Clockwise rotation of spindle

4: Anticlockwise rotation of spindle

5: Exit (back to setup)

### 6.4.5 Automatic drilling

In the ancillary panel, the display uses the pictograms with coloured backgrounds to show the adjustable parameters. The values can be set individually and independently from one another by touching the associated button fields.



#### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



#### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.



*Danger of crushing injuries.*

The sleeve feed is power-operated in automatic mode. During automatic mode, you must not reach into the working area between the drilling spindle and table and/or clamped tool.

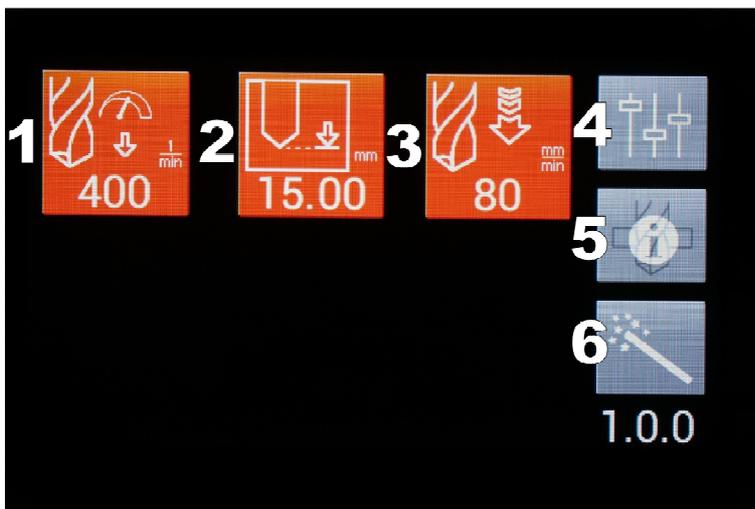
Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).  
The drill is then clamped and the machine is set to the required height.



**Attention**

*Risk associated with repeated loads.*

Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.

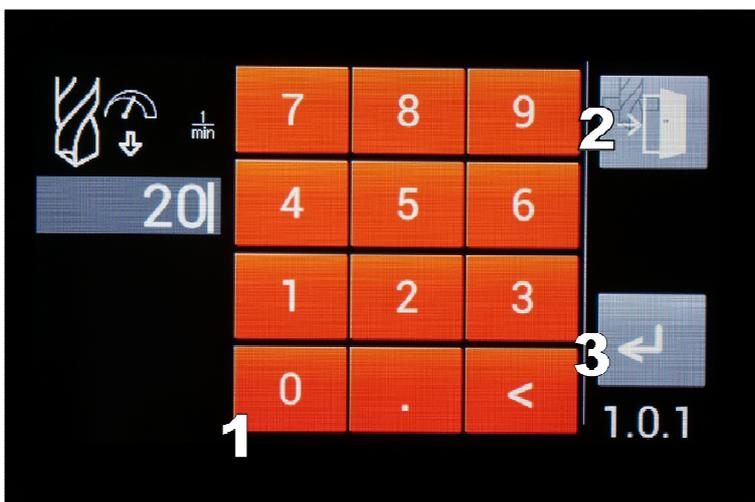


Step 1:

The “automatic drilling” operating mode is accessed via the “drive type” push button on the control panel



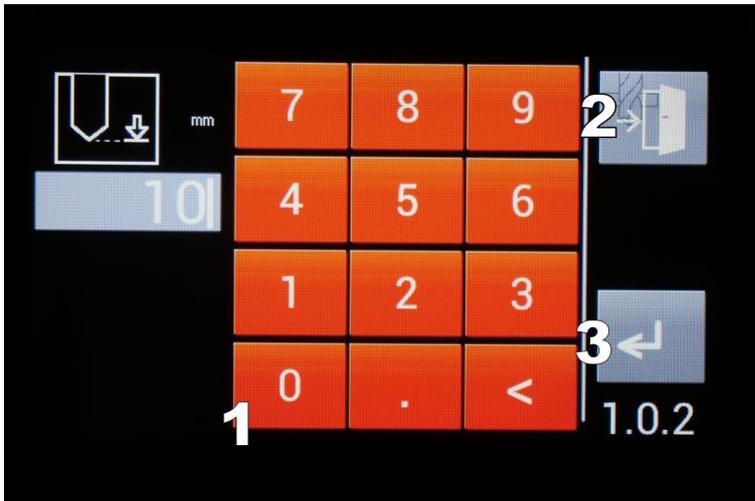
- 1: Spindle speed (rpm)
- 2: Target depth (mm)
- 3: Drilling feed speed (mm/min)
- 4: Access default settings/setup
- 5: Info/save/load
- 6: Drilling wizard (See Chapter “Wizard”)



Step 2:

Drilling speed entry:

- 1: Button field for value entry
- 2: Exit (back to 1.0.0)
- 3: Enter: accept value

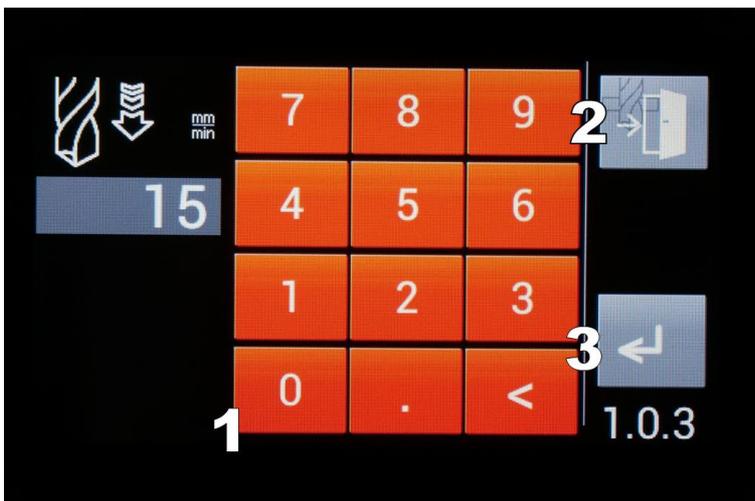


Step 3:

Target depth entry:

- 1: Button field for value entry
- 2: Exit (back to 1.00)
- 3: Enter: accept value

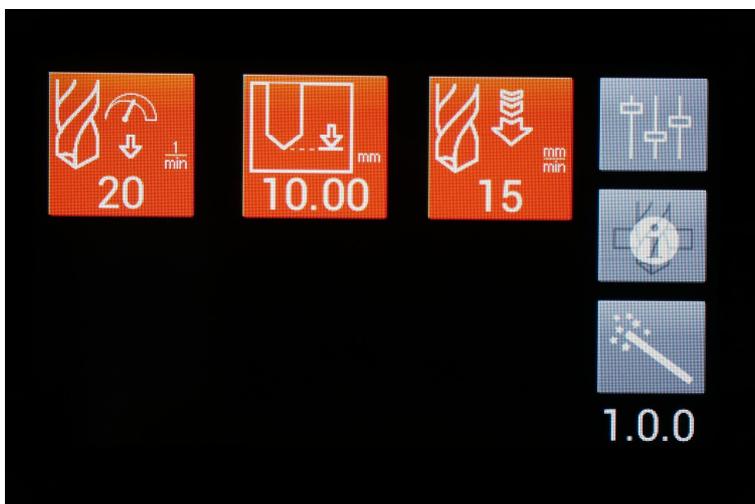
Unit depends on the default setting (mm or inches)



Step 4:

Entry of the drilling feed speed:

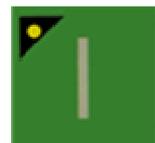
- 1: Button field for value entry
- 2: Exit (back to 1.00)
- 3: Enter: accept value



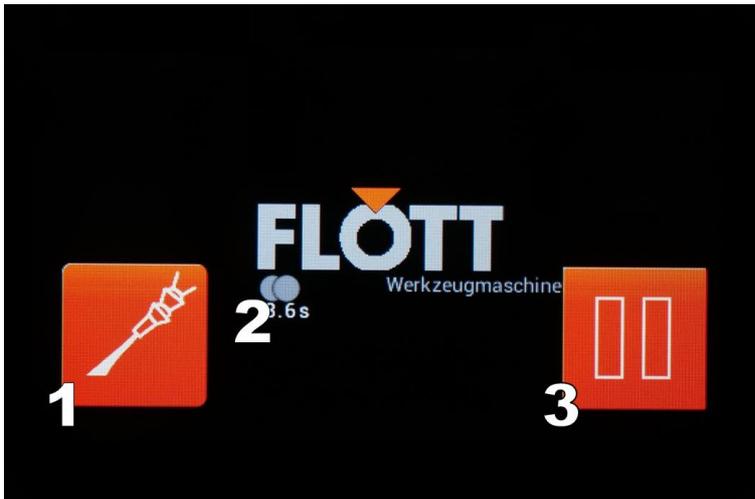
Step 5:

The values which are entered are shown in the overview.

You can now start the programme with the button.



There is also the option of starting the programme with the foot switch (if installed at the factory)



Step 6:

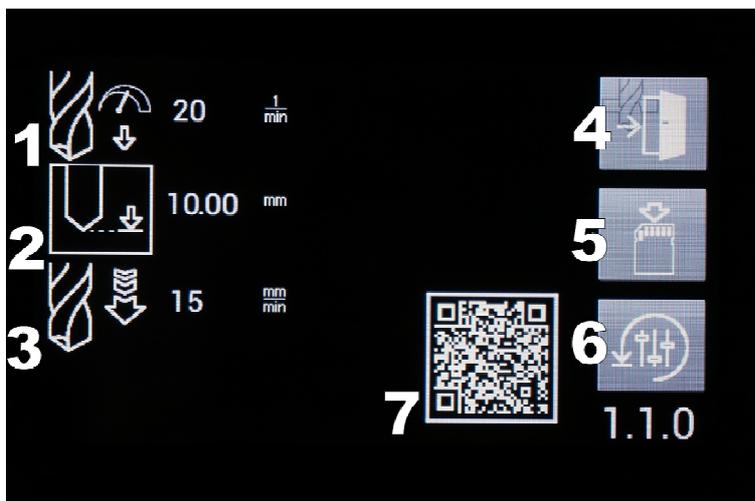
Drilling status display:

1: Switch coolant on and off (temporarily overrides the "coolant" default setting)

2: Stopwatch (seconds)

3: Pause/start:

Pauses the feed (spindle continues to move)



Drilling parameters overview:

1: Revolutions per minute

2: Depth

3: Feed rate

4: Exit (back to 1.0.0)

5: Save values -> saved as standard for "automatic drilling" (hold button down until signal sounds)

6: Factory settings (hold button down until signal sounds)

7: QR code (media library)

### 6.4.6 Automatic thread cutting

Automatic thread cuttings enables the threads to be cut without a compensating chuck via process-controlled and process-monitored coupling of the rotation speed and feed. Please set the required settings for automatic thread cutting as follows:



#### **Wear safety goggles**

Always wear the required safety goggles for all work on and with the machine!



#### **Warning**

*Risk associated with the fast rotation of the drill spindles.*

The fast rotation of the drill spindles may result in hair or clothing getting pulled into the machine. This can lead to serious injury.

Therefore, when operating the machine

- wear long hair in a hair net or wear suitable headgear at all times;
- **never** wear gloves, ties, armbands, rings on your fingers, necklaces or other loose items of clothing.

*Danger of crushing injuries.*

The sleeve feed is power-operated in automatic mode. During automatic mode, you must not reach into the working area between the drilling spindle and table and/or clamped tool.

Carry out all of the necessary tasks to prepare the machine (see Chapter 5 *Before using the machine*, Page 29).

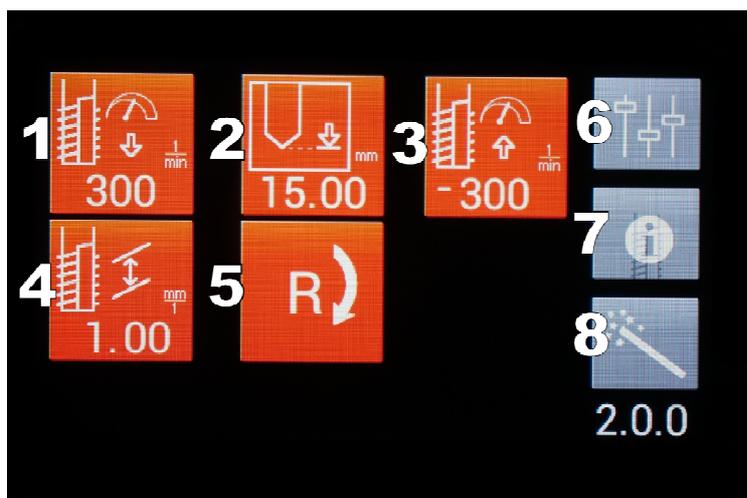
The drill is then clamped and the machine is set to the required height.



**Attention**

*Risk associated with repeated loads.*

Repeated lifting of heavy weights may lead to unhealthy pressure on the body and rapid tiring. For work piece weights > 10 kg, use a suitable lifting device for the loading and unloading process.

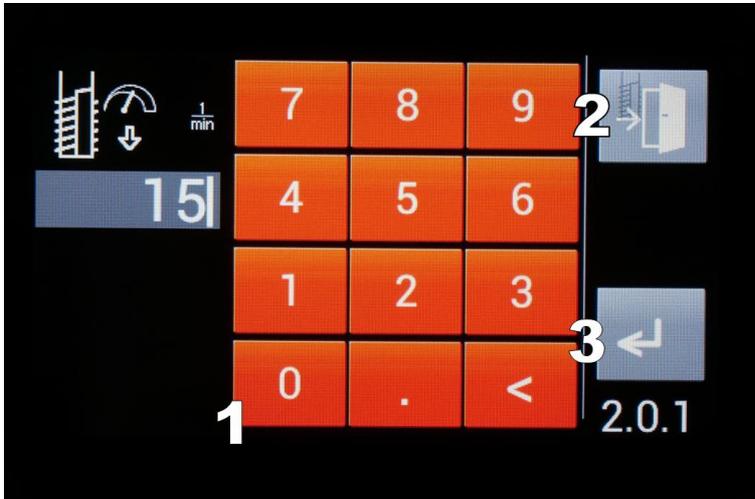


Step 1:

The “automatic thread cutting” operating mode is accessed via the “Operating mode” push button on the control panel



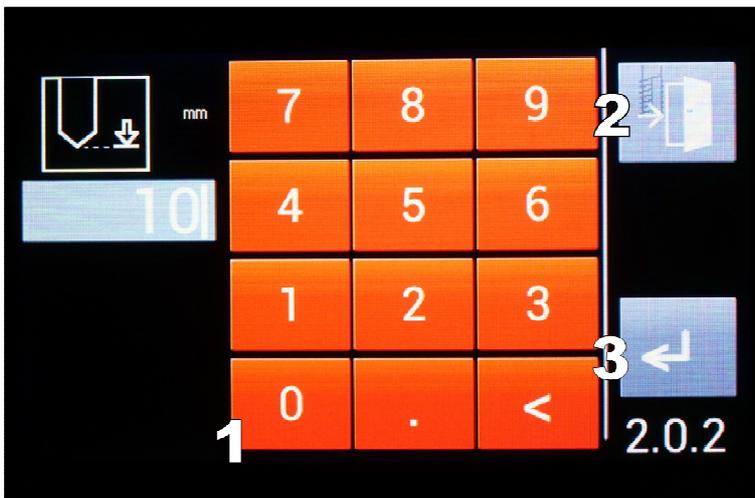
- 1: Spindle speed, forwards (rpm)
- 2: Target depth (mm)
- 3: Spindle speed, backwards (rpm)
- 4: Pitch (metric/inches)
- 5: Right-hand/left-hand rotation
- 6: Access default settings/setup
- 7: Info/save/load
- 8: Thread cutting wizard < (See Chapter “Wizard”)



Step 2:

Speed entry forwards threads:

- 1: Button field for value entry
- 2: Exit (back to 2.0.0)
- 3: Enter: accept value



Step 3:

Target depth entry:

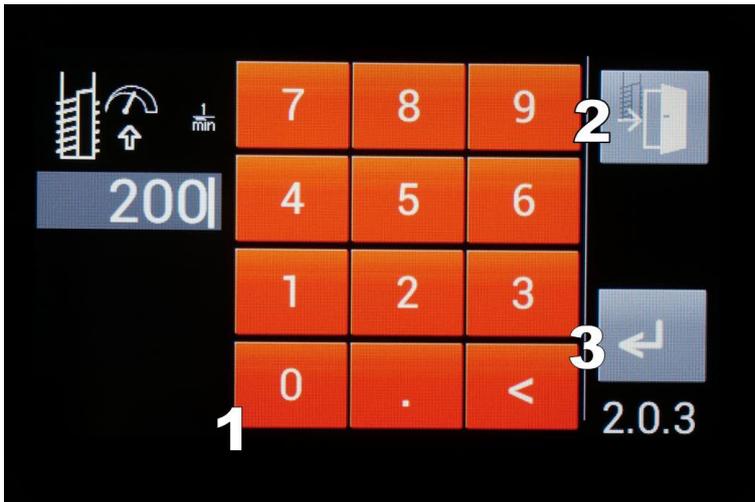
- 1: Button field for value entry
- 2: Exit (back to 2.0.0)
- 3: Enter: accept value

Unit in mm or inches according to settings

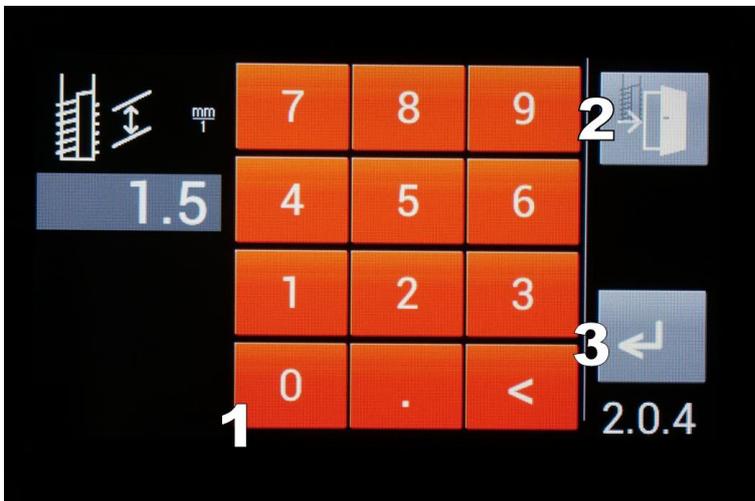
**Attention:**

The feed is coupled with the spindle speed depending on the pitch. High speeds may lead to the target depth being exceeded (depending on the tool, material and friction values).

In this case, reduce the depth value accordingly.

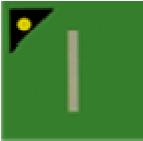


Step 4:  
Speed entry backwards thread:  
1: Button field for value entry  
2: Exit (back to 2.0.0)  
3: Enter: accept value



Step 5:  
Pitch entry  
1: Button field for value entry  
2: Exit (back to 2.0.0)  
3: Enter: accept value



Step 6:  
The values which are entered are shown in the overview.  
You can now start the programme with the  button.

There is also the option of starting the programme with the foot switch (if installed at the factory)



Step 6:

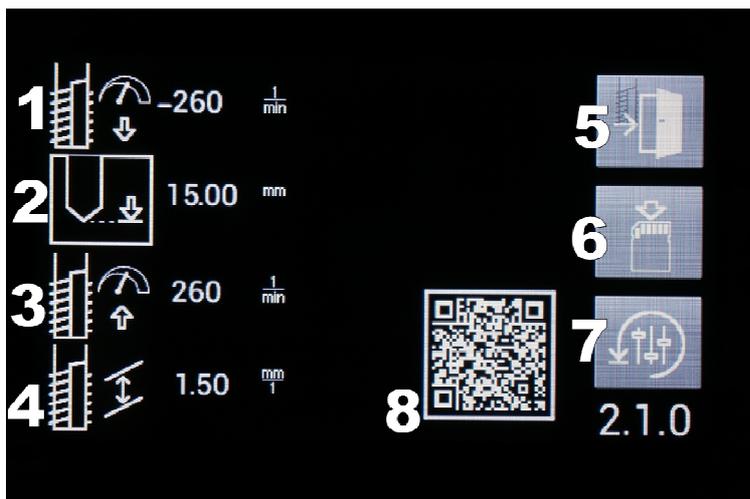
Thread cutting status display:

2: Switch coolant on and off (temporarily overrides the default settings)

2: Stopwatch (seconds)

Note:

Unlike with automatic drilling, no feed pause function is possible with automatic thread cutting for technical reasons.



Thread parameters overview:

1: Speed, forwards

2: Depth

3: Speed, backwards

4: Pitch

5: Exit (back to 2.0.0)

6: Save values -> saved as standard for "automatic thread cutting" (hold button down until signal sounds)

7: Factory settings (hold button down until signal sounds)

8: QR code (media library)

### 6.4.7 Wizard – assistant for selecting machine parameters

The drilling and thread cutting operating modes offer the wizard function, which, depending on the tool size (drill and tap) and the material (hardness), gives you recommendations for suitable machine parameters and sets these directly.

The spindle speed and the automatic feed are selected to achieve an optimum cutting speed, tool life and cutting performance.

The wizard is a material matrix which stores cutting speeds and material characteristics.

The operation of the wizard is identical for the "automatic drilling" and "automatic thread cutting" operating modes and takes place as follows:



Step 1:

Open the wizard in the overview windows for drilling or thread cutting (1.0.0 or 2.0.0)

Step 2:

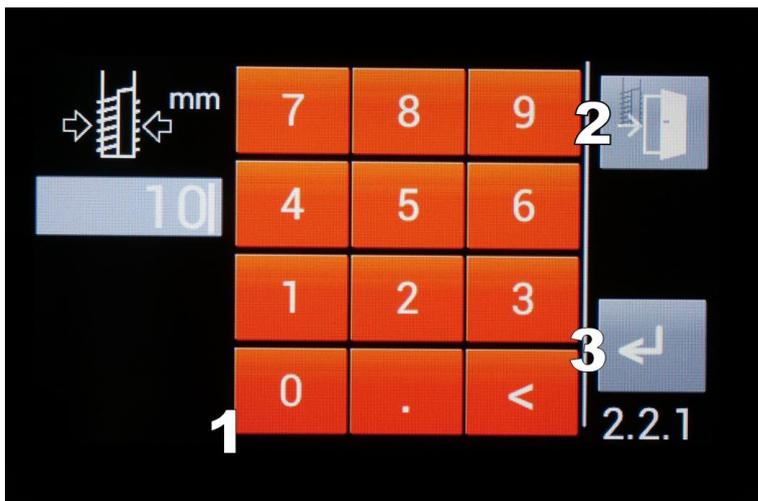
Drilling wizard:

Query of the drill diameter

1: Button field for value entry

2: Exit (back to 1.0.0)

3: Enter: accept value



Thread cutting wizard:

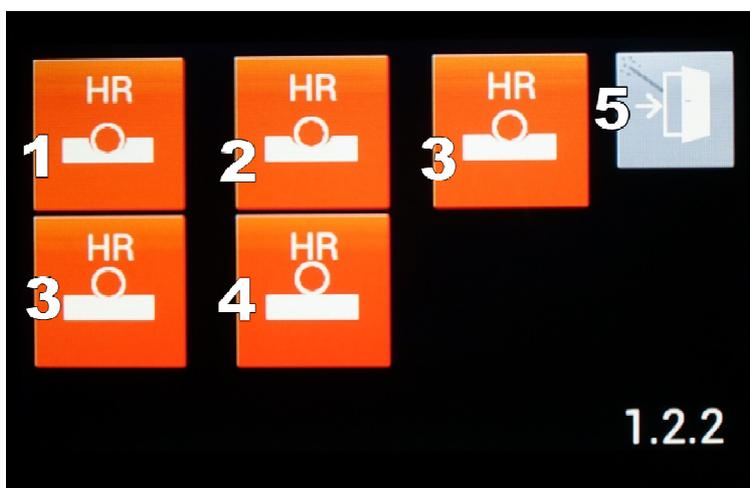
Query of the thread diameter

1: Button field for value entry

2: Exit (back to 2.0.0)

3: Enter: accept value

A coarse thread is required.



Step 3:

Drilling and thread cutting wizard:

Query of the material hardness:

HR > Rockwell hardness

1: soft

2: soft-medium

3: medium

4: medium-hard

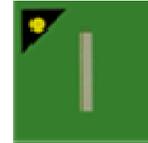
5: hard

Page 2.2.2 (Thread hardness wizard) is set out in the same way



Step 4:

The values recommended by the wizard are loaded into the machine directly and the machining process can be started.



Alternatively, the parameters can also be adjusted individually before starting the machine.

## 6.5 Stage programming

Stage programming provides you with comprehensive and variable adjustment of the automatic operating mode to suit your processing task.

You can access the overview of stage programming by selecting the “Stage programming” button in the setup menu.

### 6.5.1 Stage programming overview

The left-hand column shows the chronological sequence of the stage programmes. The respective pictogram refers to the processing type of the stage (e.g. drilling, thread cutting, grating). The key operating parameters of the stages are also shown.

The “Plus” and “Minus” buttons at the bottom edge of the screen can be used to add or remove stages.

The “Up” and “Down” arrows are used to navigate through the stages. The cursor (arrow symbol) on the left-hand edge of the screen shows the position of the selection.

The respective stage which is selected is highlighted. The position of the cursor can be used to add or remove stage programmes.



- 1: Cursor
- 2: Stage programme display with operating mode and parameters
- 3: Sleeve path (short arrow = fast stroke, long arrow = working stroke)
- 4: “-”: Remove stage
- 5: “+”: Insert stage at cursor position
- 6: Select memory locations for stage programmes and choose between “hare” and “snail” (Chapter 6.5.5)
- 7: Exit: back to setup (0.2.0)
- 8: Move cursor up
- 9: Move cursor down

The respective stage can be called up and changed by pressing the button.

24 memory locations, each with 8 stages, are available.

6 demonstration programmes are factory-installed; these can be used as programming examples, overwritten or used following adaptation to the individual processing task.

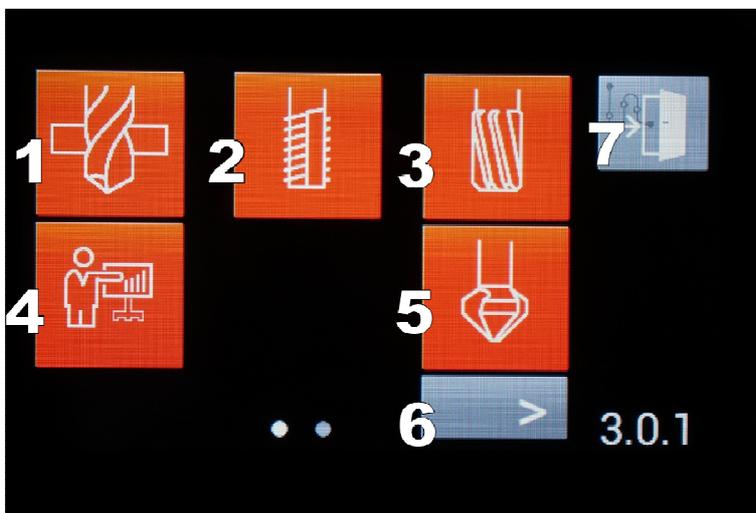
Note: For all operating modes with the exception of “Free stage step”, the spindle returns to the starting position (Z position at the start of the process) after the processing stage.

If this is not desired, the “Free stage step” operating mode must be used and “Back to start position” must be deactivated in the options (Page 76).

## 6.5.2 Selection of the operating mode (stage programme)

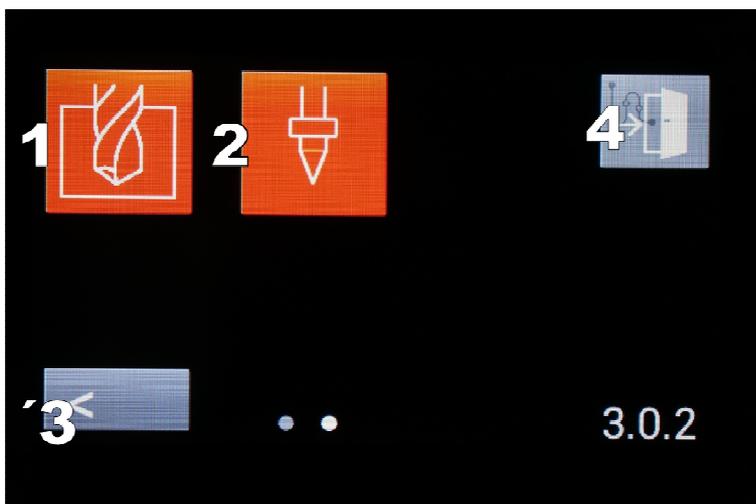
The following operating modes can be selected in the stage programming:

- Drilling
- Thread cutting
- Grating
- Countersinking
- Deep hole drilling
- Flow drilling
- "Free stage step"



Stage programme selection Page 1

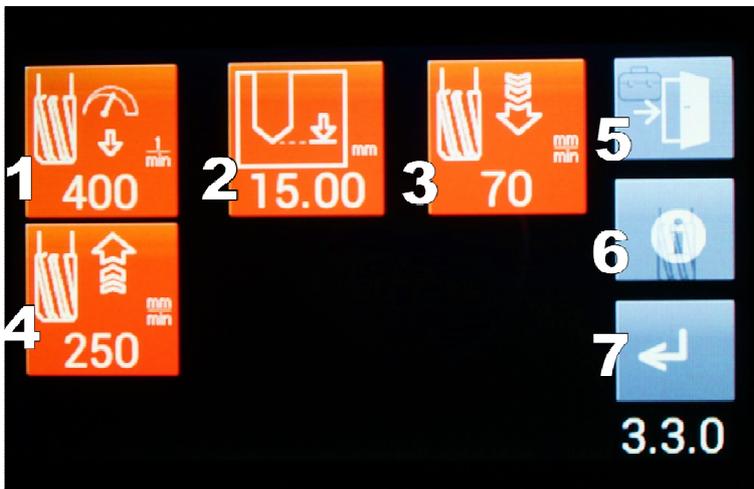
- 1: Drilling
- 2: Thread cutting
- 3: Grating
- 4: Free stage step
- 5: Countersinking
- 6: Go to stage programme selection Page 2 (3.0.2)
- 7: Exit: back to stage programme overview (3.0.0)



Stage programme selection Page 2

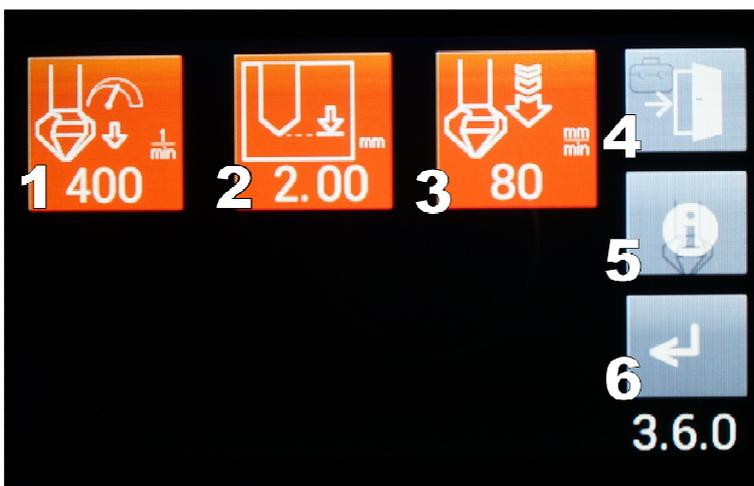
- 1: Deep hole drilling
- 2: Flow drilling
- 3: Go to stage programme selection Page 1 (3.0.1)
- 4: Exit: back to stage programme overview (3.0.0)

### 6.5.3 Special operating modes



Grating:

- 1: Spindle speed, forwards (rpm)
- 2: Target depth (mm)
- 3: Forwards feed (rpm)
- 4: Backwards feed (rpm)
- 5: Exit: back to overview 3.0.0
- 6: Info/save/load
- 7: Press enter to confirm (transfer to the programme)



Countersinking:

- 1: Spindle speed (rpm)
- 2: Target depth (mm)
- 3: Feed rate, forwards (mm/min)
- 4: Exit: back to stage programme overview (3.0.0)
- 5: Info / save / load
- 6: Exit: back to overview 3.0.0



Deep hole drilling:

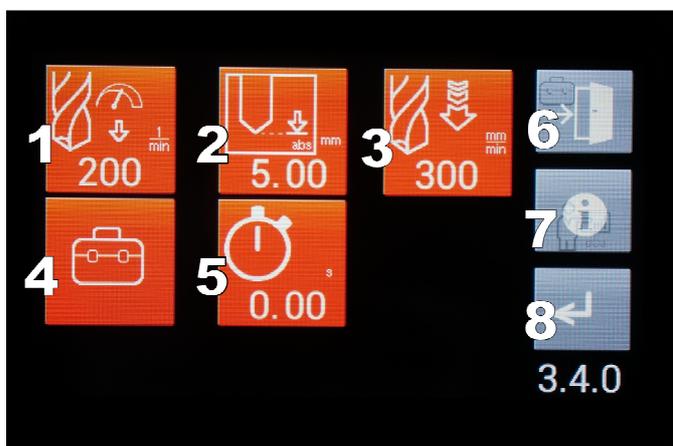
- 1: Spindle speed, forwards (rpm)
- 2: End depth (mm)
- 3: Feed rate (mm/min)
- 4: Part depth value, forwards (mm)
- 5: Part depth value, backwards (mm)
- 6: Free cutting time per run (secs)
- 7: Exit (back to 3.0.0)
- 8: Info / save / load

9: Press enter to confirm



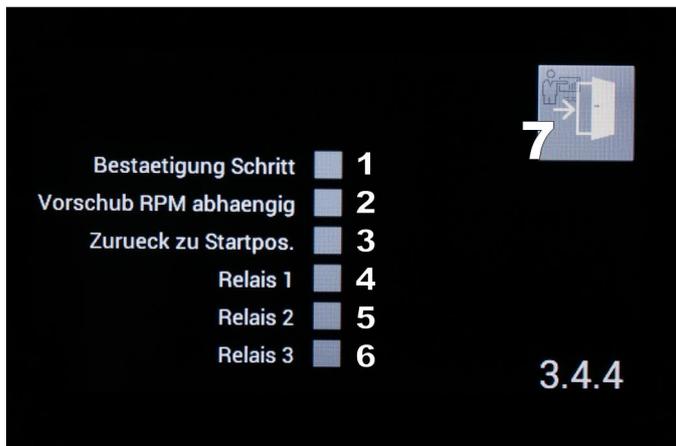
Flow drilling:

- 1: Spindle speed 1 (rpm) when heating the tool surface
- 2: Penetration of the flow drilling tool (mm) when heating the tool surface
- 3: Feed rate (mm/min) when heating the tool surface
- 4: Spindle speed 2 (rpm) when penetrating the material
- 5: End depth of the flow drilling tool (mm) when penetrating the material
- 6: Feed rate (mm/min) when penetrating the material



Free step:

- 1: Spindle speed (rpm)
- 2: Target depth (mm) – absolute or incremental
- 3: Feed rate
- 4: Options (see below)
- 5: Free cutting time
- 6,7,8: cf. 3.7.0, 3.8.0, etc.

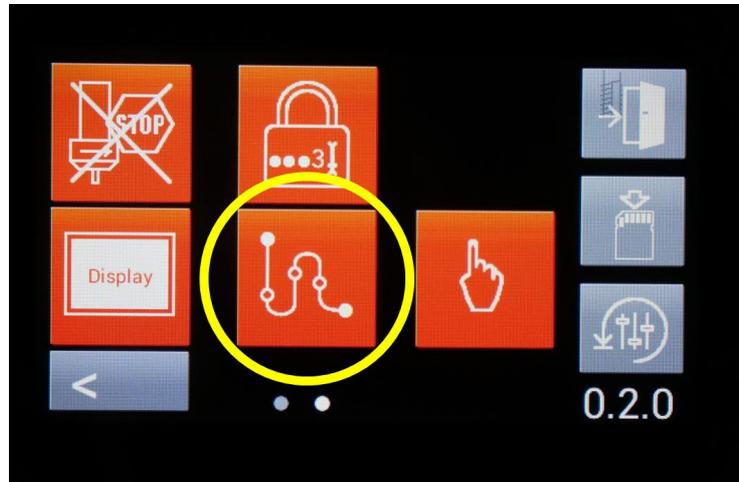


“Free step” options:

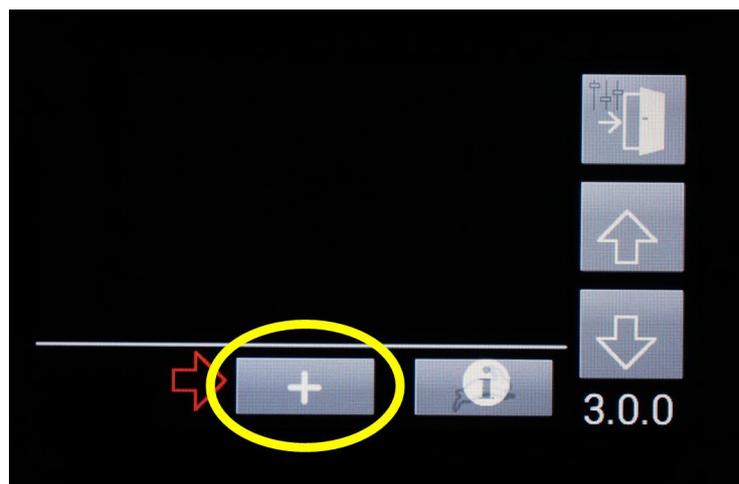
- 1: Confirm for programme sequence active/inactive
- 2: Speed-dependent feed (i.e. thread mode)
- 3: Sleeve moves back to starting position after step active/inactive (only possible at last stage)
- 4,5,6: Switch relay (with optional connected accessory)

## 6.5.4 Create individual stage programme

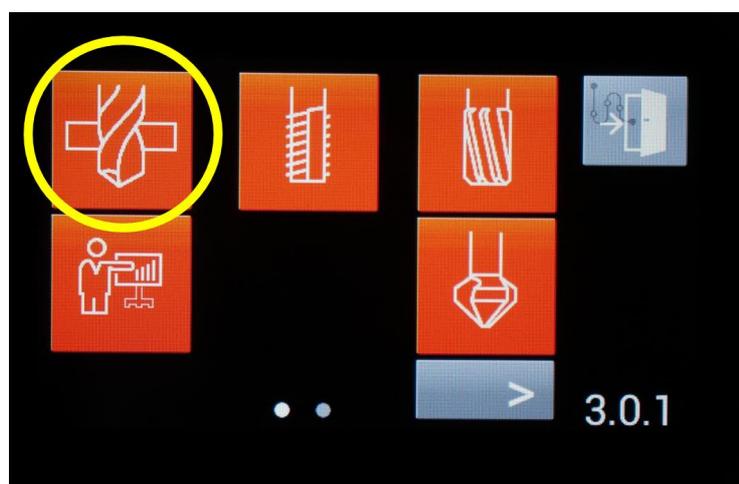
1. Access the stage programme function via the setup (Page 0.2.0)



2. Add the desired operating mode as the first stage using the "+" button

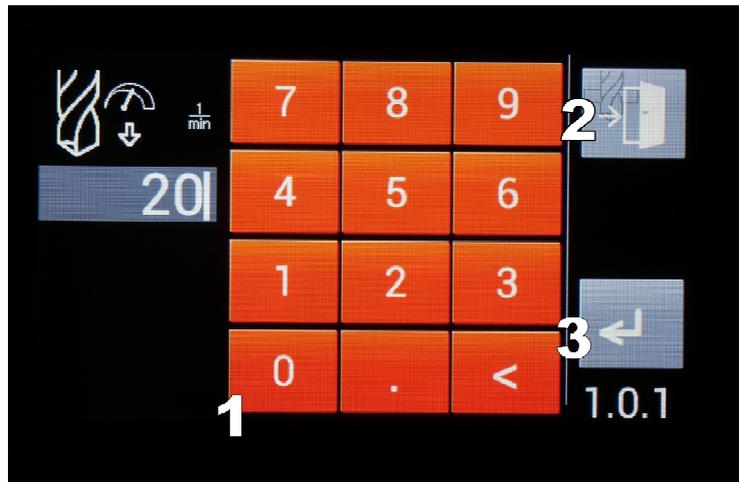


In the example here: "Drilling a through hole"

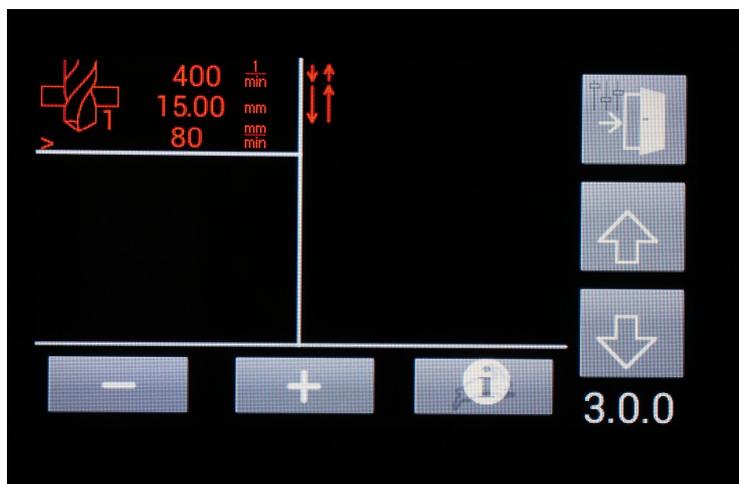
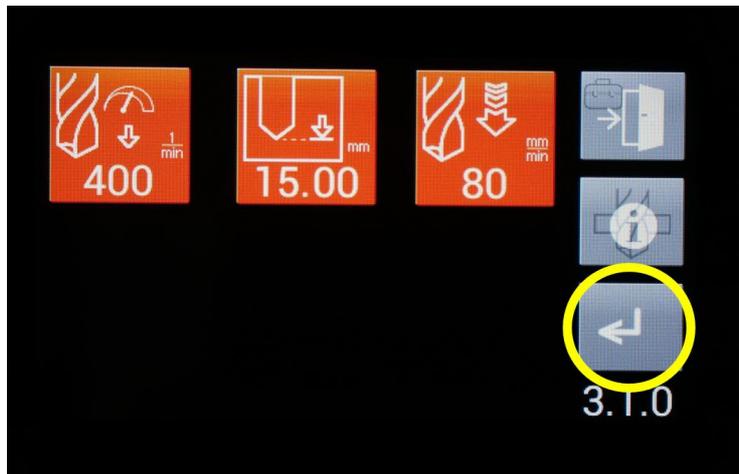


- The settings for drilling and thread cutting in stage programming are set in the same way as for "Automatic drilling" and "Automatic thread cutting" (Chapter 6.4.5 and Chapter 6.4.6).

For the special operating modes (grating, flow drilling, etc.), please observe the instructions in Chapter 6.5.3, Page 76)



- The first stage is transferred to the program when you press the "Enter" button



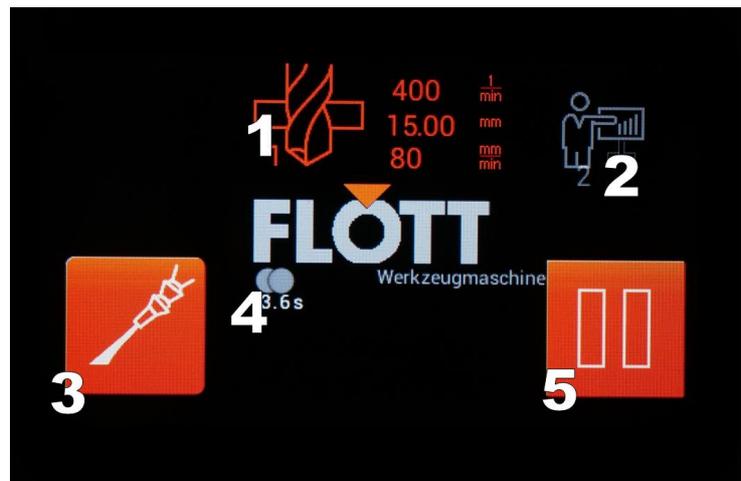
5. Add however many additional stages you need to complete your individual stage programme



6. After the programme has been completed, the machine can be started directly from the 3.0.0 view and/or the programme can be saved (Chapter 6.5.5).

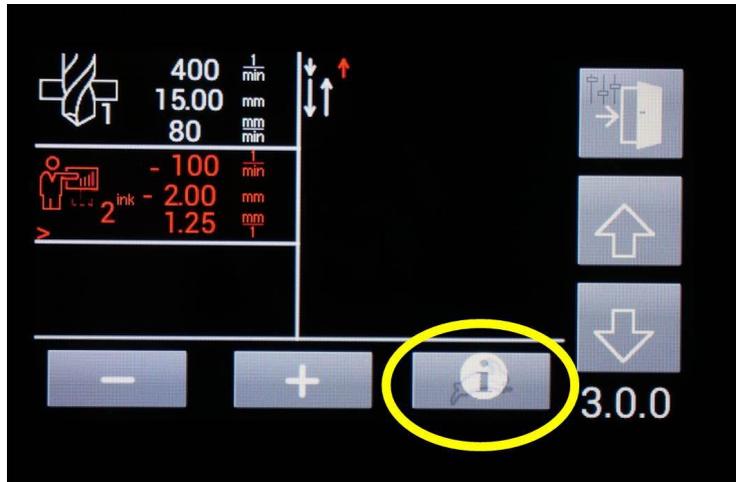


7. Status display during programme sequence:
- 1: Stage 1 (currently active)
  - 2: Stage 2 (as preview)
  - 3: Switching the coolant on/off
  - 4: Stopwatch
  - 5: Pause/resume (feed) (not available for threads and/or pitch-dependent feed)



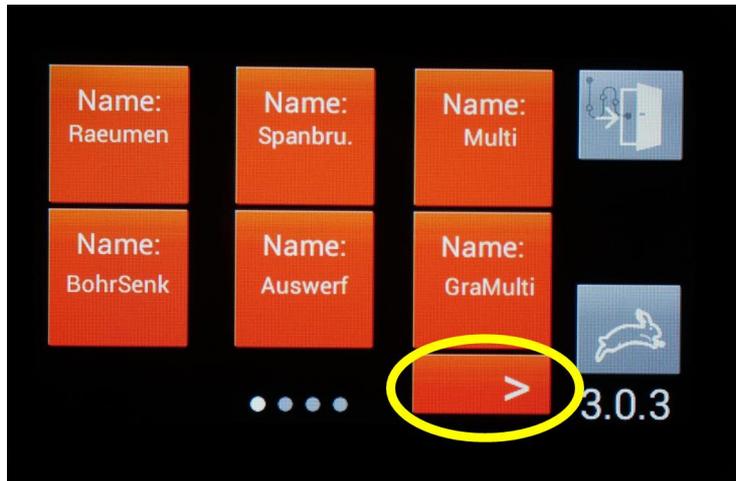
### 6.5.5 Save stage programme

1. In the Stage programming overview (3.0.0), the buttons marked in yellow in the illustration are used to access the memory locations.



2. Page 3.0.3 shows memory locations 1-6. Example programmes are stored for demonstration purposes. These may also be changed or overwritten.

Use the arrow key to access memory locations 7-24 on pages 3.0.4 to 3.0.6



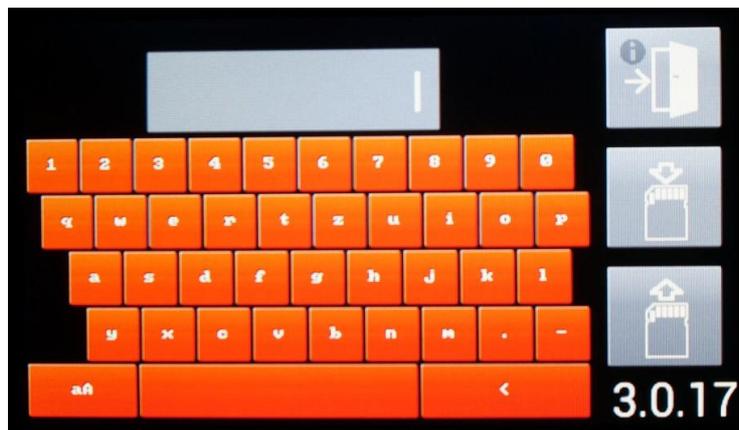
3. Select any memory location of your choice by pressing the button.



4. An overview of the selected memory location is shown on the display.  
If the memory location is not yet occupied, the display is empty.  
Press the "Save" button (marked in yellow in the illustration).  
If you wish to select a different memory location, leave the window by pressing the "Exit" button and select the option you wish to use.



5. Name the programme (up to 8 characters possible)



6. Save the programme by pressing the "Save" button.  
Important: Hold the "Save" button for at least 2 seconds until the signal sounds to complete the saving process.



- The programme has been saved successfully.

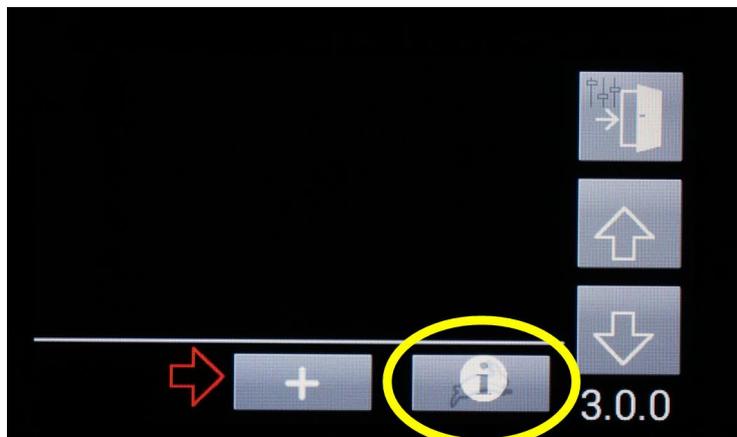


### 6.5.6 Delete a stage programme

Memory locations are deleted by overwriting the particular memory location with a new (blank) program.

### 6.5.7 Accessing and loading a stage programme

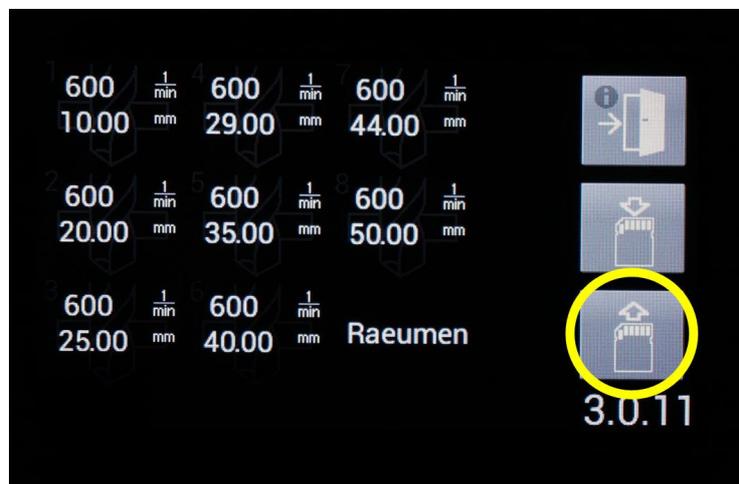
- Access the memory locations via the Stage programming overview (3.0.0).



2. Select the programme by pressing the corresponding button. In the example here, the “Clearing” demo programme is shown



3. An overview of the “Clearing” stage programme is shown.  
Load the programme by pressing the “Load” button.  
Important: Hold the “Load” button for at least 2 seconds until the signal sounds to complete the loading process.



4. The stage programme has loaded successfully and can be started.

You can now start the programme with the button.



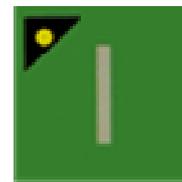
There is also the option of starting the programme with the foot switch (if installed at the factory)



## 6.5.8 Activating or deactivating the prompt

Activating/deactivating the prompt for the sequence of steps:

By switching between the “Hare” and “Snail” buttons, you can select whether you wish the stage programme to be carried out without interruptions (“Hare”) or whether confirmation is requested to continue with the programme sequence after each stage (“Snail”). Confirm that you wish to continue with the programme sequence by pressing the start button or actuating the foot switch.



## 6.6 Switching off the machine



### Warning

*Risk associated with a faulty electrical connection.*

*When connecting the machine, observe the electrical connection values in the operating manual and on the type plate.*

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

The system can only be switched off on the machine control panel.



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



2. Turn the main on/off switch to **0** to switch the machine off entirely.  
All control lights, the drill light and the display are switched off.
3. Remove the mains plug from the mains socket.
4. Check the machine for any contamination which may have arisen as a result of the work process. Please also observe the instructions in Chapter 9 *Machine maintenance*, Page 94.

5. Ensure that the protective cover is firmly screwed on to the machine. Components are located under the protective cover which may still be under residual voltage for quite some time after disconnection from the mains power supply. These must be left to discharge themselves for a period of at least 15 mins.

You have now decommissioned the machine properly.

---

## 6.7 Activate machine's EMERGENCY stop

The EMERGENCY STOP button on the control panel serves as a safety switch for the operating personnel during their work on and with the machine.

The EMERGENCY STOP button can be used to immediately stop all the drives and movements of the machine in the event of an imminent risk, regardless of which operating mode and/or function is currently selected.

In the event of an interruption due to EMERGENCY STOP, the machine and the movements triggered by actuation buttons are immediately brought to a standstill, i.e. stop moving:



- Press the EMERGENCY STOP button to stop the machine immediately.
  - The control system and the control panel on the machine remain switched on;
  - the drive motor is braked to achieve a safe standstill as quickly as possible.



### Attention

You have decommissioned the machine for safety reasons. Before switching the machine back on, you must resolve the cause of this disruption (or have this resolved). Expert works on the mechanical and electrical equipment may be carried out only by specialist personnel.



### Note

The EMERGENCY STOP button should not, however, be used to shut down the machine under normal circumstances (normal shutdown), as this will immediately interrupt the controlled movement of the machine. Only press the EMERGENCY STOP button in the event of a hazardous situation.

The EMERGENCY STOP button is self-locking. The machine can therefore only be operated again once you have eliminated the reason for the operational disruption and unlocked the EMERGENCY STOP button.

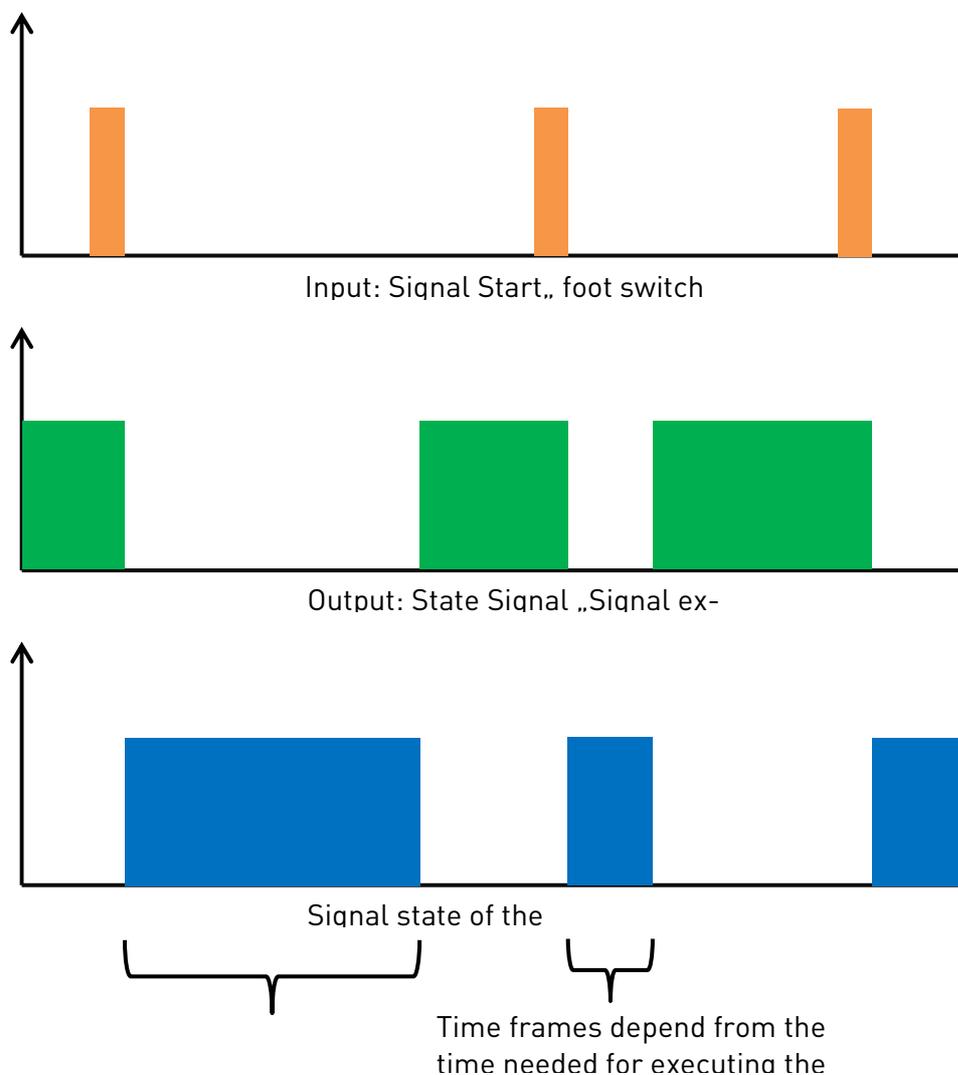
## 6.8 Signal exchange option

### Option „signal exchange“ Flott SB NC type-machines

The firmware option “signal exchange” allows a link between drilling machine control with peripheral devices like clamping supports, material infeed, robotic fitting, to achieve an efficient and safe production process.

**Description of the signal execution:** During Standby of the machine („start“ commands are accepted) the contact “Signal exchange” is closed. With presence of the start command (Contact “closing foot push button”. the contact “Signal exchange” is open for the time of operation.

Signal sequence and machine status (foot push button and signal exchange as well as main spindle)



The communication signal is provided for the automatic mode only. An agreement for the provision of this signal is recommended before delivery. Manual influence on Relay #3: the manual activation of relay #3 is not possible as long as the signal exchange is active.

## 7 Troubleshooting



### Hazard

*Risk associated with electrical voltage.*

Maintenance work on electrical components may only be carried out by authorised personnel (qualified electricians). Ensure that the machine's electrical equipment is de-energised for the maintenance period.

Wait at least 15 minutes before removing the protective cover from the machine. The DC bus capacitors must be allowed to discharge during this period.

Maintenance and repair work are activities which require special attention and safety. You should therefore take the necessary precautions to ensure safe working for yourself and also for others:

- Inform the operating personnel about the scope and period of the maintenance and repair works to the machine.
- Appoint an expert for the work in question who will take over responsibility for the maintenance or repair process and its monitoring.
- In the event of maintenance or repair work, decommission the machine as instructed (see Page 86) and secure the machine to prevent it from being switched back on. Do this by
  - only pressing the EMERGENCY STOP button for safety reasons after the machine has been taken out of operation;
  - affixing a warning sign to the control panel indicating the work to be carried out; and
  - blocking off the respective hazard area (e.g. with red and white safety tape).

## 7.1 Error message on the display

A range of possible errors can be displayed on the control panel with the help of the control system.



### Warning

*Risk associated with improper fault elimination.*

Improper fault elimination may pose a hazard to personnel working on the machine and to the machine itself. Expert works on the mechanical and electrical equipment may be carried out only by specialist personnel.

Error	Cause	Solutions
Machine will not start	<ul style="list-style-type: none"> <li>● Mains plug has not been inserted.</li> </ul>	<ul style="list-style-type: none"> <li>● Insert the mains plug.</li> <li>● Restart machine or</li> <li>● Contact FLOTT service.</li> </ul>
Display off	Machine is in standby mode.	Exit with turn/push button. If this does not help: <ul style="list-style-type: none"> <li>● Restart machine or</li> <li>● Contact FLOTT service.</li> </ul>
“Protection/Emergency active”	<ul style="list-style-type: none"> <li>● Drilling protection is not in its protection position</li> <li>● The emergency stop button is locked</li> </ul>	<ul style="list-style-type: none"> <li>● Move the drilling protection into its protection position, i.e. rest position</li> <li>● Unlock emergency stop button</li> </ul>
“Limiter”	<ul style="list-style-type: none"> <li>● Spindle has moved to an end position (bottom or top)</li> </ul>	<ul style="list-style-type: none"> <li>● Check the spindle position</li> <li>● Check that the fixed stop is firmly in place and set correctly</li> </ul>
“Frequency converter”	<ul style="list-style-type: none"> <li>● Technical error in the drive unit</li> </ul>	<ul style="list-style-type: none"> <li>● Restart machine</li> <li>● Contact FLOTT service</li> </ul>
“Access denied”	<ul style="list-style-type: none"> <li>● Lock code active</li> </ul>	<ul style="list-style-type: none"> <li>● Unlock the machine by entering the code</li> </ul>
“Key blocked”	<ul style="list-style-type: none"> <li>● Button on the control panel pressed down for too long</li> </ul>	<ul style="list-style-type: none"> <li>● Exit with turn/push button</li> </ul>
“Communication error”	<ul style="list-style-type: none"> <li>● Technical error in the control system</li> </ul>	<ul style="list-style-type: none"> <li>● Contact FLOTT service</li> </ul>
“MSR module”	<ul style="list-style-type: none"> <li>● Error in the feed safety monitoring system</li> </ul>	<ul style="list-style-type: none"> <li>● Contact FLOTT service</li> </ul>

## 7.2 Other errors and solutions



### Warning

*Risk associated with improper fault elimination.*

Improper fault elimination may pose a hazard to personnel working on the machine and to the machine itself.

Expert works on the mechanical and electrical equipment may be carried out only by specialist personnel.

Error	Cause	Solutions
Display is off	Machine is in standby mode	Press the push/turn button
Machine will not run	<ul style="list-style-type: none"> <li>● Mains connection defective</li> <li>● Drilling protection not activated</li> <li>● Control panel defective</li> <li>● Frequency converter defective</li> <li>● Motor defective</li> </ul>	<ul style="list-style-type: none"> <li>● Check mains connection</li> <li>● Activate drilling protection</li> <li>● Replace control panel</li> <li>● Replace FU</li> <li>● Replace motor</li> </ul>
Machine is running, but rotation/drill performance is low	<ul style="list-style-type: none"> <li>● Tension of the V-ribbed belt too low</li> <li>● V-ribbed belt contaminated</li> </ul>	<ul style="list-style-type: none"> <li>● Re-tension V-ribbed belt</li> <li>● Clean V-ribbed belt and belt pulleys</li> </ul>
Unusually loud operating noises being created by the drive	<ul style="list-style-type: none"> <li>● Tension of the V-ribbed belt too low or too high</li> <li>● Loosened belt pulleys</li> </ul>	<ul style="list-style-type: none"> <li>● Re-tension V-ribbed belt</li> <li>● Secure belt pulleys</li> </ul>
Drill is running unevenly	<ul style="list-style-type: none"> <li>● Drill chuck not mounted correctly</li> <li>● Jaws of the drill chuck defective</li> <li>● Spindle is defective</li> </ul>	<ul style="list-style-type: none"> <li>● Insert new drill chuck</li> <li>● Replace drill chuck</li> <li>● Replace spindle</li> </ul>
Drill creates sparks or smoke	<ul style="list-style-type: none"> <li>● Speed does not correspond to the drill</li> <li>● Poor chip removal</li> <li>● Drill is blunt or defective</li> <li>● Drill requires coolant or lubricant</li> <li>● Feed too low</li> </ul>	<ul style="list-style-type: none"> <li>● Adjust the speed according to the manufacturer's instructions</li> <li>● Raise the drill and remove the chips</li> <li>● Sharpen or replace drill</li> <li>● Insert coolant or lubricant</li> <li>● Increase feed</li> </ul>
Drill has become stuck in the work piece	<ul style="list-style-type: none"> <li>● Feed too high</li> <li>● Poor chip removal</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce feed</li> <li>● Raise the drill and remove the chips</li> </ul>
Switch lever manual/auto does not lock in upper position	<ul style="list-style-type: none"> <li>● Feed unit is live</li> </ul>	<ul style="list-style-type: none"> <li>● Release the machine table and crank this down a bit</li> </ul>

## 7.3 Release of the machine after an error



### Warning

*Risk associated with improper fault elimination.*

Improper fault elimination may pose a hazard to personnel working on the machine and to the machine itself.

Expert works on the mechanical and electrical equipment may be carried out only by specialist personnel.

1. If necessary and/or required:  
Use qualified and authorised specialist personnel to remedy the cause of the fault.  
The error message automatically disappears from the control panel once the cause has been remedied.
2. In the event that further error messages appear on the control panel, follow the procedure set out in 1.

The machine is now ready to be used again (see Chapter 6 *Operating the machine*, Page 36).

## 8 Machine maintenance

### 8.1 Testing and maintenance intervals

The following regular maintenance list provides an overview of the minimum work required to ensure error-free operation. Whether and to what extent further care and maintenance is required depends on the respective operating conditions and the use of the machine.

Maintenance work may only be carried out by qualified personnel with training, carefully observing all the necessary accident prevention provisions. Please always observe the details in Chapter *7.3 Measures before maintenance and repairs* on Page **Fehler! Textmarke nicht definiert..**

At regular intervals (where appropriate on a daily basis) according to the operating conditions or when performing maintenance work on the machine, the following general testing and maintenance work is to be carried out in compliance with the safety rules:

- All external machine areas and components must be cleaned regularly to remove any dust and contaminants.
- The machine area in which chips are collected in particular must be cleaned regularly. Remove the chips using a hand brush.
- The tools which are used must be checked for wear regularly and replaced as required (observe the manufacturer's documentation).
- Parts of the machine which are difficult to access should be cleaned carefully with compressed air; the use of bellows may be sufficient. (Suction is better, but not always possible).
- Check all screw connections for tightness. Also check all terminals for the control cables on devices and terminal strips.
- Check the function of all lights on the control panel and of the drill light (observe manufacturer's documentation).
- It is important to test the protection system. This must be done in accordance with VDE regulation 0100 or comparable national provisions.
- All monitoring equipment must be checked regularly to ensure it is responsive.
- All safety equipment must be checked regularly to ensure it is responsive.
- The bearings on the drive motor must be maintained according to the operating regulations (see manufacturer's documentation).
- If cooling air is sucked in by the filter, the filter must be cleaned or replaced where necessary (observe the manufacturer's documentation).
- All warning signs and notices are to be checked for completeness and cleanliness and, where necessary, replaced or cleaned.

Maintenance interval							Assembly	Maintenance activity
Annually	Bi-annually	Quarterly	Monthly	Weekly	Daily	In the event of		
								 <p><b>Hazard</b> Before starting any maintenance and cleaning work you must decommission the machine (see Chapter 7 <i>Decommissioning the machine</i>).</p>
					■		<b>Machine general</b>	Remove all chips from the machine. Use hand brush.
					■			Remove cooling lubricant from the machine and the area around the machine.
			■					Check the drill table for wear. Lightly oil with spray oil.
				■				Clean column. Lightly oil with spray oil.
				■				Clean gear rack. Lubricate with machine grease
				■				Move the sleeve to the lowest position, clean and lubricate slightly. Lubricate the toothing on the sleeve.
				■				Clean control panel.
					■			Check the function of all lights on the control panel and of the drill light.
					■			Check the function of the EMERGENCY STOP button.
					■			Check function of drilling protection.
								Check the spindles/drill chucks in use for wear and function and replace if necessary.
								Check the work piece holders (vice, clamping jaws, etc.) in use for wear and function and replace if necessary.
								Check the tools in use for wear on a regular basis and replace if necessary.
	■							Check all screw connections for tightness.
				■				Remove any dust and dirt from the machine. Parts which are difficult to access should be cleaned carefully with compressed air; the use of bellows may be sufficient. (Suction is better, but not always possible).
			■				Check that all warning signs and notices are complete and clean and, where necessary, clean or replace.	
	■						<b>Drive</b>	Check external condition of the drive unit.
	■					■		Check the condition of the belt pulley.
	■					■		Check the condition, tension and position of the V-ribbed belt.
					■		<b>Electrical system</b>	Check for the presence and safe function of the protective cover.
				■				Check that the connection cable and the safety plug are undamaged.
	■							Check all terminals for the control cables on devices and terminal strips.
						■		Replace control panel.

## 8.2 Disassembly of the drill chuck



### Hazard

*Danger from unwanted starting of the machine.*

You must decommission the machine before starting any maintenance or cleaning work.



### Attention

*Damage to the spindle or drill chuck.*

When disassembling the drill chuck, ensure that this does not fall onto the drill table or the vice. This may cause damage to components, which may no longer be suitable for further use.

1. Switch the machine off (see *7.1 Switching off the machine*, Page 86).
2. Swivel the drilling protection to the left side.



### Attention

*Risk associated with hot tools.*

The tool may still be hot after use. Cool the tool down with coolant or remove it using a safety glove.



3. Remove the tool from the drill chuck before disassembling the drill chuck.
4. Turn the drill lever downwards until the side ejector openings are visible. Hold the drill lever in this position.
5. Use one hand to hold the drill chuck in place so that this does not fall onto the drill table or vice and cause damage after disassembly.
6. Insert the drill shift into the side opening of the sleeve until the drill shift appears on the opposite side. Ensure that the rounded side is at the top.



### Attention

*Damage to the sleeve.*

Ensure the correct use of the drill drift in the sleeve. Never move the sleeve upwards with the drill lever when the drill drift is inserted in order to remove the drill chuck. This will cause damage to the sleeve, which may make further use of the machine impossible.

7. Hit the end of the drill drift gently with a hammer to remove the drill chuck from the sleeve.
8. Remove the drill chuck.
9. Check the drill chuck and sleeve for contamination, wear or damage.

## 8.3 (Dis)assembling the protective cover

The protective cover on the electrical system and the drive unit must be removed so that maintenance and repair work can be carried out on the drive unit.



### Hazard

*Risk associated with electrical voltage.*

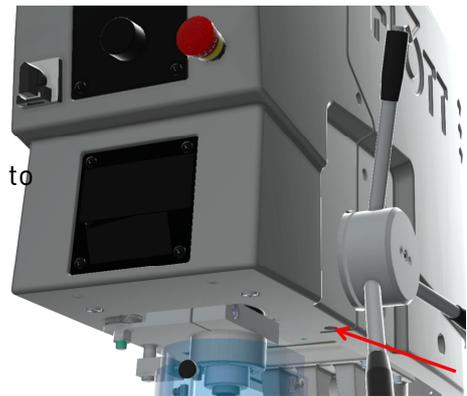
Maintenance work on electrical components may only be carried out by authorised personnel (qualified electricians). Ensure that the machine's electrical equipment is de-energised for the maintenance period.

Wait at least 15 minutes before removing the protective cover from the machine. The DC bus capacitors must be allowed to discharge during this period.

### 8.3.1 Opening the front protective cover

You can get to the electrical system and the sleeve by opening the front protective cover. This is connected with a screw on the right-hand lower edge and is secured on the left side with two hinges so that the front protective cover can be flipped open to the left.

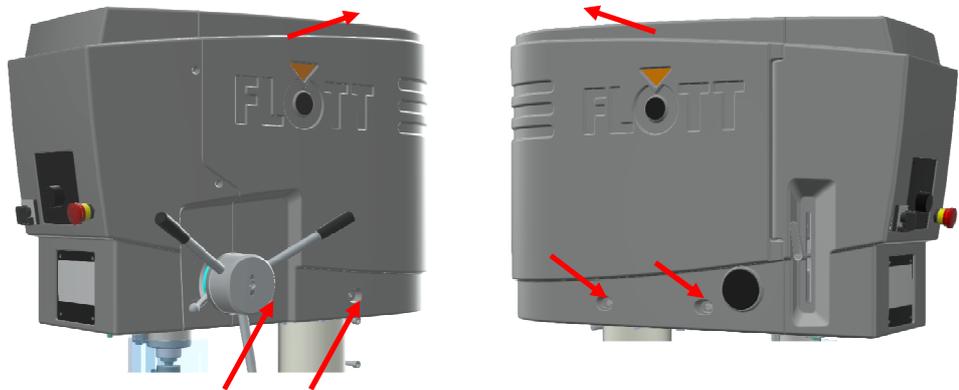
1. Switch the machine off (see *7.1 Switching off the machine*, Page 86).
2. Wait at least 15 minutes before removing the protective cover.  
Only after this period are the capacitors under the protective cover discharged.
3. Loosen and remove the screws on the right side of the front protective cover
4. Swivel the front protective cover to the left to open this and gain access to the electrical system and the sleeve.



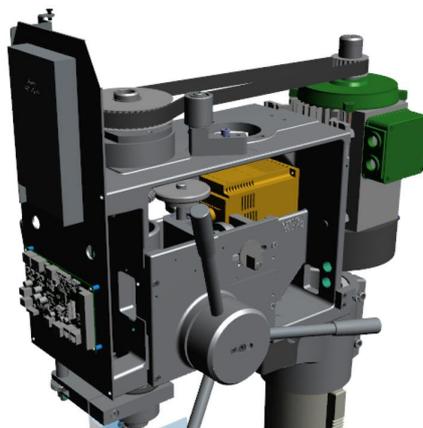
The front protective cover is now open, meaning that the required maintenance and repair work on the electrical system and sleeve can be carried out. Close the front protective cover by following these steps in reverse order.

### 8.3.2 Dismantling the rear protective cover

1. Switch the machine off (see *7.1 Switching off the machine*, Page 86).
2. Wait at least 15 minutes before removing the protective cover.  
Only after this period are the capacitors under the protective cover discharged.
3. Open the front protective cover (see Chapter *9.3.1 Opening the front protective cover*, Page 97).
4. Remove all electrical connections between the electrical assembly plate and the installations on the front protective cover (control panel, EMERGENCY STOP button, main button, etc.).
5. Remove 2 screws on each side from the rear protective cover.



6. Remove the loosened part of the protective cover by pulling it upwards and backwards at a slight angle.
7. Set aside the protective cover.

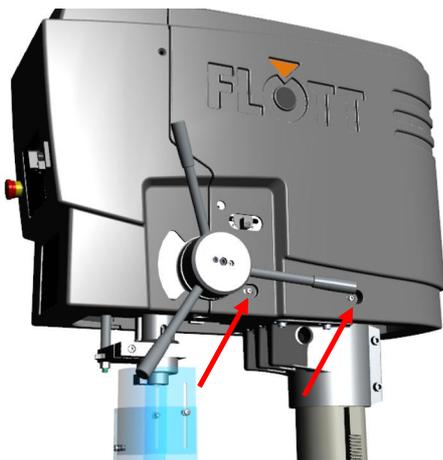


1. The entire protective cover is now disassembled, meaning that the required maintenance and repair work on the electrical system and drive unit can be carried out.

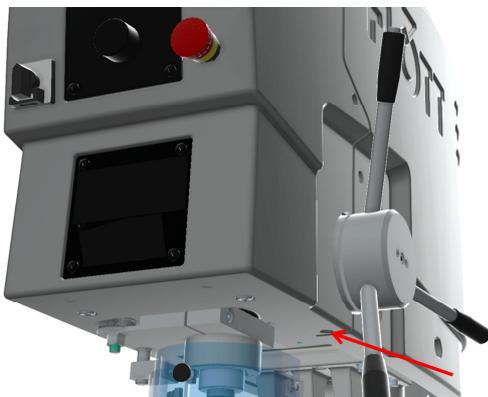
### 8.3.3 Assembling the rear protective cover



1. Place the protective hood on the machine head from above, tilting it forwards slightly. Ensure that no electrical cables or connections are caught or damaged.
2. Lower the protective cover onto the machine head and ensure that it is positioned correctly.



3. Insert 2 screws on each side of the rear protective cover and tighten these by hand.



5. Connect all the electrical cables to the individual modules of the front protective cover again (control panel, EMERGENCY STOP button, main button, etc.).
6. Swivel the front protective cover to the right to close it correctly.
7. Insert the screw on the right side of the front protective cover and tighten this by hand.

The protective cover is now assembled and the machine can be operated again.

## 8.4 Tensioning and/or replacing the belt

The protective cover on the drive unit must be removed so that maintenance and repair work on the drive unit can be carried out.



### Hazard

*Risk associated with electrical voltage.*

Maintenance work on electrical components may only be carried out by authorised personnel (qualified electricians). Ensure that the machine's electrical equipment is de-energised for the maintenance period.

Wait at least 15 minutes before removing the protective cover from the machine. The DC bus capacitors must be allowed to discharge during this period.

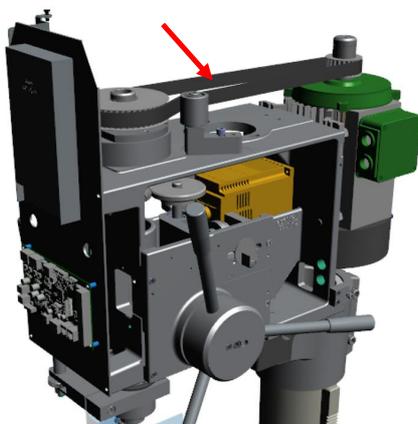
### 8.4.1 Machine type without transmission (R1 and R2)

1. Switch the machine off (see *7.1 Switching off the machine*, Page 86).
2. Wait at least 15 minutes before removing the protective cover. Only after this period are the capacitors under the protective cover discharged.



3. Remove the protective cover from the machine head (see Chapter *9.3 (Dis)assembling the protective cover*, Page 97).

The complete drive area including frequency converter is then accessible.



4. Firstly, check the condition and tension of the toothed belt. The toothed belt
  - must be in alignment on both belt pulleys. A V-ribbed belt which is positioned incorrectly will wear or become damaged very quickly;
  - may not be dismantled, frayed or broken at any point;
  - must have sufficient tension.

The right tension is deemed to be present if the toothed belt can be twisted approx. 100° on the opposite side of the tension roller.

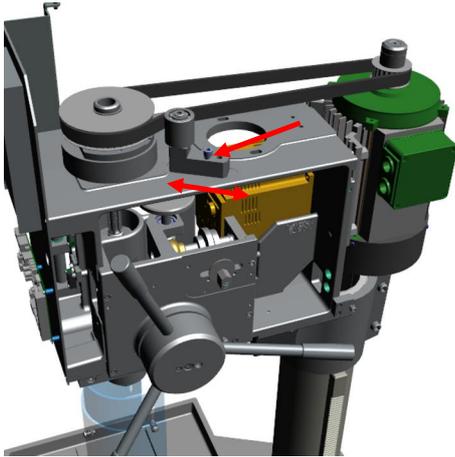
5. You should also check both belt pulleys for damage and wear. If you establish during the check that the toothed belt
  - is not correctly tensioned, then it must be re-tensioned;

- is damaged, then it must be replaced with a new one.

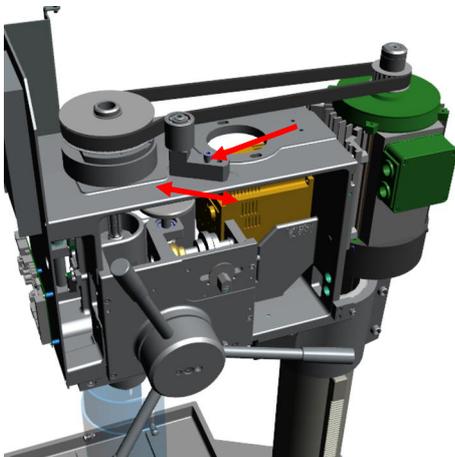


**Note**

Ensure that only original spare parts supplied by the manufacturer are used. In the event other spare parts are used, the manufacturer does not accept any warranty or liability in terms of the functionality and safety of the machine.



6. If necessary:
  - Remove the damaged toothed belt and replace this with a new one by
    - loosening the socket screw on the tension roller mount;
    - pushing the tension roller mount away from the V-ribbed belt;
    - removing the loosened V-ribbed belt from the belt pulleys;
    - placing a suitable new toothed belt on the belt pulleys. When inserting the new toothed belt, ensure that this is positioned correctly and in alignment with both belt pulleys.



7. Tension the toothed belt by
  - loosening the socket screw on the tension roller mount;
  - pushing the tension roller mount towards the V-ribbed belt with one hand;
  - checking the tension of the V-ribbed belt with the other hand.  
The right tension is deemed to be present if the opposite side of the toothed belt (return side) can be manually twisted approx. 100°.
  - Re-tighten the socket screw on the tension roller mount by hand.

8. Check that the toothed belt is positioned correctly and runs smoothly by turning the front belt pulley manually.

9. Assemble the protective cover before operating the machine again (see Chapter 9.3 (Dis)assembling the protective cover, Page 97).

The toothed belt has now been replaced (if necessary) and is correctly tensioned.

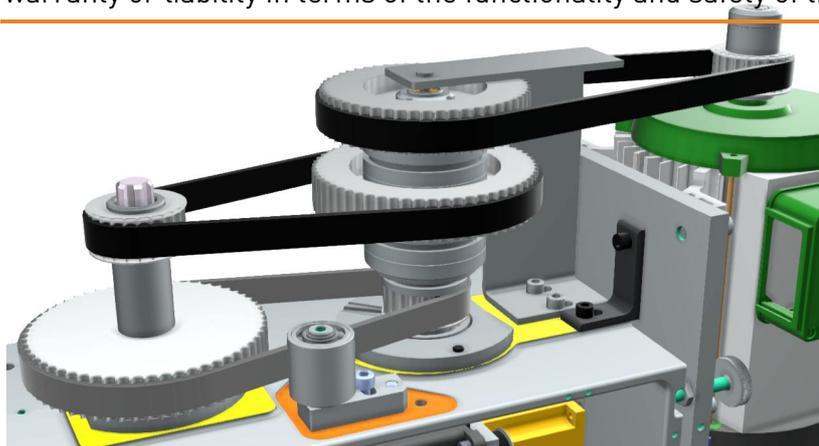
## 8.4.2 Machine type with transmission (R3)

1. Switch the machine off (see 7.1 Switching off the machine, Page 88).
2. Wait at least 15 minutes before removing the protective cover. Only after this period are the capacitors under the protective cover discharged.
3. Remove the protective cover from the machine head (see Chapter 9.3 (Dis)assembling the protective cover, Page 98).  
The complete drive area including frequency converter is then accessible.
4. Firstly, check the condition and tension of the toothed belts. The toothed belts
  - must be in alignment on the corresponding belt pulley. A toothed which is positioned incorrectly will wear or become damaged very quickly;
  - may not be dismantled, frayed or broken at any point;
  - must have sufficient tension.
 The right tension is deemed to be present if the V-ribbed belt can be manually twisted approx. 90° between the belt pulleys.
5. You should also check both belt pulleys for damage and wear.  
If you establish during the check that the toothed belt
  - is not correctly tensioned, then it must be re-tensioned;
  - is damaged, then it must be replaced with a new one.

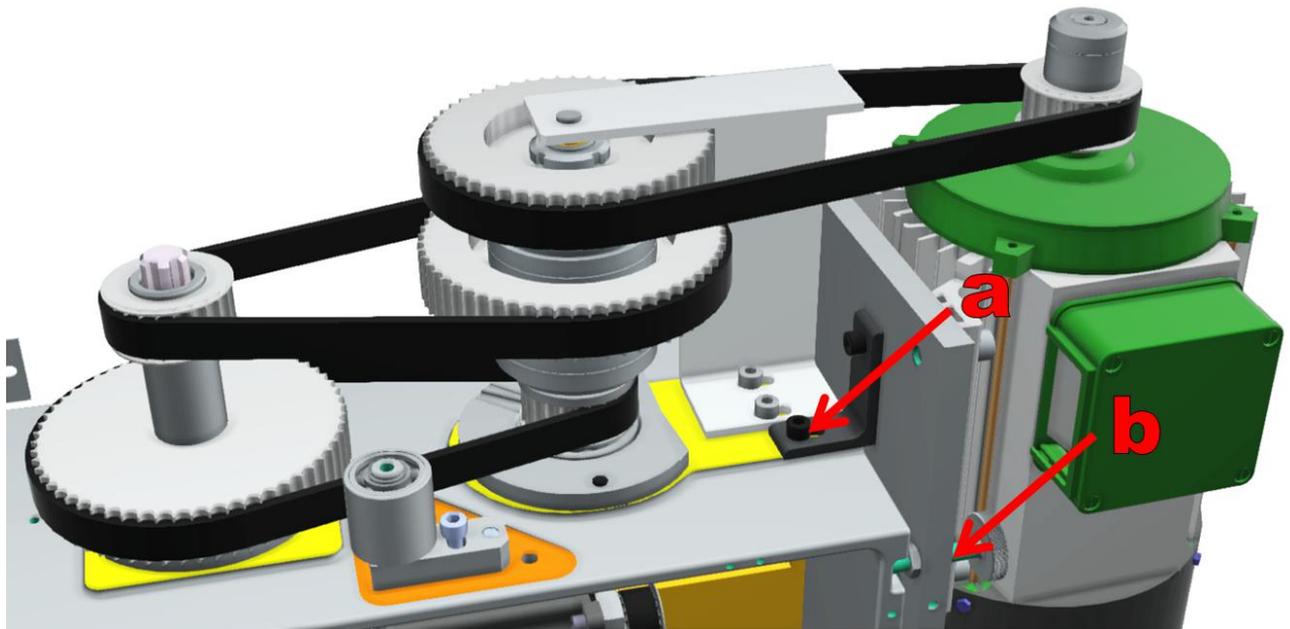


### Note

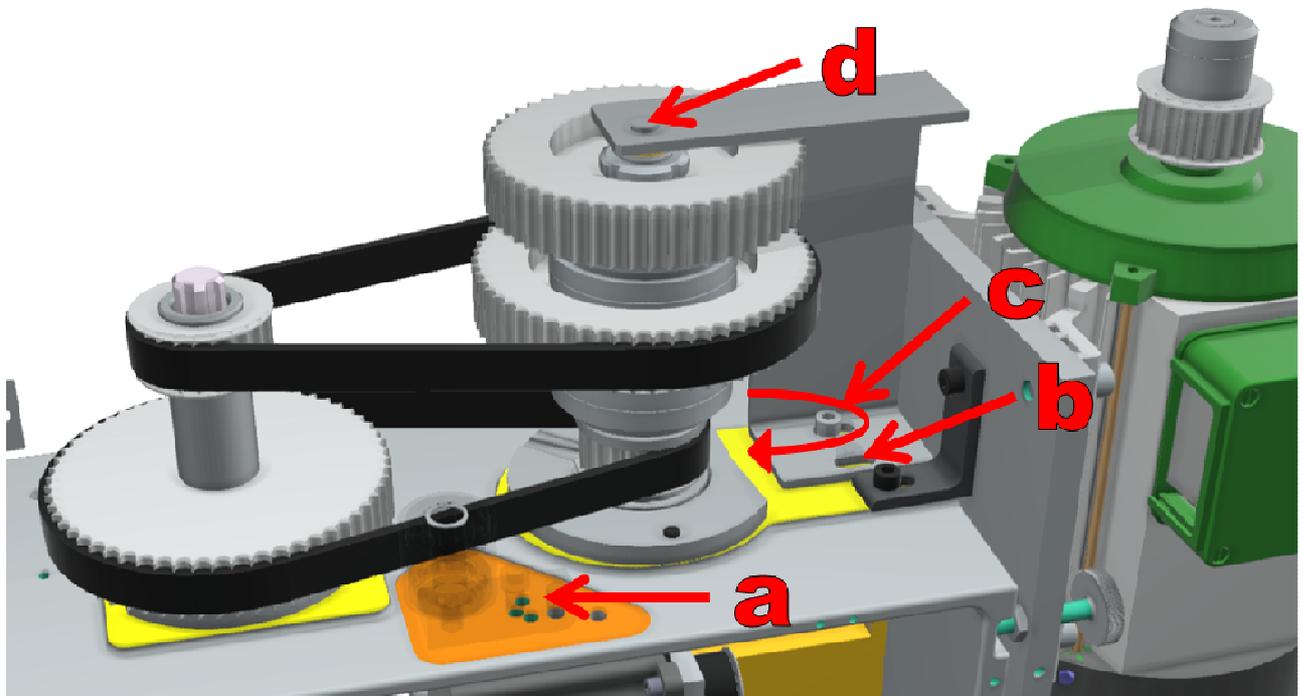
Ensure that only original spare parts supplied by the manufacturer are used. In the event other spare parts are used, the manufacturer does not accept any warranty or liability in terms of the functionality and safety of the machine.



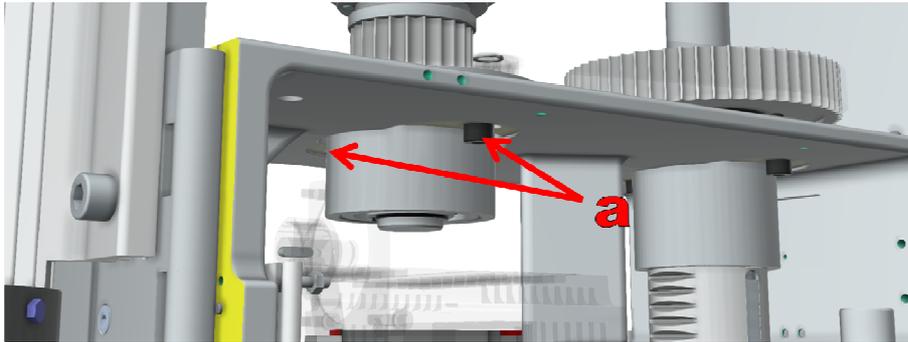
6. If necessary:  
Remove the damaged toothed belts and replace these with new ones by
  - (1) releasing the screw connection of the support angle (a) and the knurled screw (b) on the motor plate to loosen the top belt;



- (2) removing the tension roller (a) and loosening the screw (c) on the brush holder (Fig. below);
- (3) removing the screw (b) and the bolt (d) on the brush holder (Fig. below);
- (4) swivelling the brush holder outwards (Fig. below);



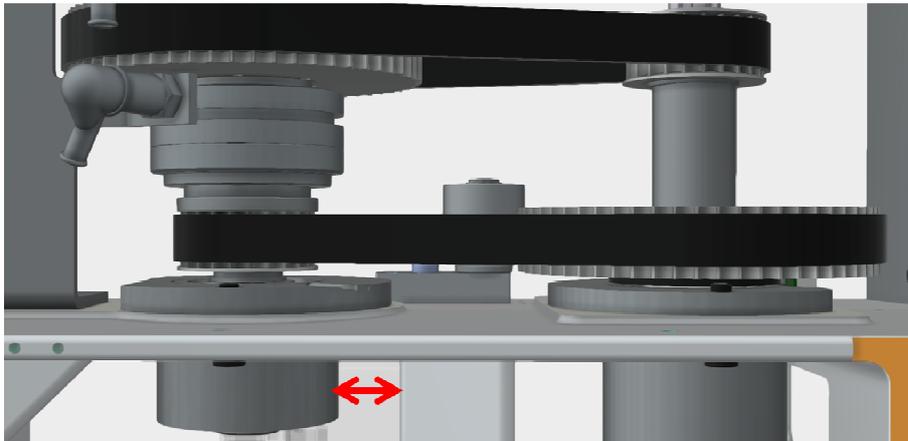
- (5) releasing the screws (a) on the flange bearing (Fig. below);
- (6) removing the loosened belts;



- (7) placing suitable new V-ribbed belts on the belt pulleys.  
When inserting the new toothed belts, ensure that these are positioned correctly and in alignment with the respective belt pulley.

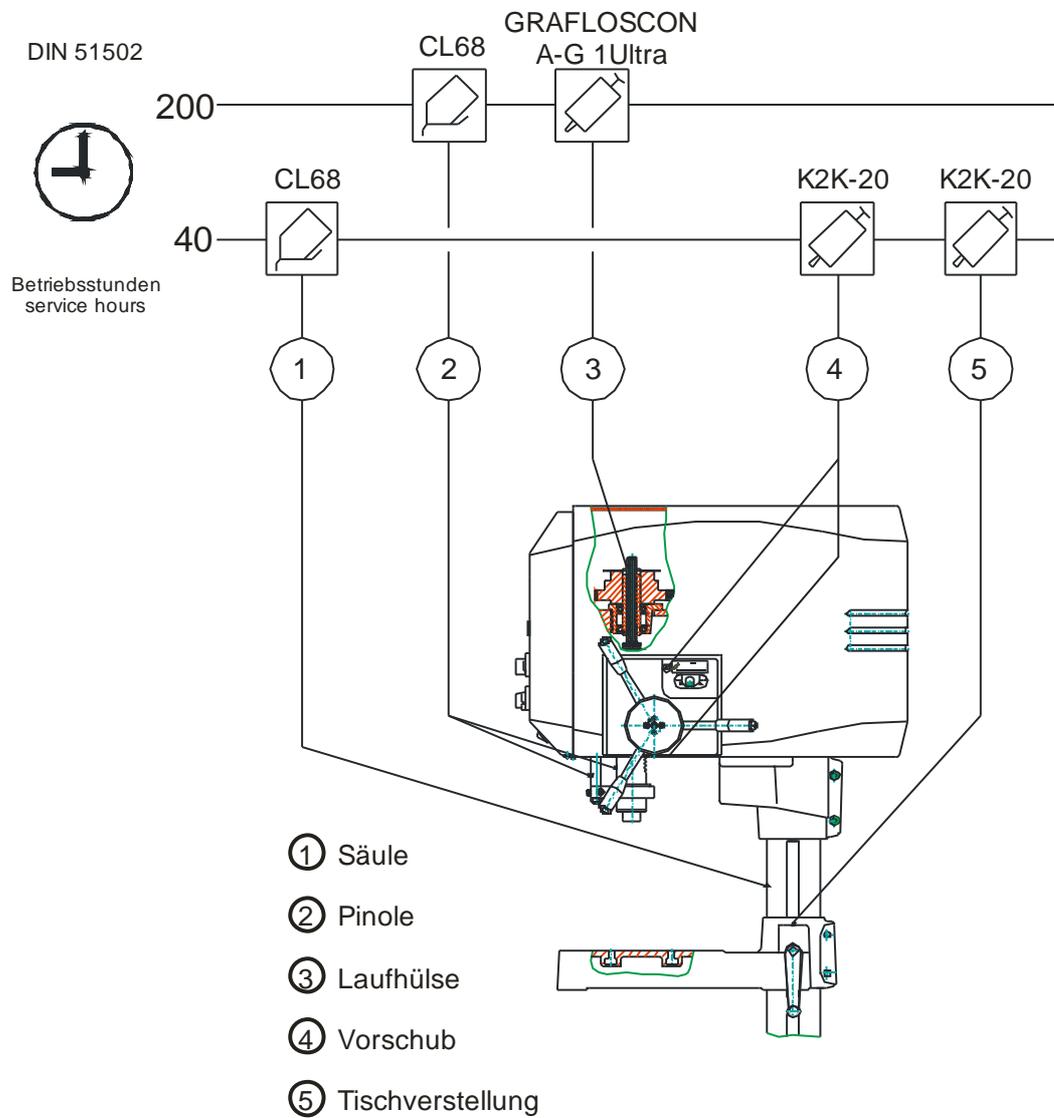
7. Tension the belts by

- (1) positioning the flange bearing flat on the cast head and using the screws (a) (Fig. above) to tighten it gently so that the collar of the flange bearing is positioned free of play on the machine head and can still be moved for tensioning;
- (2) using a suitable tool (supported between cast rib and flange bearing) to tension the middle belt such that it can be manually rotated approx. 90° (Fig. below);



- (3) tightening the screws on the flange bearing whilst retaining the belt tensioning;
- (4) swivelling the brush holder back and tightening the screws until the brush holder is positioned on the cast head free of play, but can still be moved;
- (5) inserting the bolt (ensure the layshaft is exactly vertical!);
- (6) tightening the screws on the brush holder;
- (7) inserting the tension roller again and thus slightly tensioning the lower belt;
- (8) setting the belt tension of the upper belt with the knurled screw on the motor plate (manually turn belt approx. 90°);
- (9) re-tightening the support angle.

## 8.5 Lubrication schedule



## 8.6 Repairs

For most repair work, specialist knowledge of the materials, components, test stands and equipment is required. Therefore, such work should only be carried out in consultation with the manufacturer.



### Hazard

*Risk associated with electrical voltage.*

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

- Ensure that the system's electrical equipment is de-energised for the repair period.
- Only the manufacturer may change the circuit logic.



### Hazard

*Risk associated with improper working on and with the system.*

- The system may only be repaired by authorised and trained personnel using original spare parts.
- Do not dismantle any safety devices on the system. If it is necessary to dismantle safety devices for repair works, you must reassemble the safety equipment afterwards and check that it is working properly.
- All safety devices must be checked before recommissioning after repair measures.



### Note

If damage is caused to the systems for reasons which were not foreseen, the manufacturer is to be consulted before the repair takes place.



### Note

Please also always observe the repair instructions in the third-party documentation provided by the product manufacturer.



### Note

*Danger to the environment resulting from improper disposal.*

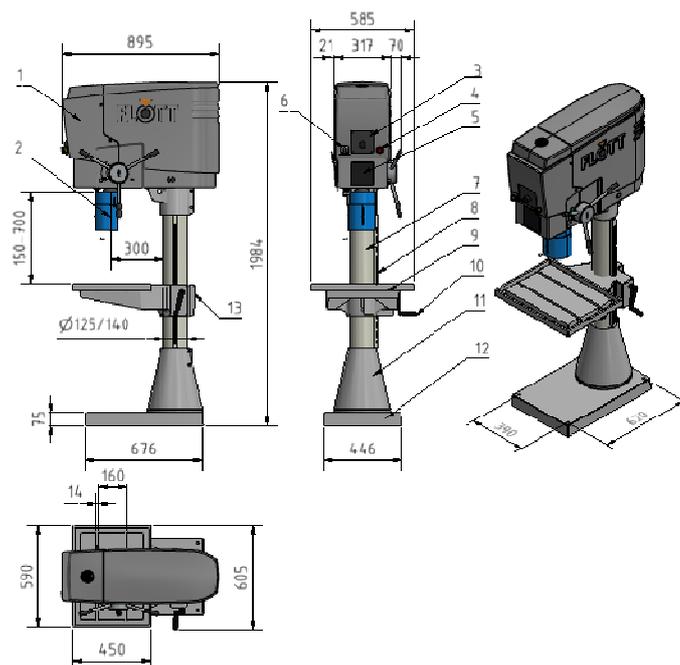
Have suitable collection equipment and containers to hand to catch any operating materials which leak or are spilt (e.g. cooling lubricant). Dispose of all equipment, auxiliary materials and spare parts which have been used in a safe and environmentally friendly manner. Observe the respective provisions and laws on environmental protection.

## 9 Spare parts list

Excludes parts which are no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number	
			SB 30 NC Plus	SB 40 NC Plus
1	1	Cladding, complete	230581	230651
1	2	Electrical drilling protection, complete	230750	230750
		Replacement sight protection 160 x 230 mm	230831	230831
		Replacement sight protection 74 x 230 mm	230832	230832
		M6 star knob nut	009645	009645
		Guide bar	230757	230757
		Switch, complete	230825	230825
1	3	Display, top	230701	230701
1	4	Main switch	208040	208040
1	5	Plate bottom, diagram	230706	230706
		Toggle switch	009461	009461
1	6	Emergency stop impact button	010053	010053
1	7	Column D125	240103	240103
		Column D140	---	230902
1	8	Gear rack	205109	205109
1	9	Arm for column D125	320201	320201
		Arm for column D140	---	230906
1	10	Crank	009657	009657
1	11	Stand for column D125	280102	280102
		Stand for column D140	---	230907
1	12	Stand base	280101	280101
1	13	Tension lever M12*	009176	009176

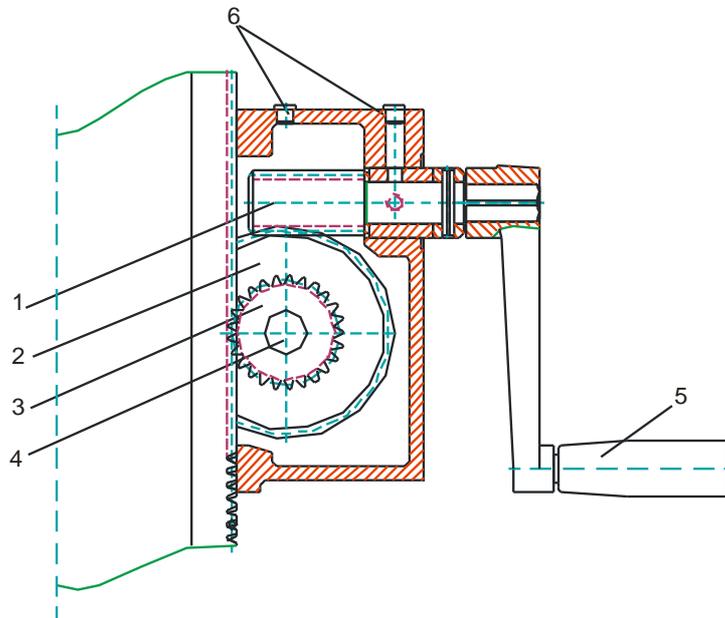
\* Wear part



Excludes parts which are no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number	
			SB 30 NC Plus	SB 40 NC Plus
2	1	Worm screw (incl. adjusting collar, bushing, clamping sleeve)*	205117	205117
2	2	Helical gear*	161127	161127
2	3	Helical gear*	161126	161126
2	4	Load bolt*	320202	320202
2	5	Crank SW 14	009657	009657
2	6	Funnel grease fitting D8 mm DIN 3405*	007534	007534

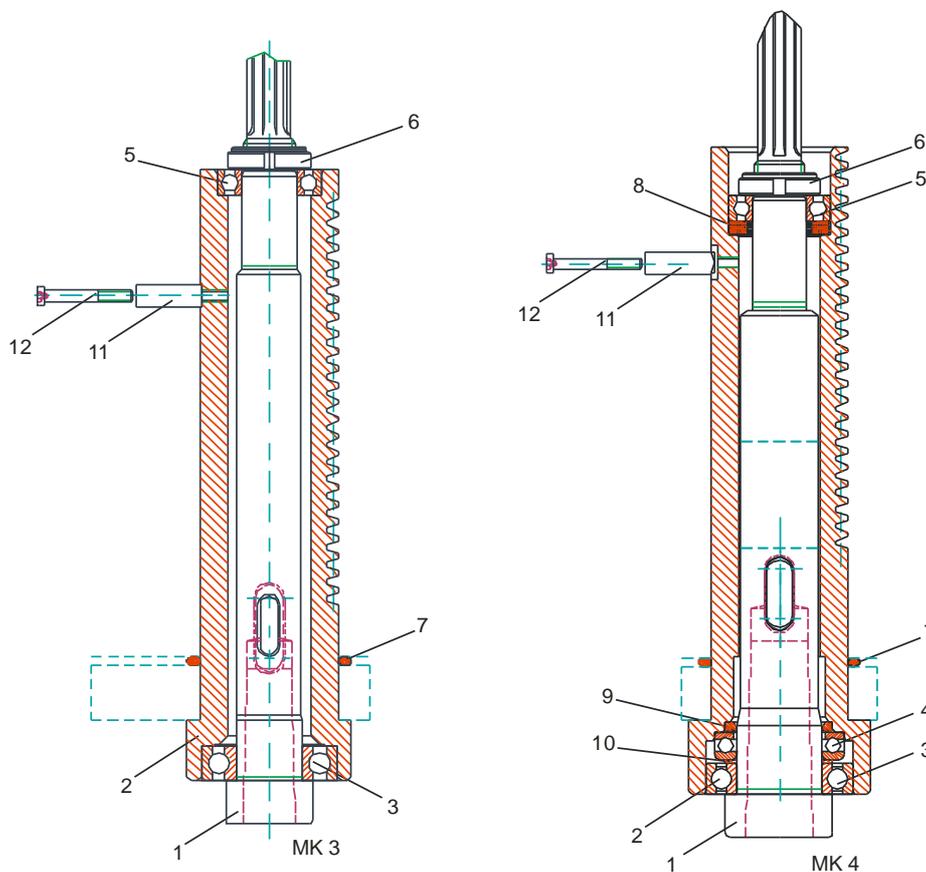
\* Wear part



Excludes parts which are no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number	
			SB 30 NC Plus	SB 40 NC Plus
3	1	Spindle*	205349	205481
3	2	Sleeve*	230616	230612
3	3	Deep groove ball bearing DIN 625-30x62x16 mm 6206-ZZ*	006793	---
3	3	Deep groove ball bearing DIN 625-40x68x15 mm 6005-ZZ*	---	007690
3	4	Deep groove ball bearing, axial, DIN711-40x60x13 mm*	---	009893
3	5	Deep groove ball bearing DIN 625-25x47x12 mm 6005-ZZ*	006842	006842
3	6	Self-locking groove nut M24x1.5 mm*	009798	009798
3	7	O-ring DIN 3771 63x8 mm*	009878	009878
3	8	Cup spring	---	007166
3	9	Shaft seal G40x50x4A*	---	009894
3	10	Adjusting washer DIN 988-40x50x1.5 mm	---	009892
3	11	Spacing roller MR 10/5.3x30 mm	201928	201928
3	12	Cylinder screw DIN 912 - M5x40 mm	007438	007438

\* Wear part



Excludes parts which are no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number	
			SB 30 NC Plus	SB 40 NC Plus
4	1	BG running sleeve R1*	230840	230930
		BG running sleeve R2*	230845	230790
		Running sleeve	230787	230791
4	1.1	Toothed belt pulley (R1)	230784	230784
		Toothed belt pulley (R2)	230792	230792
4	1.2	Flange bearing	230624	230624
		Deep groove ball bearing DIN 625-35x62x14-6007-2Z*	006793	006793
		Circlip DIN 472	006954	006954
4	2	Press roll, complete*	230796	230796
		Holder for press roll	230799	230799
4	3	BG drive	230570	230570
4	3.1	Toothed belt HTD-S8M-1200-20-Z150*	230571	230571
4	3.2	Toothed belt pulley*	230661	230661
4	3.3	Motor	230669	230669
4	4	Frequency converter 4 kW	230721	230721
4	5	BG cross bar	230585	230585
4	5.1	Cross bar	230752	230752
4	5.2	Knurled nut	205854	205854
4	5.3	Guide bar	205855	205855
4	5.4	Limit stop	205856	205856
4	5.5	Tension lever M8	009099	009099

\* Wear part

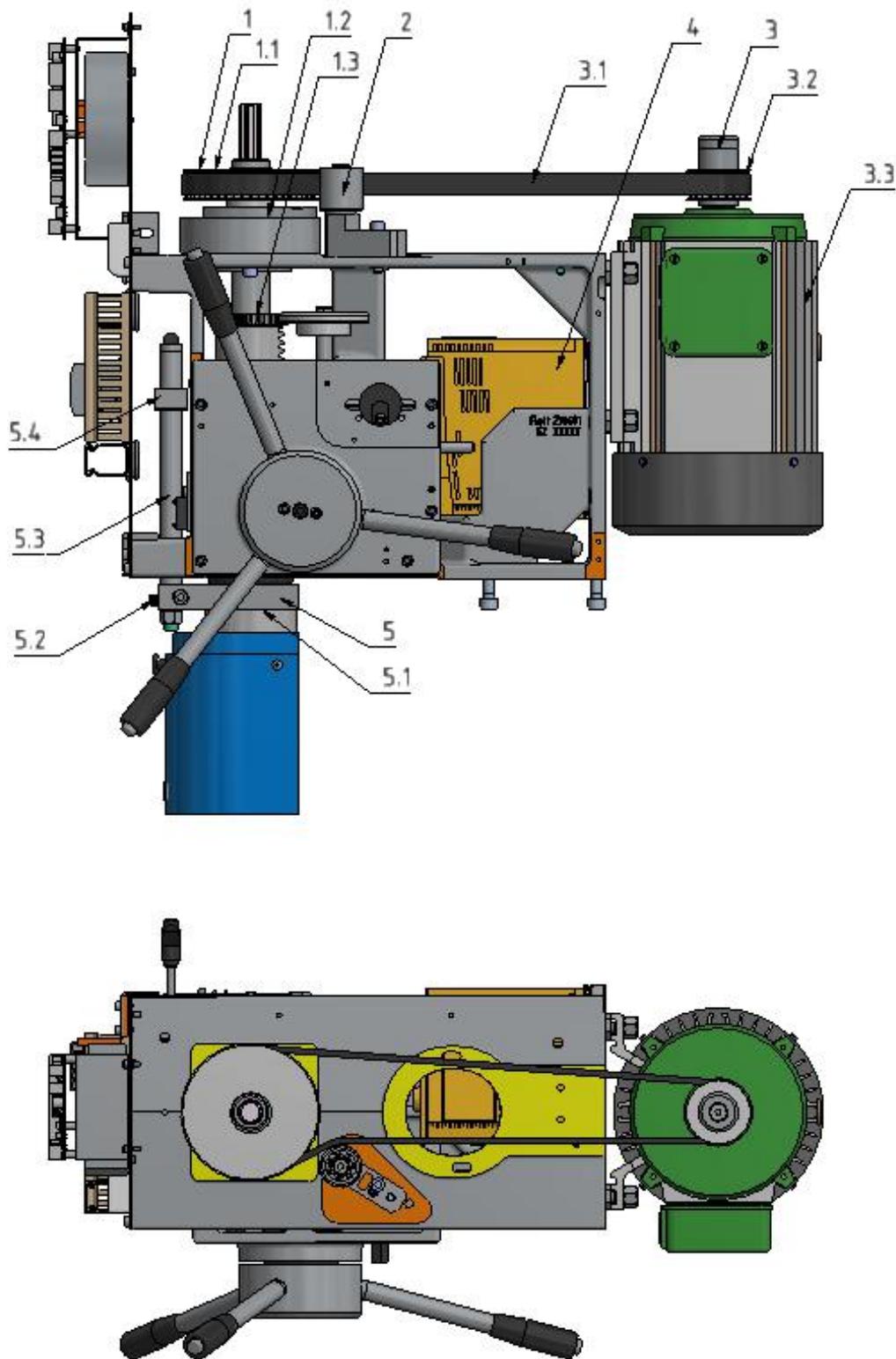


Fig. 4: SB 30/40 NC Plus (R1/2)

Excludes parts which are no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number	
			SB 30 NC Plus (R3)	SB 40 NC Plus (R3)
5	1	BG running sleeve*	230745	230620
		Running sleeve	230746	230621
		Toothed belt pulley	230622	230622
		Toothed belt pulley	230623	230623
5	1.1	Toothed belt ZR-HTD-8M-720-20-Z90*	230626	230626
5	1.2	Flange bearing	230524	230524
		Deep groove ball bearing DIN 625-35x62x14-6007-2Z*	006793	006793
		Circlip DIN 472	006954	006954
5	2	Press roll, complete*	230796	230796
		Holder for press roll	230799	230799
5	3	BG transmission (on request)	230630	230630
		Angular contact ball bearing DIN 628-25x47x16-2Z*	010111	010111
		Deep groove ball bearing DIN 625-7x19x6-607-2Z*	010112	010112
5	3.1	Flange bearing	201401	201401
		Deep groove ball bearing DIN 625-35x62x14-6007-2Z*	006793	006793
		Circlip DIN 472	006954	006954
5	4	BG drive	230660	230660
5	4.1	Toothed belt pulley*	230661	230661
5	4.2	Toothed belt HTD S8M-824-20-Z103*	230665	230665
5	4.3	Motor	230669	230669
5	5	Motor retaining plate	230741	230741
5	6	Frequency converter 4 kW	230721	230721
5	7	BG cross bar	230585	230585
5	7.1	Cross bar	230752	230752
5	7.2	Knurled nut	205854	205854
5	7.3	Guide bar	205855	205855
5	7.4	Limit stop	205856	205856
5	7.5	Tension lever M8	009099	009099

\* Wear part

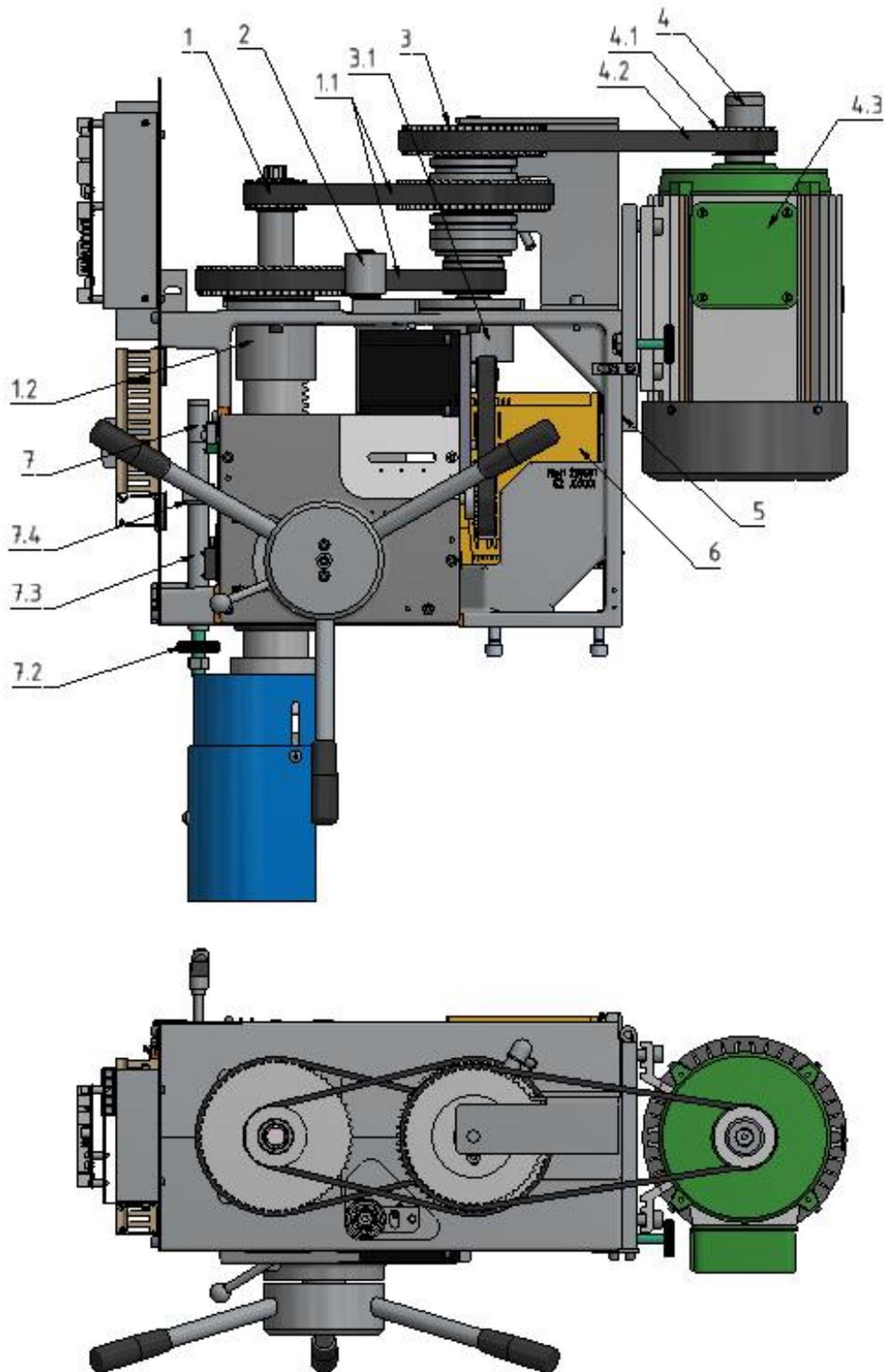
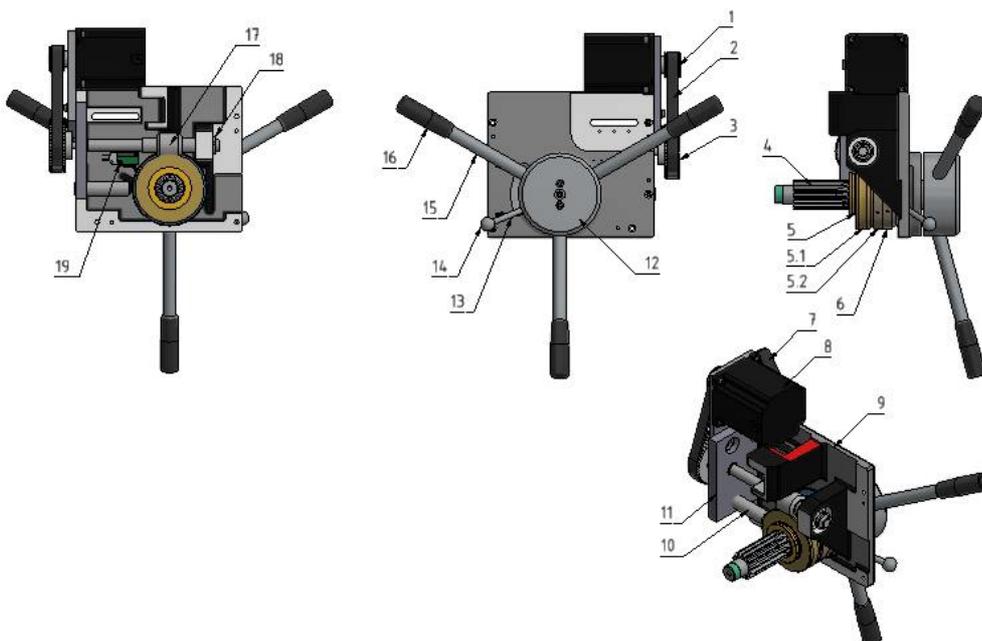


Fig. 5: SB 30/40 NC Plus (R3)

Excludes parts which are no longer manufactured due to technical innovations!

Fig.	Item	Designation	Order number	
			SB 30 NC Plus	SB 40 NC Plus
6	1	Toothed belt pulley	230686	230686
6	2	Toothed belt HTD 5M Z85-425x15 mm*	230688	230688
6	3	Toothed belt pulley	230685	230685
6	4	Pinion shaft	230682	230682
6	5	BG worm wheel coupling, complete	230565	230565
	5.1	Worm wheel	230683	230683
	5.2	Switching ring	230562	230562
6	6	BG coupling sliding part, complete	230560	230560
	6.1	Spacer	230561	230561
	6.2	Switching ring	230562	230562
	6.3	Deep groove ball bearing DIN711-60x40x13*	009893	009893
6	7	Motor bracket, complete	230740	230740
6	8	Step motor	230687	230687
6	9	Housing	230681	230681
6	10	Grease fitting extension	205839	205839
6	11	Top cover	205824	205824
6	12	Crosspiece	205844	205844
6	13	Switch lever	230694	230694
6	14	Ball knob D20*	230695	230695
6	15	Drill lever	280390	280390
6	16	Cylinder knob*	009206	009206
6	17	Worm shaft	205836	205836
6	18	Self-locking groove nut M15x1 mm	009796	009796
6	19	Micro switch	008537	

\* Wear part



## 10 Technical drawings and plans

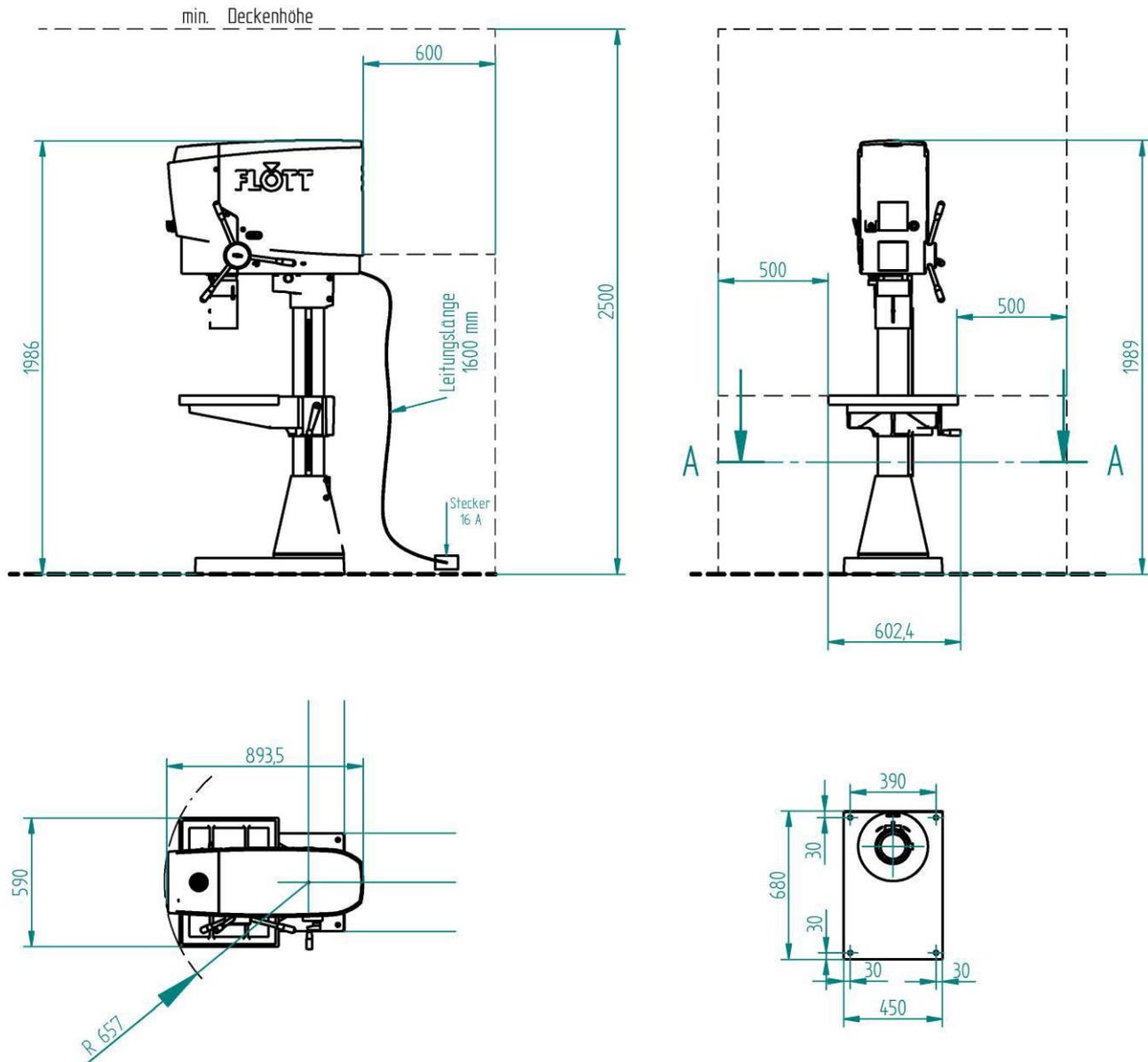


Fig.: Installation plan/space requirements SB 30 NC Plus, SB 40 NC Plus



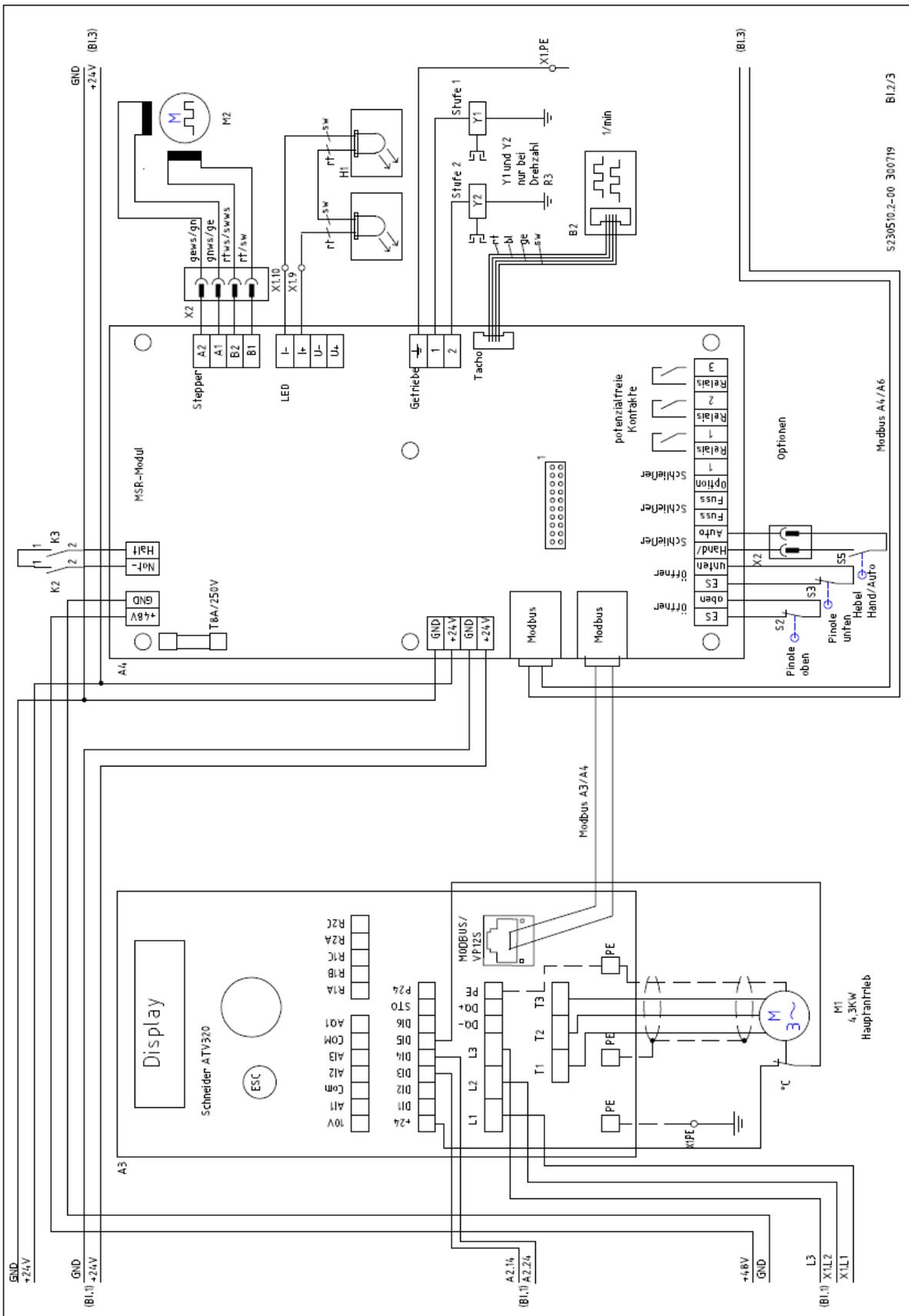


Fig.: Circuit diagram SB 30/40 NC PLUS (Sheet 2)



## 11 EC Declaration of Conformity



We, Arnz FLOTT GmbH Werkzeugmaschinen, Vieringhausen 131, D-42857 Remscheid, hereby declare that the following machine.

**Modell:** Säulenbohrmaschine  
**Typenbezeichnung:** SB 30 NC Plus, SB 40 NC Plus  
SB 30 FB NC Plus, SB 40 FB NC Plus  
**Maschinennummer:** 2023 230.510 001-999, 2023 230.511 001-999,  
2023 230.512 001-999, 2023 230.540 001-999,  
2023 230.541 001-999, 2023 230.542 001-999,  
2023 230.513 001-999, 2023 230.543 001-999,  
**Baujahr:** 2023

beschrieben in der vorliegenden Dokumentation, mit den nachfolgend aufgeführten Richtlinien übereinstimmt:

- Maschinen: 2006/42/EG
- RoHS-II Richtlinie: 2011/65/EU

**Angewendete harmonisierte Normen:**

- DIN EN ISO 12100: 2011
- DIN EN ISO 13849-1: 2016
- DIN EN 12717: 2001 / A1: 2009
- DIN EN 50370-1: 2006
- DIN EN 55011: 2018
- DIN EN 60204-1: 2019
- DIN EN IEC 61000-3-2: 2019
- DIN EN 61000-3-3: 2020

**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.

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## 12 Notes





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

**FLOTT**  
Werkzeugmaschinen

**Arnz FLOTT GmbH  
Werkzeugmaschinen**

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