

Twister FU -180

LATHE



Originale Betriebsanleitung



Dear Customer,

Thank you for deciding on the Twister FU-180 lathe.

With the Twister, you are getting a lathe which unites innovations with tried and tested methods. The result of cooperation between experienced turners and engineers is a lathe that is outstandingly suited for beginners, advanced students, professionals and craftsmen, with a superb price-performance ratio. Continuous support is important to us. In all matters relating to our products or service, please call us or write us an email.

We will be delighted to hear from you. Your experiences will enable us to improve the quality of the lathe still further.

With best wishes

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Note:

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Symbol explanation



Wear goggles



Wear breathing apparatus



Wear ear defenders



Environmentally hazardous



Wear safety shoes



Immediate health risk
and serious injuries



Damage or risks for
persons, the lathe, material or the



Important note

Introduction

This manual contains assembly instructions, safety notes, general operating instructions, servicing instructions and spare parts lists. The design and construction of the Twister FU-180 is intended to give you years of fault-free working, taking into account the recommendations made in these instructions.

1. Basic health and safety notes



Failure to observe the rules and warnings below, as well as those listed in this user manual and affixed to the machine can lead to serious injuries.

In the interest of your own safety.

Read the user manual before you begin assembly or start the machine. Keep this user manual in a safe place and if you hand the machine over to others, give them the user manual with it.

- **Do not make any technical changes.**
The machine has been developed exclusively for working with wood. Learn the scope of use and the restrictions of the machine and be aware of the particular hazards associated with it. If the machine is used for other than its intended purpose, any claims against the vendor under the guarantee or warranty are void. Neither is the vendor liable for any injuries that may result from improper use of the machine.
- **Familiarise yourself with this before starting the machine for the first time.**

If you are unfamiliar with the way a lathe works, enlist the support of a competent person. Instruction by a person competent in handling lathes is strongly recommended. Drechselbedarf Schulte offers you appropriate training courses.

- **The minimum age** for users of the lathe is 16.
- **Physical aptitude.** Users must be physically suitable and be instructed by an expert before first use. Handicapped persons may use the machine only after prior advice by specialists and with aids if need be.
- **Keep children and visitors away from the workplace**
Children and visitors must remain in a safe area outside the working area. Make the workplace childproof, by blocking off the workshop, shutting off the feed line or making it lockable.

- **Wear suitable clothing. Risk from rotating parts.**
Wear close-fitting clothing. Remove ties, scarves, rings, bracelets or other items of jewellery and clothing that may catch in rotating parts. Wear sound safety shoes and ensure the floor is slip-resistant. Wear headdress or a hairnet that protects long hair. Avoid wearing gloves that can catch while turning.



- **Use personal protective equipment (German abbreviation - PSA).**
Ear defenders: Wear ear defenders if you are working for a long time. Various materials can generate an increased noise level while turning.



Goggles/visor: Always wear goggles while working on the machine. Always use adequate eye protection or a visor. Normal glasses are usually resistant only to impact and goggles protect only the eyes. A visor protects eyes and face.



Breathing apparatus: Various types of wood, tropical hardwoods or other substances hazardous to health, as well as certain tasks such as sanding, sawing and drilling can generate dust that is hazardous to health. Make yourself aware accordingly. Therefore, operate machines only in well ventilated rooms and wear breathing apparatus (PSA). Also, use a suitable dust extraction system and/or filtering of the surrounding air. If you are using the lathe commercially, a BG-certified, automatically switched chip and dust separation unit must be present.



- **Do not work in a damp and dangerous environment.**
The Twister FU-180 lathe is intended exclusively for use indoors. Protect the lathe against steamy or damp locations. Don't expose the machine to damp. Ensure there is adequate workplace lighting and ventilation. Avoid areas with an explosive atmosphere. Failure to obey the rules can lead to voiding of the guarantee and warranty.
- **Keep the workplace clean.**
Untidy workplaces and benches cause accidents. Switch the machine on only after all objects (tools, pieces of wood *et al.*) have been removed from the lathe. Keep the immediate working area and the floor free from dirt and parts lying around. Accumulated sawdust is a fire and accident risk.

Fire protection

Be aware of the fire alarms and fire fighting possibilities, such as, say, site and operation of fire extinguishers.

- **Obey the electrical safety standards.**
Ensure there is a proper electrical installation to which you connect the lathe and use only the supplied shockproof plug. Do not use extension leads. The protective contact sockets must be fused 16A. Isolate the machines from the electricity supply before you carry out any servicing or repairs.

- **If the power fails**, the part in the lathe is no longer braked. The machine can take some time to stop.
 - **Avoid accidental starting.**
Ensure that the master switch is in the "**AUS/OFF**" position if you are connecting the lathe to a power point.
 - **Never allow the machine to run unattended.**
Leave the machine only if it is switched off and has come to a standstill.
- **Protective devices**
Leave the safety devices present in their positions and keep these in an operational state.
- **Use the correct tool.**
Use only tools or accessories that are designed for turning tasks. Avoid unnecessary tool stress. Keep the turning tool in good condition. Sharp and clean tools guarantee the best and safe results. At the same time, bring the tool into the right position relative to the part in the lathe.
 - **Never climb on to the machine and tool.**
A tipping machine or a cutting tool touched accidentally can cause serious injuries.
 - **Remove wrenches and screwdrivers.**
Never push the key into the chuck. If the chuck is turning, this can be thrown out and lead to significant injuries. Make it a habit to ensure that all tools are removed from the machine before you switch it on.
 - **Cleaning the lathe.**
Switch the lathe off before cleaning it. Use a brush to remove wood chips and dirt.
 - **Attention while working.** Concentrate on your task. A distraction through talking or inattention can lead to serious injuries.
Ensure your posture is always correct and that you are balanced.
Do not operate the machine if you are **tired** or under the influence of **drugs, alcohol** or **medication**.
 - **Check for damaged parts.**
Before you use the lathe or tools, check these carefully for damage. Ensure that these parts are in a serviceable condition and their intended function is guaranteed.
Check the alignment and fastening of moving parts. Defective parts can affect operation and lead to injuries. Damaged parts must be repaired correctly or exchanged.
- **Working on the lathe**
With the power supply switched off, check whether the part can move freely by turning the spindle by hand.
Check the part to prevent pieces breaking off it while turning. Remember when using adhesives, in particular cyanoacrylate superglue or epoxy resin, that these can still be liquid in hollows or wide cracks after some hours. While turning, these can then be ejected due to the centrifugal forces and fly in the direction of the wood chips, in other words towards the turner, and represent a risk to health or of injury.
Before switching the spindle on, always check whether the right speed is set.
Use the lowest speed for new or irregularly shaped parts.
Turn with the recommended speed (table fig. 46+47).
Never brake ejecting parts by hand.
Place the toolrest as near as possible (approx. 5-10 mm) to the part. Before each start, turn the part by hand to ensure that it is running freely. Stop the lathe from time to time to reset the toolrest.

2. Intended use

The Twister FU-180 lathe is designed and built for turning tasks with small size wooden materials, horn, bone and plastics. Machining of other materials is not allowed or may take place in special cases only after discussion with the machine manufacturer. The lathe may be used only for longitudinal and plane turning of circular or regularly shaped prismatic parts.

The lathe is unsuitable for use in an environment where there is a risk of explosion.

Improper use of the machine causes risks for people and property; in addition, the functioning of the machine can be impaired.

If the lathe is used other than as listed above, it is no longer deemed proper use. As manufacturer, we do not accept liability for any resultant damage.

3. Technical specification

Dimensions

Top section: Length x Height x Depth..... 1,345 mm x 530 mm x 465 mm

Top section with bottom section: Length x Height x Depth..... 1,345 mm x 1240 mm x 525 mm

Working height with base frame (without adjustable feet) 1075 mm

Weight

Top section (without cast iron base frame) 79 kg

Frame..... 65 kg

All-up weight..... 144 kg

Bench bed (cast iron) 1,005 mm

Weight..... 33 kg

Hold point for the outboard turning device..... front/central

Hold point for the bed extension right

Between centres560 mm

Centres with bed extension.....960 mm

Swing 180 mm/(dia Ø 350 mm)

Headstock (cast iron)

Spindle thread..... M33 x 3.5 mm

Headstock taper..... 2MT with 10 mm clearance hole through

Indexing device..... can be divided into 24, 12, 8, 6, 4 and 2 parts

Spindle lock 4X

Tilting..... 0 to 180 degrees with fixed positions at 0; 22.5; 67.5; 90; 112.5 and 180 degrees

Weight..... 34 kg

Drive.....~230 volts, 3-phase AC motor, IP54, 1,420 rpm, 50 Hz, 1,100 W

..... The motor speed is continuously variable by means of the potentiometer on the mobile control box.

Mains power230 volts ~ 1/N/PE 50 Hz

Speed steps (rpm at the spindle).....Step I 150 – 3,700 rpm and Step II 50 – 1,230 rpm

Tailstock (cast iron)

Quill..... 2MT with 10 mm clearance hole

Quill travel..... 70 mm with measuring scale

Weight..... 8 kg

Tool rest lower part 350 mm tool rest with 1" (25.4 mm) pins

Weight..... 5 kg

Emission sound pressure level..... < 79 dB(A)

Outboard turning device optional with bed extension

Part diameter..... max. Ø 500 mm

Part thickness..... max. 200 mm

Basic fittings

Revolving lathe centre 2MT, 25 mm 4-edge dog, ejection rod, 350 mm hand rest, 80 mm faceplate, fork wrench for releasing the faceplate, mobile control box with German user manual.

Special accessories

- Outboard turning device and machine bed extension (400 mm) with an extension pin for the handrest and additional support base.
- Cast iron machine stands (base frame), prepared on all sides for the outboard turning device (6 anchor points).
- Easy Take Away (ETA) for rapid unlocking of the banjo underpart.

Maker's plate

Modell / Type	Twister FU-180	CE
Motor / Power	3~230 V 50 Hz 1,1 kW	
Techn. Daten / Specification	0-3700 U/min(RPM)/ M33x3,5 / MK2	
Baujahr / Year	201711	
Gewicht / Weight	144 kg (79 kg Tisch- / Table-Version)	
Serien-Nr. / Series No.	DN7 1030	
Hersteller / Manufacturer	Drechselbedarf Schulte Meppener Str. 111 , D-49744 Geeste Deutschland	

Fig. 1

4. Functional description

A lathe is a machine with which most cylindrical or prismatic wooden parts can be machined. For this, parts are clamped with special fixing devices between headstock and tailstock or with special clamping devices (chuck, faceplate, 4-prongs, spur drive etc.) and driven via an electric motor.

The drive is by the electric motor via pulleys on the spindle. With the Twister, there are two speed groups (ranges) which you can select. The fine coordination of the motor speed is achieved via a frequency converter, which is controlled via a potentiometer (POT for short) on the mobile control box, so that the motor speed is continuously variable in the speed range. This helps you to select a reasonable circumferential speed*** according to the diameter of the part. This improves safety while turning and the quality of the surface of the part.

To switch on the drive unit, first turn the **master switch** (see fig. 3) clockwise until it engages. At the mobile control box (fig. 2), switch the motor on and adjust the motor speed to high at the potentiometer.

Automatic shutdown

The Twister FU-180 is fitted with a zero voltage switch, which switches the bench off if there is a power failure and prevents a restart if the power supply is then restored. The speed can also be disconnected by the frequency converter in the event of overload while turning. To be able to restart the lathe in all cases, the cause must be rectified. If there is a power failure, the power supply must be restored. If need be, the pulley with the lower speed information can also be selected as the solution.

The turning chisels*** are fed to the part by hand, using the toolrest, which conceals a risk of injury, as the cutting force arising must be absorbed by the operator.

In order to divert the resultant forces, the turning chisels must sit firmly on the tool rest at all times.

It is important that you read the user manual attentively before first use, so that you are made aware of the risks that might arise through the operation of the machine (in particular rotating parts, the forces arising and the risks of injury).

If you do not yet have any turning experience, familiarise yourself with the lathe before first working with it. To do this, ask specialist turning personnel and experts and take instructions from them.

At our site, we offer beginners' courses and continuation training in this.

5. Protective devices

Protective devices protect persons and property. Without intact protective devices, serious injuries could be the consequence.

Danger!



The lathe may only be operated with functioning safety devices. Switch the lathe off immediately, if you establish that a safety device is faulty or has been removed! All supplementary operator systems must be fitted with the prescribed safety devices.

EMERGENCY STOP/OFF and ON function

(fig. 2). Pressing the **red** button (0) stops all machine functions. Press the **green** ON button (I) for a restart.

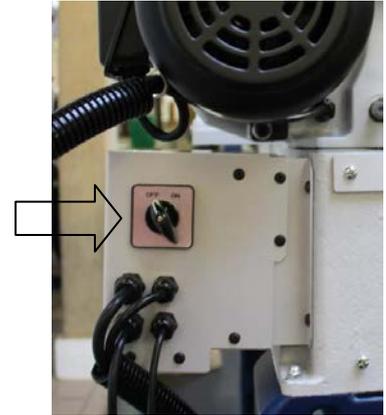
The tilt switch is used to switch into reverse. You vary the motor speed with the potentiometer.



Fig. 2

Master switch

The master switch is at the frequency converter (FU) unit under the drive motor.



Warning notices on the lathe



Existing warning notices on the lathe ensure your safety. Always keep these legible and take note of their significance. In this case: Wear goggles and ear defenders.

Overview of further protective devices

The lathe has various safety devices:

1. Circuit breakers that are connected via protective contacts to the local power supply.
2. Covers on the electric motor.
3. Stop button via the mobile control box.
4. Leakage protection at both ends of the lathe bed.

5. Installation site requirements

Requirement	Recommendation
Lathe installation site	<p>Install the Twister FU-180 close to a power source (protective contact socket).</p> <p>Ensure there is a level, solid and load-bearing base.</p> <p>Leave adequate space around the machine. Also, take into account adequate space for the rotating headstock, the bed extension and/or the outboard turning device. Other machines installed in the workshop must not be affected by operation of the lathe.</p>
Lighting and ventilation	<p>Ensure there is good lighting (lighting intensities to DIN 5035) and ventilation.</p> <p>Also, use variable illumination for your work area at the lathe, so that no shadows are cast on the part. We recommend fitting a light source that has a value of at least 300 LUX and better 500 LUX at the cutting tool.</p> <p>If possible, install the machine close to a window.</p>
Electrical equipment	<p>To be able to operate the lathe, this needs a suitable, normal household 230V protective contact socket fused 16A.</p> <p>Electrical lines and sockets must comply with local electrical regulations. If in doubt, ask your electrician. Avoid using an extension lead (see also for this the chapter "Connecting the lathe to the power supply").</p>
Ventilation	<p>Ventilate your workplace adequately. The degree of ventilation depends on the size of the workshop and the number of parts produced. Using dust suction systems and filters reduces your health risk.</p>
Working height	<p>The lathe must be installed at a working height such that the centre of the spindle is at the height of the user's elbow.</p>
Working area	<p>When fixing the lathe to the floor, clearance around the lathe of at least 80 cm for repair and servicing tasks must be guaranteed.</p>
Frame	<p>If the lathe is used without a base frame, a suitable installation area for the operator must be chosen. In this case, the outboard turning device cannot be used.</p>

6. Assembling the lathe

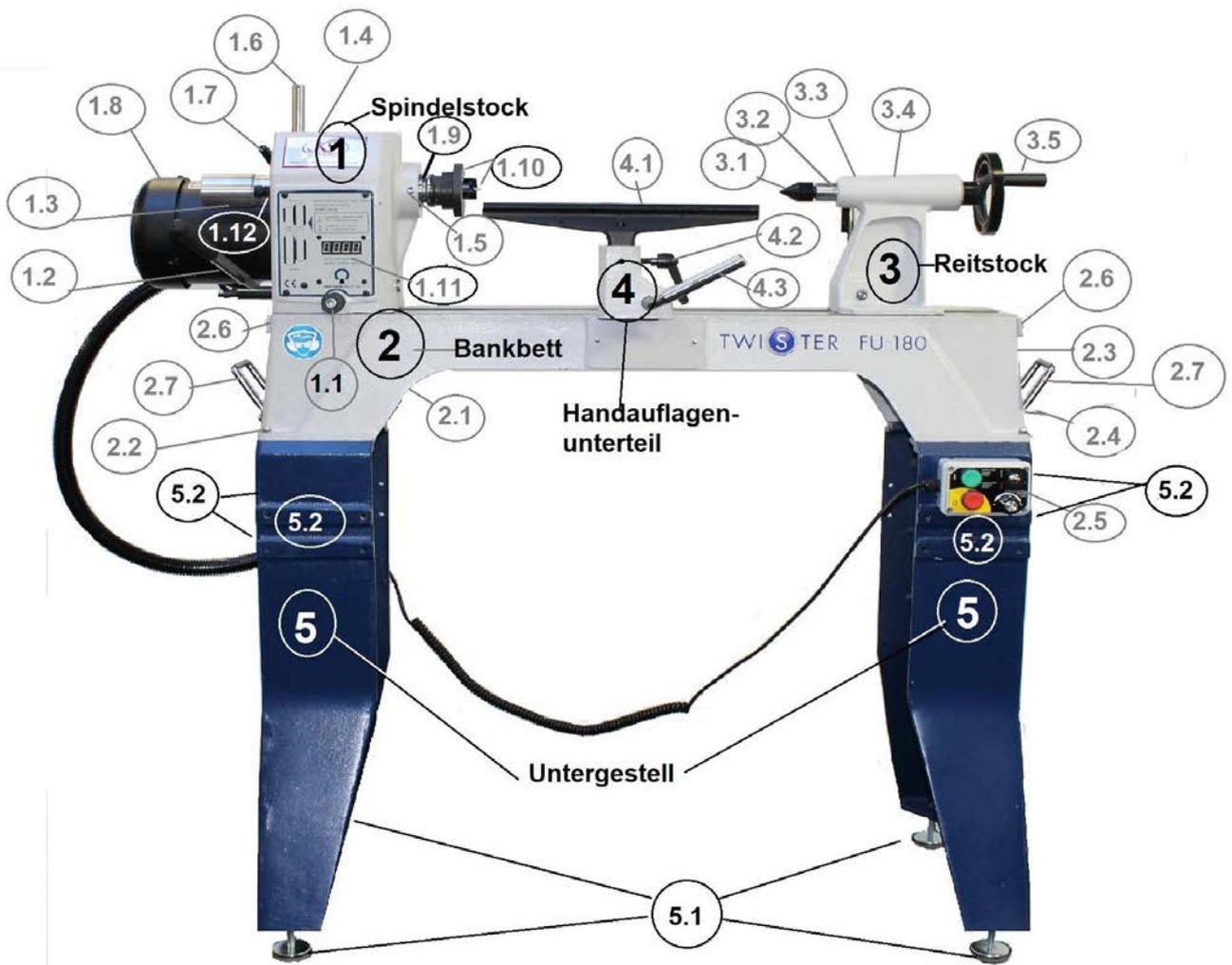


Fig. 4

Description of the lathe

1 Headstock 2.5 Mobile control box

1.1 Turn & pull button to turn the headstock

1.2 Headstock clamping lever

1.3 Handwheel

1.4 Pulley cover

1.5 Spindle stop

1.6 Motor tilting lever

1.7 Motor clamping lever

1.8 Electric motor

1.9 Spindle with M33 thread

1.10 Faceplate and/or spur drive

1.11 Digital rev counter

1.12 24-step locking screw

2 Lathe

2.1 Master switch (rear)

2.2 Baseframe fastening with bench bed

2.3 Borings for bed extension

2.6 Lathe leak stop (Bolt)

2.7 Carrying handles

3 Tailstock

3.1 revolving centre

3.2 Quill

3.3 Quill fine adjustment (on the back)

3.4 Quick clamping lever for quill stop (rear)

3.5 Handwheel

4 Banjo

4.1 Tool rest

4.2 Quick clamping lever

4.3 Banjo clamping lever

5 Base frame

5.1 Variable height feet

5.2 Anchor points for bed extension

Notes on assembly:

The machine was packed carefully at the factory. After delivery, please check the packaging for damage, or whether the machine has been damaged in transit, or you wish to complain, as well as the completeness of the contents of the package. If you have complaints, please report them to your dealer immediately and do not start the machine. Later complaints cannot be accepted. Use of other machines may lead to loss of warranty.

This packaging is raw material and can be recycled in the raw materials circuit via the existing local collection points. Dispose of the packaging only if the lathe has been assembled and is working properly.

Read through the user manual carefully!

Caution!	
	<ul style="list-style-type: none"><input type="checkbox"/> Note the weight of the individual components and handle these carefully, so that you are not injured.<input type="checkbox"/> Ensure that all screwed connections are tightened firmly but not to excess. After eight hours run, all screwed connections must be checked for firm seating.<input type="checkbox"/> When assembling the headstock, place it so that cable connections are not damaged and that cables are not crimped under any circumstances.<input type="checkbox"/> The cast-iron underparts were developed for use with the Stratos FU-230, Twister FU-200 and 180. Using other machines can conceal a risk of injury.

Tool and material recommendation for assembly:

- Two timber spacers are needed to fit the headstock.
- 14 mm wrench, Philips screwdriver, Allen key to release the faceplate from the spindle and the built-on parts.
- Standard spirit level.
- Plank (length x width) 1,150 x 100 mm and approx. 20 mm thick, with two holes Ø 9 mm to secure the base frame during installation.
- It is essential to have a second person for installation.



Fig. 5 Content of the transport packaging

Bench bed, headstock, tailstock, banjo, form a unit.

The base frame (fig. 8) and accessories are packed in separate cartons (fig. 6).

Content of the transport packaging

- A** Bench bed (see fig. 5) with headstock, tailstock, banjo, tool rest 350 mm (1" stem).
- B** Baseframe optional (fig. 8)
- C** 2MT revolving lathe centre.
- D** 4-edge dog 25 mm, 2MT.
- E** Ejection rod.
- G** 8 x M 8 screws for screwing the bench bed on to the underparts with 8 washers and locking washers, 8 nuts and 4 cap nuts.
- H** Double-sided Morse taper, 2MT, for adjusting alignment.
- I** 4 mm Allen key.
- J** Wrench for releasing the faceplate from the spindle.
- K** 80 mm faceplate with M33 x 3.5 mm threads with 2 x 5 mm Allen screws (flow protection).
- N** Stainless steel handle, which must be screwed vertically on to the top of the motor flange. It tensions and releases the poly-V belt.
- M** Handle for tailstock handwheel
- O** Bench bed carrying handles

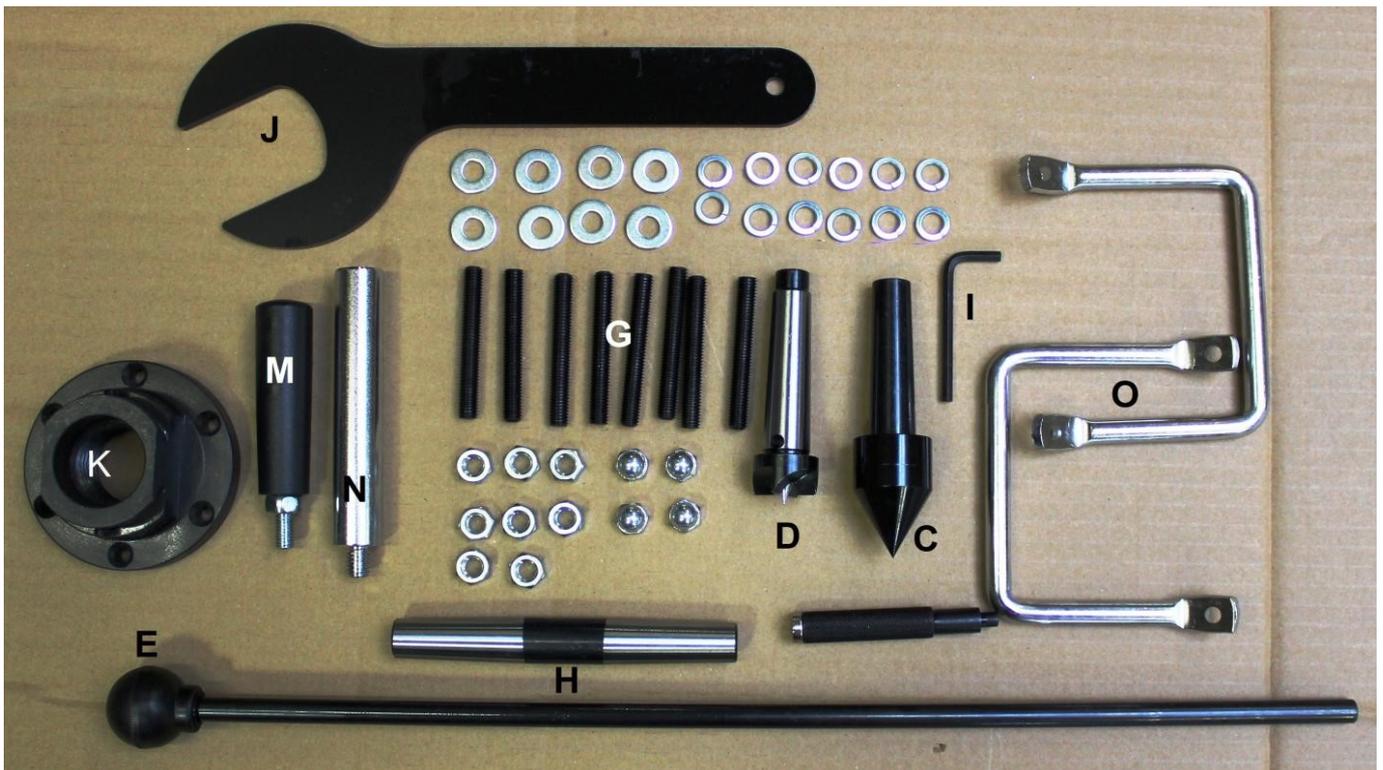


Fig. 7 Accessories



Fig. 8 Optional accessories Base frame with adjustable feet

Danger!



- When installing the machine, always take care not to get your fingers trapped between components. There is a risk of crushing!
- Note the weight of the individual components and handle these carefully, so that you do not suffer any injury!

Preparation for the base frame on bench bed :

The Twister FU-180 can be used with or without the base frame (table version)

When using the base frame, put it flat on the floor and fasten the feet to the underside in the tapped holes and secure with the hex nuts.

To guarantee that the lathe is secure and horizontal, the setting screws can be adjusted on the underside, both left and right sides. Use a spirit level to align the lathe.

The variable height feet can also be discarded if a level base is available and the working height is sufficient.

These are used to compensate uneven levels and to change the working height by up to 50 mm (The spindle height should be set to the user's elbow height).

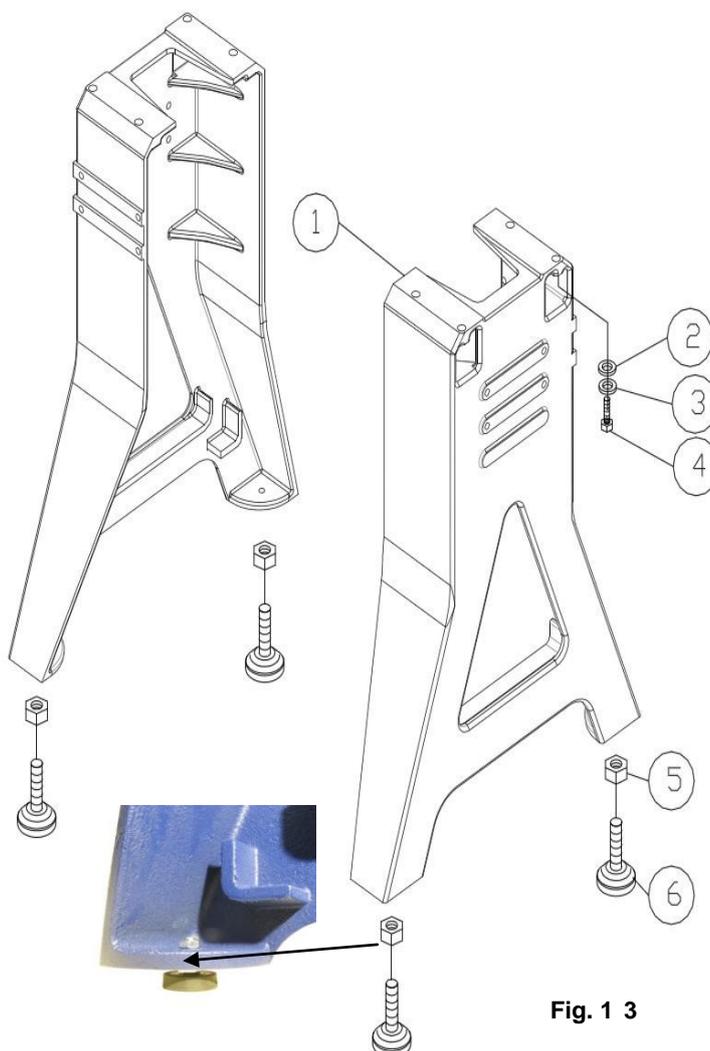


Fig. 1 3

Screw a prepared plank to the outer turning device anchor points (see fig. 15) on the base frame using M8 machine screws (alternatively, use the enclosed stud bolts). Now align the base frame so that it ends with the plank and secure the plank to the base frame with screw clamps.

Note! Before you now fasten the Twister FU-180 (79 kg) to the base frame, first reduce the weight of the bench bed by removing the headstock, tailstock and banjo. To do this, release the stops at both ends of the bench bed (fig. 4) and at the same time look out for the connected cable.

Lift the bench bed (fig. 16) (two people are essential) on to the base frame and align it.



Fig. 14



Fig. 15



Fig. 16 Placement on the base frame

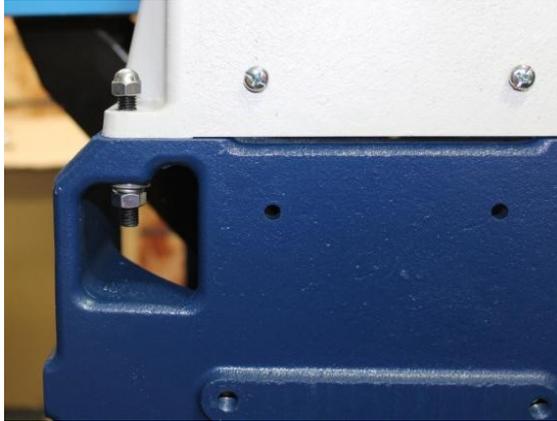


Fig. 16 Screw the bench bed on to the base frame (using screws fig. 7)

Now screw the bench bed firmly to the base frame with the supplied studs, nuts, washers and locking washers. You can turn the studs in with the Allen key supplied.

Tighten the screws only by hand initially, so that after removing the screw clamps the bench bed and the feet can still be aligned. After you have tightened both screws on the bench bed, you can remove the plank and connect the bench bed firmly with the screws supplied.

Now use the spirit level to check whether the bench bed is level. Align the lathe if necessary using the adjustable feet.

Now turn the stainless steel handle (N) in the mounting provided for it to clamp the drive belt to the motor flange and the handle (M) into the tailstock handwheel.

Aligning the headstock.

Release the headstock with the clamping lever and turn it so that the bench bed and the tailstock are inline. With the double 2MT (H) in the tailstock, feed it using the tailstock into the headstock spindle so that it slides in without any resistance.

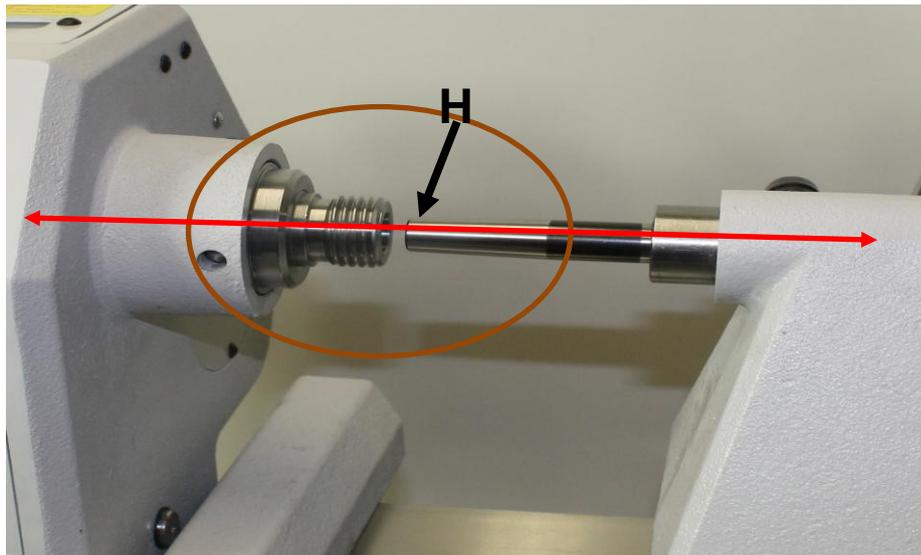


Fig. 29 Aligning the headstock

Once the head is fully aligned with the tailstock, lock down the headstock.

Caution!



You must always repeat this process of aligning the headstock if you have moved it, for example while using the outboard turning device.



Fig. 30 The lathe is now assembled and ready for operation.

Easy quick clamping system (available as an option)

This high quality device (fig. 31) allows a quick change of the bench bed extension and the outboard turning device (figs. 33-36). This is an accessory that is not included in the ex works delivery.



Fig. 31

Assembling the bed extension (available as an option)

- Combined bed extension and outboard turning device (consisting of cast iron bed extension 400 mm, shaft extension for handrest).
- Can be used at 8 assembly points on the FU-180 (fig. 33)!

The bed extension can be used to extend the bench bed and for the outboard turning device. This is an accessory that is not included in the ex works delivery.



Abb. 32

1. Before the bed extension is installed, push the tailstock away from the end of the bench bed.
2. With the support of a second person, place the bed extension flush with the bench bed and push the Allen screws with the washers and locking washers through the openings in the tapped holes on the bench bed.
3. Lift the bench bed extension carefully over the top of the bench bed. Tighten the screws only until the extension is held firmly in position.



Abb. 33

IMPORTANT: So that the tailstock can be moved easily over the joint, bench bed and extension must be aligned exactly.

Tip: Before tightening the bench bed firmly, guide the tailstock over the connection point and clamp it tightly. This aligns the screws.

4. If need be, use a hammer with a softening block underneath or a plastic hammer to align the bed extension with the bench bed.

! Never hit the metal surface directly with a metal hammer!

Hammer only until both surfaces and the insides are completely aligned.

5. Now finally tighten the Allen screws firmly. However, at the same time ensure that the alignment of both parts is no longer changed.

Outboard turning device

If the bed extension is used as an outboard turning device, then screw this to the base frame at the marked anchor points (fig. 33). Insert the shaft extension supplied into the bottom of the hand rest.



Fig. 34



Fig. 35



Fig. 36

6. Connecting the lathe to the power supply

At the operator's position, there must be a grounded power point fused on the building side with a 16A fuse. The supply voltage (230 V) and frequency (50 Hz) must be the same as the data on the maker's plate on the lathe.

Mains protection connected with the grounded plug of the lathe must be available in the building.

The grounded plug supplied may be used only with a properly installed and appropriate grounded power point compliant with national electrical regulations.

Danger!



□

- A lathe not connected in accordance with the regulations can lead to an electric shock.
- Only an electrician may carry out any electrical equipment connections and repairs.

7. Start-up

First check that the machine is properly installed and assembled.

Remove all loose parts and tools on and around the lathe before start-up.

Put the master switch to "AUS/OFF" On the mobile controller, place the tilt switch at "forwards" and turn the potentiometer to the left until it stops on zero. Push the grounded plug into the grounded power point provided for the purpose.

Now place the master switch at "EIN/ON" (You must first reset this to "AUS/OFF", if you have ended work on the lathe).

To start the machine, press the green button (I) on the mobile control box.

Turn the potentiometer to increase the motor speed to the desired rpm.

! On starting the lathe with a clamped part, always ensure that the potentiometer is at "0". Only now press the green **ON button** to start the lathe turning.

8. Operating the lathe

Headstock

The headstock consists of the drive unit (electric motor) with snaplock lever and clamping lever for releasing the belt, pulleys with translation, spindle with M33 x 3.5 mm thread and additional 34 mm collar and 2MT, turn and pull button for the headstock, cover for pulleys with siph glass, 24-step parts device, handwheel, clamping lever to move the headstock, digital display of the speed at the spindle in rpm, turn and pull button for turning the headstock.



Changing the 4-prong drive plate

You use the ejection rod supplied to push out the 4-prong drive plate from the rear through the drilled spindle shaft. First try to push out the 4-prongs by pushing slowly, at the same time hold then 4-prongs carefully but firmly on the outside with the other hand. Do not hold the 4-prongs from the front at the tip - injuries would be the result.

Tailstock

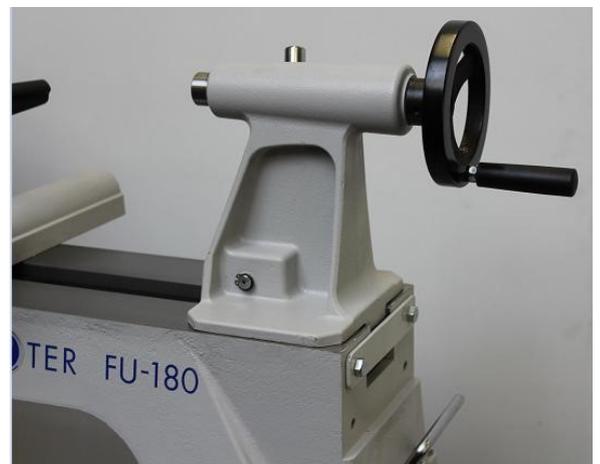
Never loosen the tailstock quill or the tailstock itself while the part is turning. The tailstock is fitted with a 2MT quill. The quill guide is fitted with a

snaplock lever, with which the quill must always be locked after clamping the log with the handwheel. In addition to the snaplock lever, there is a nut which is attached for re-adjustment of the quill. Please ask you dealer if need be. A lever for locking the tailstock on the bench is fitted on the back of the tailstock. It can be removed by removing the safety plate, placed on the end of the lathe bed if you wish.

Ensure at regular intervals that the tailstock is clamped properly on the bench bed. The tailstock guarantees an exactly flying line between centre punches and drive plate. This guarantees low vibration turning and is the best condition for exact drilling with the tailstock.

To push the tailstock on to the bench bed, release the clamping lever and push the tailstock to the desired position and then secure it here again.

To turn the tailstock quill in or out, release the snaplock lever at the quill and turn the handwheel. Centre punches and tools with a 2MT can be used with the quill. To fit the tool, this is pushed by hand quickly and firmly into the quill housing. Do not hit it into the quill housing.



To prevent the tool falling out, it is held firmly by hand from the outside. Caution: There is a risk of injury from the tip.

Changing the centre punch

The punch can be ejected by turning the headstock handwheel to the left. Alternatively, it can also be pushed out with the ejection rod.

Hand rest

After releasing the clamping lever, the bottom of the hand rest is pushed to the desired position on the bench bed and again locked in position.

Guide the toolrest close to the part. Each turner will select his favourite position. Before switching on the lathe, the part is turned by hand to ensure that there is no contact with the toolrest. While working, the lathe is stopped periodically and the toolrest reset.



Optional: "Easy Take Away" quick change system

This "Easy take away" snaplock system is suitable for the bottom part of the knife rest on Stratos FU-230, Twister FU-200; Twister FU-180 and Twister ECO. Using an Allen key, or say Nova2 or similar chuck keys, the complete banjo base can be unlocked and removed in seconds. This quick unlocking is used if the bottom of the knife rest is removed and, say, must be replaced by a ball turning machine or its like, or is to be used for outside turning.



Fig. 40

Parking device (Eccentric clamp)

If the headstock, tailstock or banjo cannot be secured firmly to the bench bed, a reset of the eccentric clamp is required. Pull headstock, tailstock or handrest bottom to the end of the bench bed and reset the locknut (see adjoining picture) slightly.

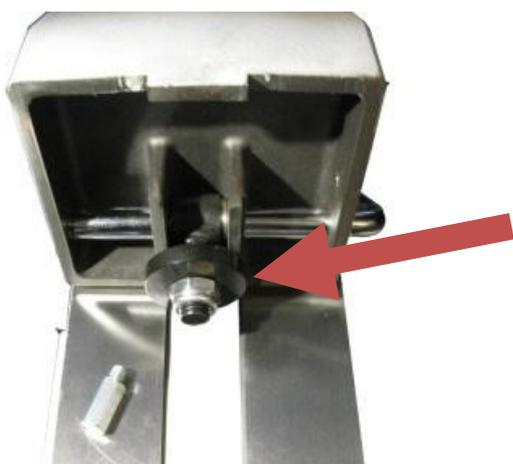


Fig. 41

Danger!	
	<ul style="list-style-type: none">□ While turning tools are in contact with the part, these must be seated firmly on the handrest.□ To avoid pinching your fingers during grinding or polishing tasks, the handrest must be removed from the part.

Spindle lock

You lock the spindle by inserting a pin. Use the spindle lock to release a chuck or its like from the spindle (Fig. 42).

- ! It is essential to ensure that the motor is not switched on during locking.



Fig. 42

24-step indexing device

Slacken the knurled screw to set the 24-step indexing device. This facilitates even division while the spindle is turning. With this division, the spindle can be stepped down 24, 12, 8, 6, 4 and 2 times per revolution (fig. 43).

- ! It is essential that you ensure the mains plug is pulled out. Do not switch the motor on during lock.
- Use the 24-step indexing device only for divisions, not to release a chuck from the spindle.

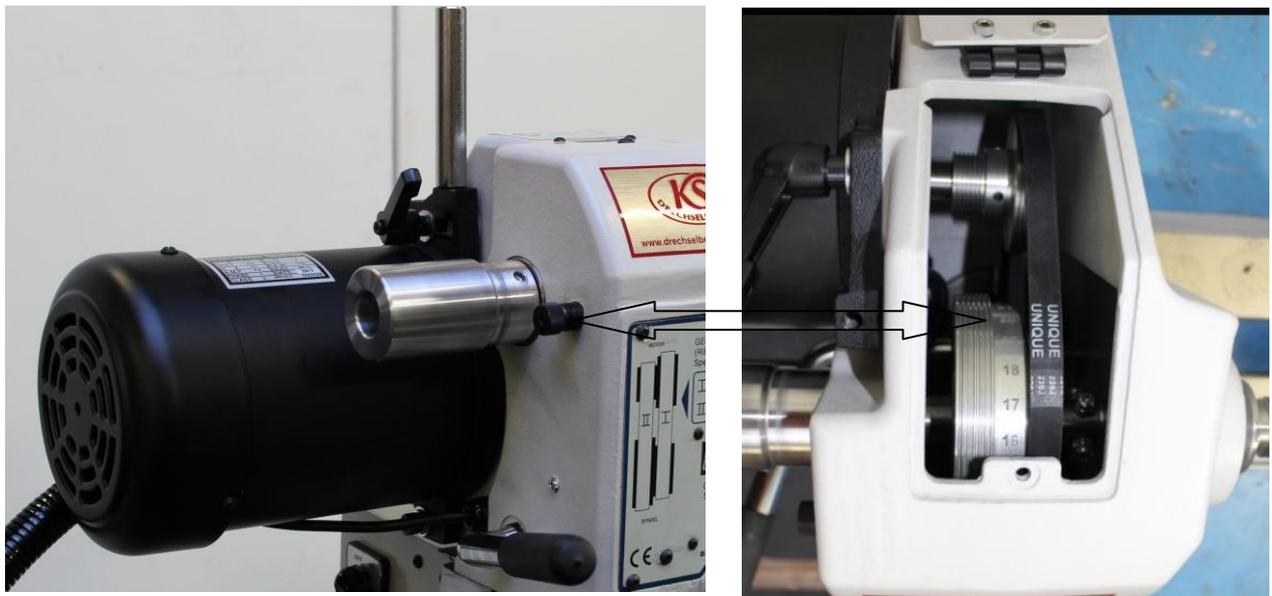


Fig. 43

Mobile control box and master switch

Master switch

Set the master switch to switch-off at "AUS/OFF" and to switch on at "EIN/ON" (fig. 44).

The **master switch** is only to be switched on or off at the beginning and at the end of turning. Normal switching on and off is by means of the mobile control box.

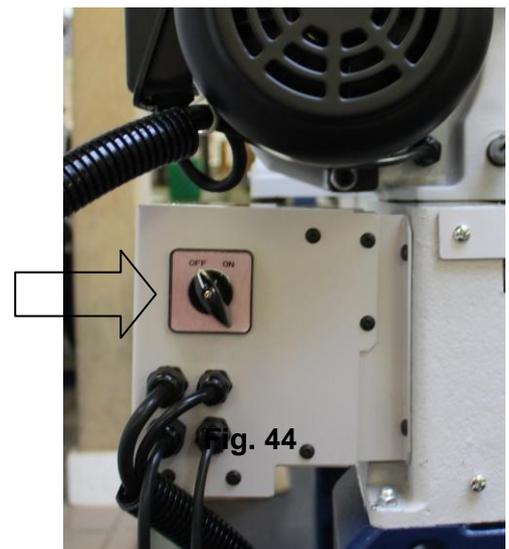


Fig. 44

Mobile control box

Place the mobile control box (fig. 45) at an easily accessible place or on the mounting provided.

- The **red** button (0) is a **STOP** and OFF (0) during turning.
- The **green** ON button (I) is used to switch the lathe on while turning.
- The toggle switch is intended for forward and reverse running. It is normally placed in the forwards position. Reverse is used very rarely, e.g. for repeated sanding.
- The potentiometer (Pot) controls the motor rpm.
Turning it clockwise increases the turning speed, turning it counterclockwise reduces the turning speed.



Fig. 44

Caution!



- Always position the mobile control box within reach at the lathe or at the place provided for it on the lathe, so that you can **at any time** operate the **STOP** button (0).
- When using chucks, face plates and other M33 devices it is essential to use a locking screw when in reverse

Recommended rpm range

1. Explore the diameter of the part.
2. With a vertical line, determine the rpm intersection point.
3. Move left from this point and determine the speed (rpm).

A. Recommended rpm range for general turning work

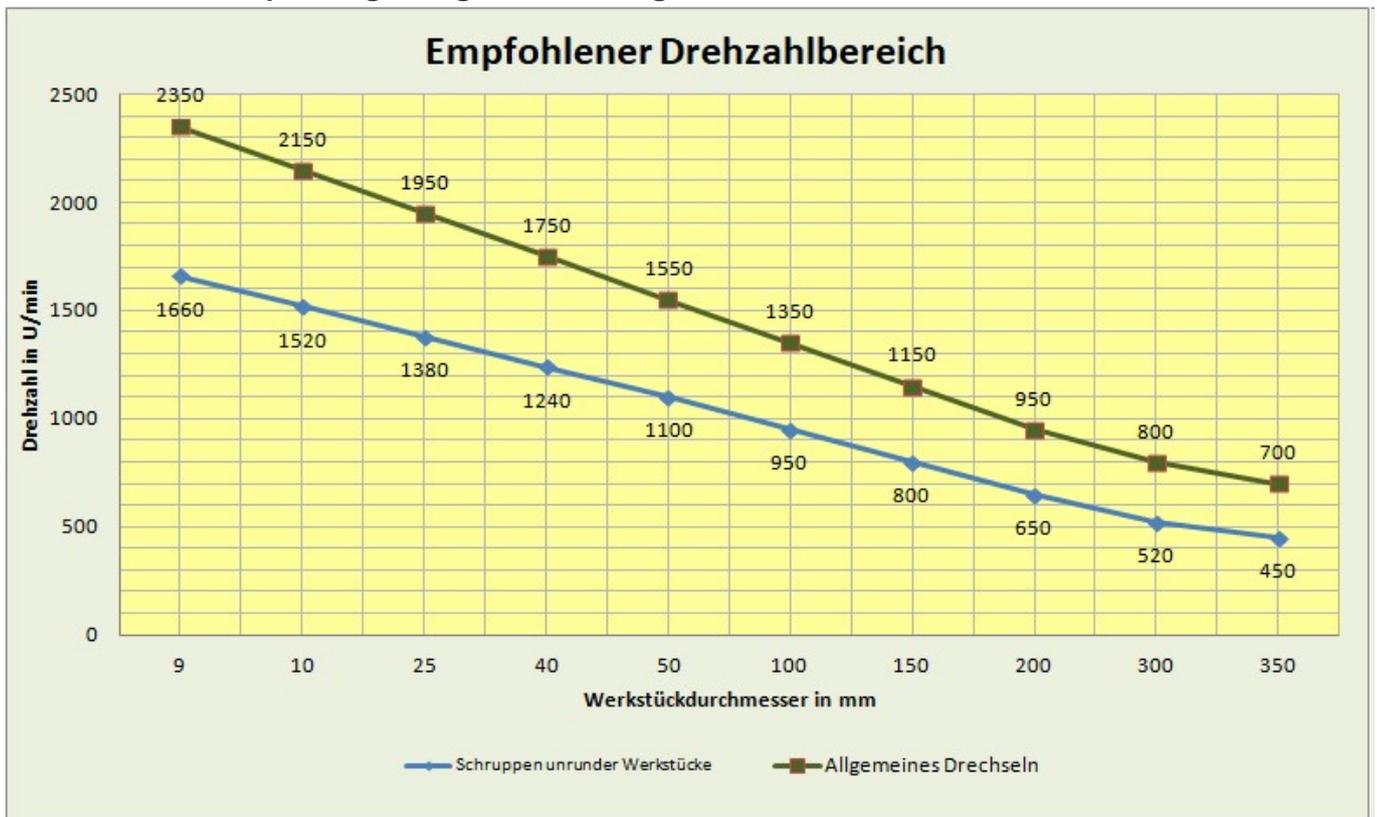


Fig. 46

A. Recommended rpm range for general turning work on the outboard turning device

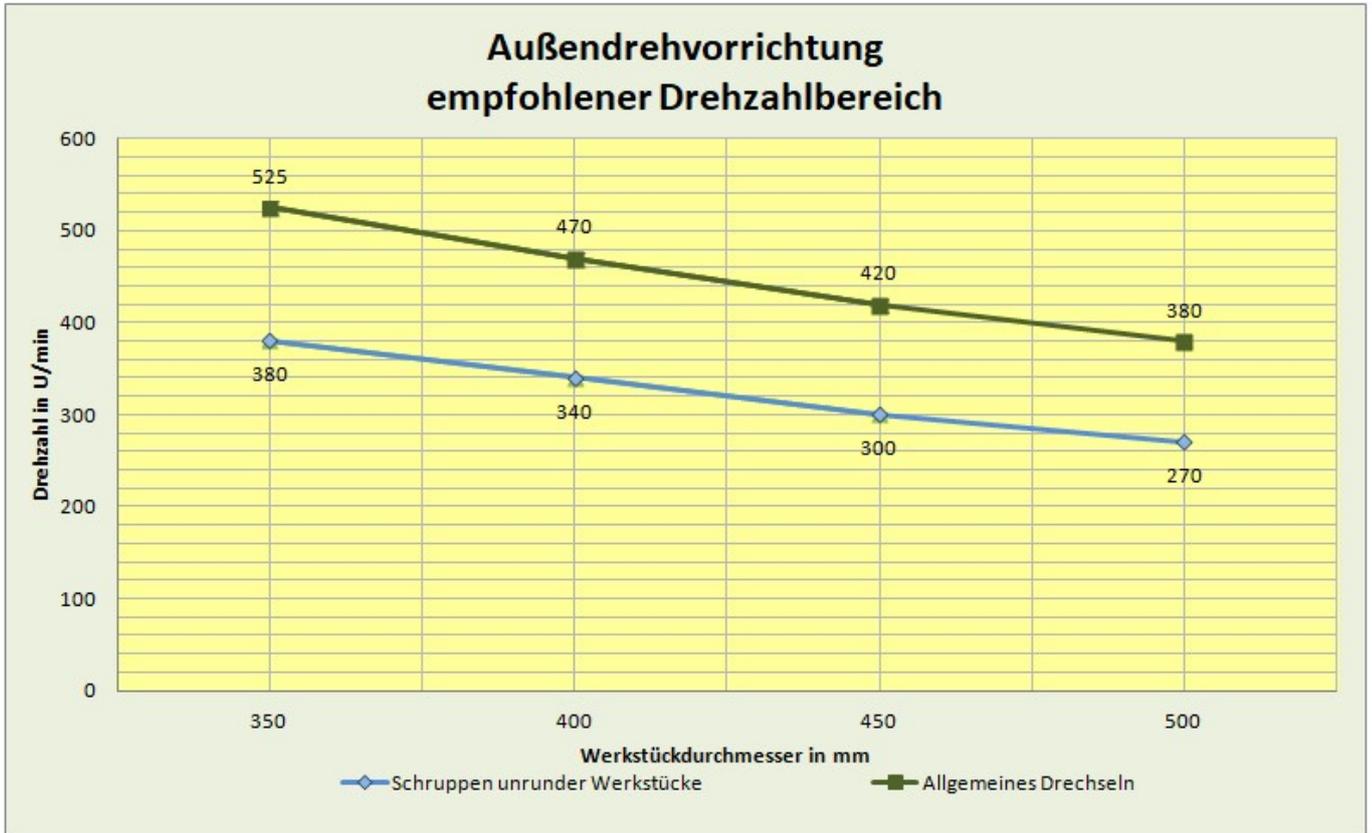


Fig. 47

RPM range by changing pulleys

The motor drives the spindle via 2 wide pulleys using poly-V-belts. To maintain optimum torque, a slower belt speed will be needed when working with larger diameters. In other words, you have been turning at a fast belt speed e.g. spinning tops or the like and then want to turn a bowl with a diameter of 30 cm or more, the motor output can be reduced at a high stress. You must then select a different speed.

Under the cover at the headstock are two pulleys, with which you can switch between the two speed ranges.

Pull out the mains plug and only then open the cover (fig. 48, V) at the headstock. Now release the snaplock lever at the motor flange. Pull the motor forwards at the chromium-plated clamping lever (S, fig. 50). This releases the poly-V-belt tension.



Fig. 48 Open cover



Fig. 49 Release the lock

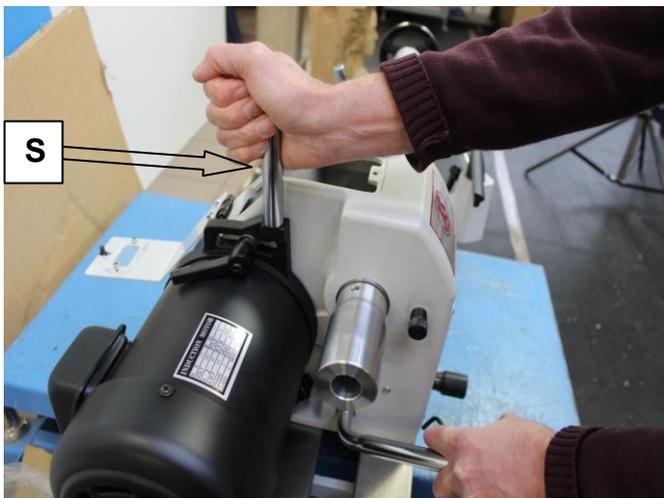


Fig. 50 Release the poly-V-belt tension

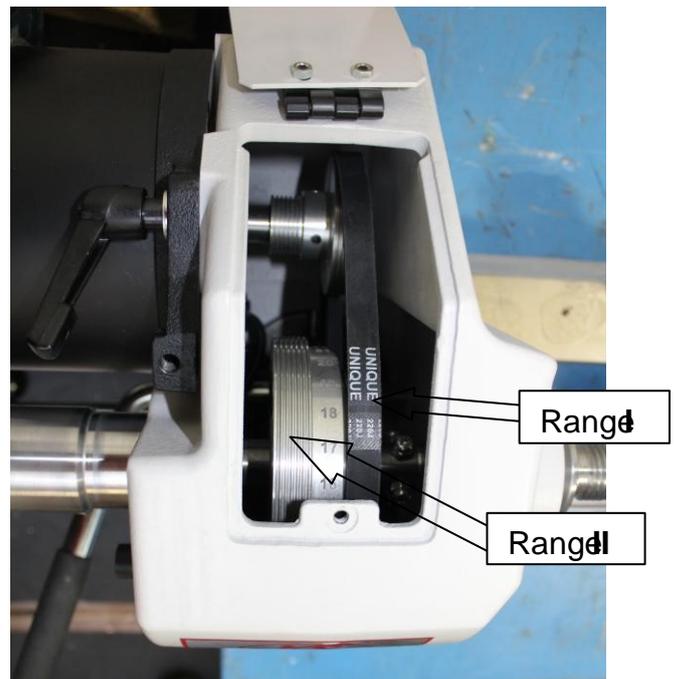


Fig. 51 Change translation

Now place the belt at the corresponding pulley combination at the or and spindle.



Fig. 52 Belt change



Fig. 53 Belt change



see Fig. 54 Tensioning belt



Fig. 54a lock

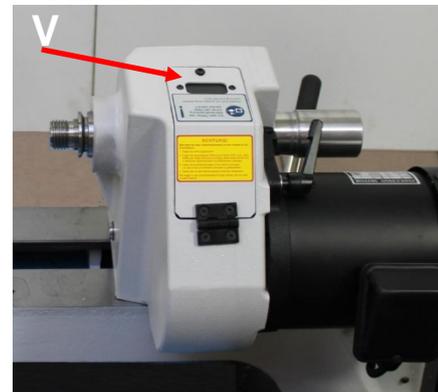


Fig. 55 Close cover

The combination range I for 180 -3,700 rpm or range II for 80-1,350 rpm (see fig. 51). Then press the motor using the chromium-plated clamping lever in the opposite direction and in this way clamp the belt (fig. 54). Fix this position again with the snaplock lever (S, fig. 54a) and close the cover (fig. 55). Close the locking screw (V, fig. 55) again.

You can now plug the mains plug back in. The new rpm range is available.

Belt change

Should you have to change a defective belt, please contact your dealer, as the spindle has to be removed for this.

If you have the necessary technical knowledge, proceed as follows: Pull out the mains plug and only then open the cover (fig. 51) at the headstock. Now release the snaplock lever (fig. 49) at the motor flange. Pull the motor in the direction of the headstock at the chromium-

□ Drechselbedarf Schulte

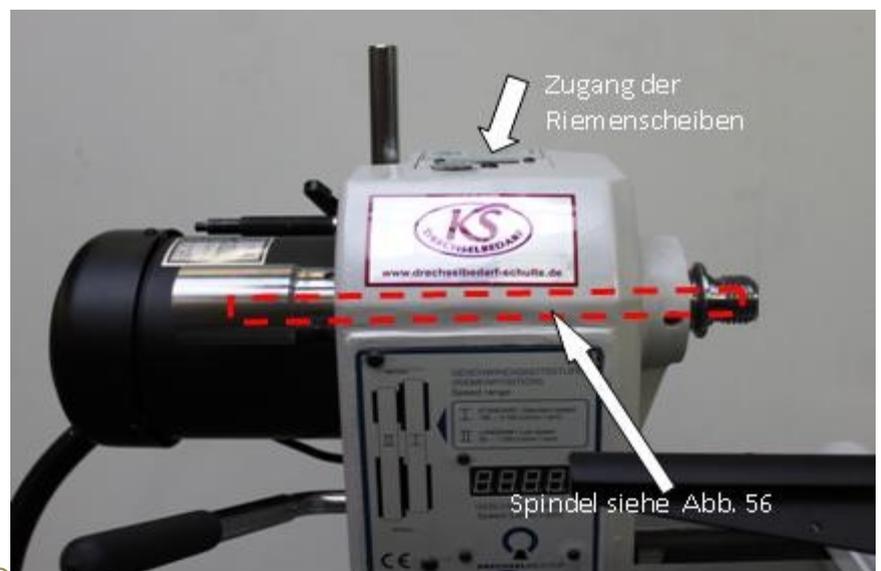


Abb. 56

plated clamping lever (S, fig. 50). This releases the poly-V-belt tension.

Now remove the damaged belt (if need be, cut it with a knife or shears). To insert the new belt, the spindle shaft must now be removed (fig. 56a). Then insert the new belt and refit the spindle in the reverse order to that for removal.

Then pull the motor away from the headstock again using the clamping lever (fig. 54) and in this way tension the belt. Fix this position again with the snaplock lever (fig. 54a), close the cover and close the locking screw (V, see fig. 55). You can now plug the mains plug back in. The belt drive is now again ready for operation.

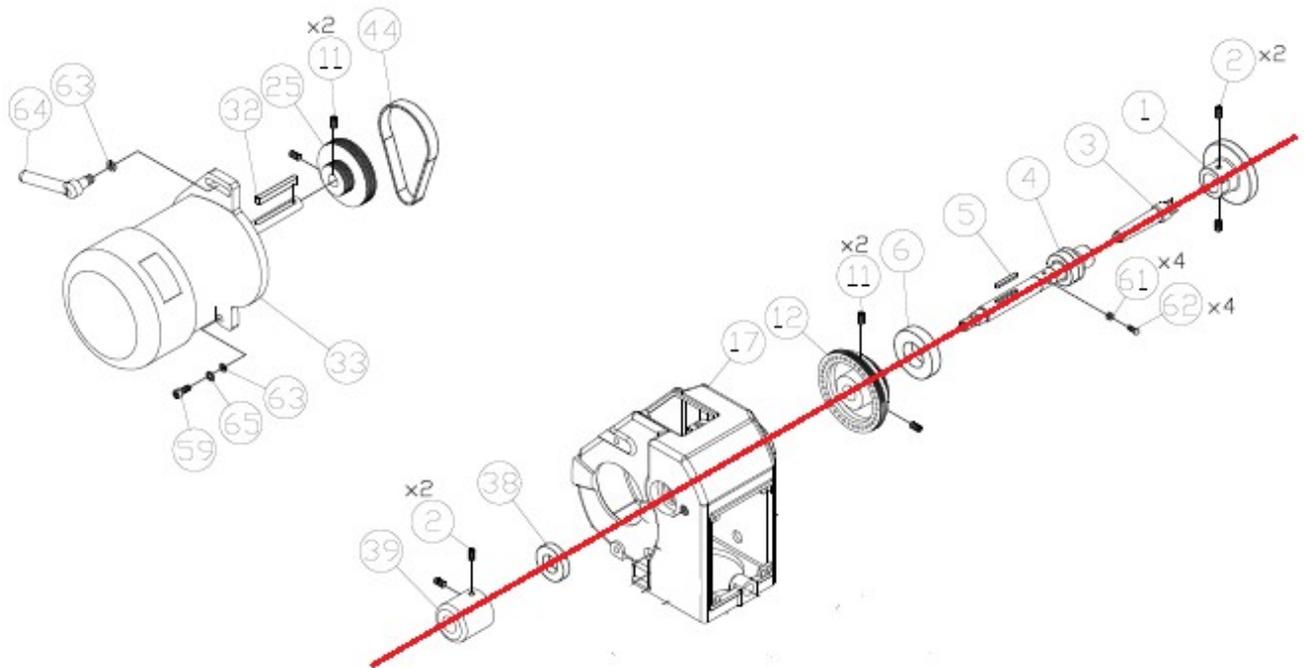


Fig. 56a
Machining parts

Danger!



- Always wear goggles
- Ensure that the part is clamped securely.
Always start with a slower motor speed and increase this to the optimum motor rpm.
- Out of balance parts can be ejected from the lathe at excessive motor speeds and cause you serious injury.
- After pressing the **STOP** button, the lathe is preprogrammed to run the speed slowly back to zero. Do not try to hold the part by hand during the rundown phase.
This conceals risks of injury through splinters and overheating.
- Your fingers could be trapped between part and knife rest.

Caution!



- If the power fails, the part in the lathe is no longer braked. The machine can take some time to stop.
- The 4-prong drive plate must grip securely. Punch the part forward with the 4-prong drive plate and a wood hammer (see fig. 57).
- With long and thin or long parts, especially with incipient vibrations, use an intermediate support (centre steady).
- When using a skew, proceed with caution; in particular, first place the skew on the toolrest and then guide it to the part.
- When working with woods that are harmful to health, use suction or a face mask and wear goggles
- Do not use parts that are seriously out of balance. If vibrations set in, switch the machine off immediately.



- Do not use parts with cracks or inadequate strength (e.g. owing to rot) □ Clamp the part securely.
- Select a state of the art chuck.
- Select a motor rpm dependent on the diameter of the part.

Use the recommendations in the stipulated motor rpm table (see fig. 47)

Pay particular attention to clamping the part. This must be done as securely as possible. There are various options for this. Pull out reference books, explore training opportunities or attend a turning course in our company.

Pay attention to safety and take particular care with parts running out of true. Use a balanced rpm, clamp the part securely and try to correct any off balance timber as far as possible before clamping.



Clamping logs between the tips

Optimum centring is essential, as any imbalance must be minimised, especially with large parts. Pressing the 4-pronged plate down hard also increases the secure holding of the part while turning.

Take a square piece of wood and first determine the centre point at both ends.

To do this, join the end points with a diagonal pencil line (see fig. 57). Alternatively, off-the-shelf beam centring devices are available.

The beam is then placed on a firm foundation and the 4-prong plate is hit into the exact centre of the wood with a mallet, rubber or Teflon hammer. In this way, you have 4 deep grooves at one end of the beam, where the 4-prong drive plate can penetrate easily and the part housed securely without slipping. Push the 4-prong drive plate into the spindle and ensure that it is seated tightly. Clean the 2MT Morse cone regularly. Now press the beam with the imprint into the 4-prong drive plate and push it



Fig. 58

into the tailstock with an

overlap at the other end and place the tailstock with the clamping lever on the rear side and firmly on the bench bed. Turn the handwheel to press the punches into the centring of the other end of the beam. Finally, the quill is locked with the snaplock lever.

Do not press the part with the tailstock into the clamped 4-prong drive plate, this places excessive stress unnecessarily on the tailstock and headstock and makes it unnecessarily difficult to press the 4-prong drive plate into the beam, especially with hardwoods. The specimen is clamped properly and is ready for turning **Set the toolrest**

The bottom of the toolrest is fixed in front of the log with the clamping lever.

Adjust the hand rest (fig. 59) so the wood can still turn freely. The

gap between part and toolrest should be approx. 5-10 mm. Lock this with the snaplock lever.

The basic rule is: The wood should be cut with the tool. If too low a speed is selected, the wood is "hammered" against the tool, splits and significant forces are exerted on tool and part. This can lead to dangerous situations.

It is therefore better to select fig. 59 Hand rest gap a suitable speed (see fig. 47), in this way

you obtain a better cut and lower forces are exerted in the part. Compare working with a plane. If the plane is moved very slowly, it is much more difficult to break the fibres.

Bowl blanks on a faceplate

Crossbar specimens must be sawn with a bandsaw to be as circular as possible before clamping on a lathe. This simplifies the start when turning and reduces vibrations. A level surface is needed to clamp a sawn specimen on a faceplate or a chuck. For this, hollow or curved surfaces must sometimes be planed smooth. Faceplates are bolted to the specimen with at least 6 wood screws. Particularly for larger parts, the face plate is the



safer way for first clamping. Modern chucks allow clamping using screwed chuck inserts or appropriate drilled holes. The screwed chuck insert is suitable for plane parts formed from bowl blanks up to a diameter of approx. 25 cm and a thickness of 8 cm. When using chucks, read the user manual for the chuck in question.

Placing the skew or toolrest on a log



For rough machining, set the toolrest so that the cut can engage somewhat above the centre. The roughing gouge is used until the imbalance is turned out (see fig.

61)

To machine a shape, a shape or spindle gouge is used. It engages well above the centre of the part. Cylindrical shapes can be smoothed with a skew. Again here, the chisel engages on the part well above the centre.

Fig. 61 Chisel setting

Roughing gouges, German shape

A square or slightly rectangular log can be machined roughly into a cylindrical shape with a roughing gouge. We distinguish the English "U-shape" and the German "flat-forged" roughing gouge. The English roughing gouge is used only for logs, whereas the flat forged from can also be used in the crossbar area for the top and under sides.

Shaping with spindle gouges.

The spindle gouge is used to shape large and small shapes such as beads and coves, on stair spindles rails etc. and for the final cut on logs.

Changes in the diameter of the part are offset to some extent by adapting with the lower arm. Spindle gouges machine the log always somewhat above the centre of the part. Spindle gouges are almost always used slightly at the vertical and they always cut **ONLY** with the underside of the cut, near the front nose. In addition, chamfers are always created when cutting with a spindle gouge. Again in the crossbar area, the flat forged spindle gouge can be used, but generally only a shell tube is still used for this. Also see the video "Introduction to the principles of turning" or the video "Turning bowls"

Box chisels and oval skew chisels

Box chisels are traditional tools and have always been used for particularly fine surfaces when turning logs. Oval skew chisels date only from the end of the 70s and have been developed for machining cleaning cuts.

Chisels are kept with a side angle of approx. 45° to the part (see fig. 62). The central third of the cut works.

Again the chamfer must be created.



F

ig. 62

Skew cutting

When cutting, the blade is placed on the top third line of the part and in a curve cut to the centre. When turning a plate in the log area, the procedure is the same, but always only to the desired diameter. For further information, attend a turning course, collect our video programme "Principles of turning", read technical manuals or have your dealer explain in detail.

Recommended speed selection

The speed in rpm is aligned mainly with the size of the part. However, other features such as imbalance, weight, hardness, different density etc. determine a safe speed. If too low a speed is selected, this usually precludes production of a smooth surface. If speeds are too high and the lathe begins to vibrate, there is then a risk that the part will fly out of the clamp and cause serious injuries or damage.

Outboard turning device

Caution!



- When using the outboard turning device, it is recommended that the lathe be fastened to the floor with heavy duty anchors.
- Working with the outboard turning device remains reserved to experienced turners with the corresponding education or training!

Even larger bowls, requiring a lower speed, can be turned with the outboard turning device. Select the speed range so that vibrations do not occur. When using the outboard turning device, it is recommended that the lathe be fastened to the floor with heavy duty anchors, if the selected speed range does not preclude vibrations. While parts are rotating, disproportionately higher forces occur than when turning via the bench bed.

The Twister FU 180 gives you the opportunity to turn parts larger than 35 cm in diameter. You have the choice of fitting the

outboard turning device at one on the three anchor points front left under the headstock or on the outside right of the right base frame. The headstock must be pushed to the right end of the bed to do this (fig. 64). However, for this, first remove the tailstock from the bench bed and look out for the cable when moving the headstock.

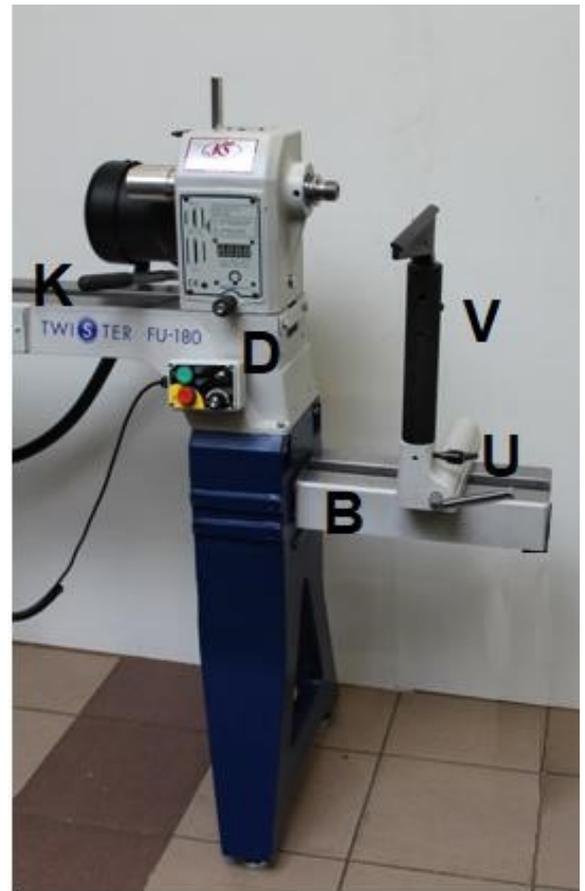
To start the outboard turning device (figs. 63 and 64), fasten the bench bed extension (B) (only available as an option) to the anchor points provided for this purpose (fig. 33) of the base frame, using the fastening set supplied. Release the clamping lever (K,



fig. 63)

to pull or push the headstock. To turn the headstock, you must first unlock the locking device (D) (fig. 63). To do this, release the turn and pull button (D) counter clockwise and then pull the entire headstock can now be turned through 90° and 180° in the desired direction. Now lock the headstock again using the

clamping lever (K) and the turn and pull button (D). Now insert the bottom of the hand rest (U) into the bed extension. To compensate for the greater height of the outboard turning device, you must push the shaft extension (V) into the bottom of the banjo and the toolrest into the shaft extension as usual and lock both.



9. Cleaning and servicing

Servicing/cleaning the machine:

The Twister FU-180 should be protected after each use, in particular with higher air humidity, by an appropriate wax, silicone spray or other rust protection at all point vulnerable to corrosion, such as bench bed, spindle thread with 2MT and quill with 2MT, as well as some screw threads.

After each use, clean bench bed, spindle and tailstock MT, as well as the M33 spindle thread with a cloth soaked in spirit or an off-the-shelf solvent. Store or dispose of used cloths properly.

In particular when working with unseasoned wood, it is necessary to clean and impregnate all exposed points.

After each use, check the pulleys for deposits of dust and dirt and clean these as necessary.

The threaded spindle in the tailstock, which is subject to high stresses through drilling, must be greased once a year or as required. For this, the quill is to be moved out completely with the handwheel; it is then possible to access the spindle for greasing.

All bearings are sealed on both sides and are zero maintenance.

Repairs

Danger!



- Work on electrical system components only with the mains plug pulled out, do not leave mains plugs unsupervised and secure them against being plugged back in.
- Only electricians may work on the electrical system.

10. Decommissioning

You must observe the following instructions for preparing for final decommissioning:



- If the machine has been decommissioned, the laws and regulations applicable for disposal at the time must be obeyed.
- The machine does not belong in household waste.
- Dispose of all parts of the system so that health and environmental damage are excluded. It is sensible to check which materials can be fed for recycling and then to do so with our environment in mind.



Oils, greases, solvents and detergents **damage the environment** and must not reach waste water or normal household waste. Dispose of these via local delivery points. Cleaning cloths or cotton waste soaked with oils, greases, solvents and detergents are combustible. Collect these in suitable sealed metal containers.

Cleaning cloths or cotton waste soaked in linseed oil has a tendency to **spontaneous combustion** and are to be stored and disposed of separately.

11. Warranty terms and conditions

From the date of its purchase, this product comes with a five year manufacturer's warranty, over and above the statutory guarantee. If machining or material errors occur during proper use of the Twister FU-180, then your dealer will repair or replace these at its costs and at its discretion. A condition for this is that the customer sends the lathe to an authorised Twister service centre within the warranty period - evidence through the purchase receipt and against prepayment of the carriage expenses and gives the service centre adequate opportunity to check the defects claimed. The service centre in question will assume the return carriage costs. However, if it transpires that the complaint is outside the warranty terms and conditions granted, then the customer must itself bear the costs of any storage and return shipment.

For a claimed defect, that in connection with fair wear and tear, improper use, mains power overloads, mains overvoltages or if there are changes to the machine which were not made by an authorised workshop, the manufacturer/distributor cannot be held liable. Under no circumstances is the manufacturer/dealer liable for random, special, indirect or consequential damage or costs, including any loss of profits or missing machine operation. There are no other warranty claims, neither in writing nor verbal, neither explicit nor implicit, statutory, business, customer-specific or other, nor merchantability and fitness for purpose or other. This excludes claims to which the customer is entitled under customer protection regulations or any other legal regulation.

You are reminded that dealers in Austria and Germany may have separate warranty terms and conditions for this product. The conditions for these may vary from those listed above. Therefore, your first point of contact should be your local dealer.

12. Faults

Description of an error/fault	Possible cause	Possible solution
Machine does not switch on	<ul style="list-style-type: none"> <input type="checkbox"/> No power <input type="checkbox"/> Motor, switch or cable faulty <input type="checkbox"/> Spindle locked or 24-step indexing device locked 	<ul style="list-style-type: none"> <input type="checkbox"/> Check mains fuse <input type="checkbox"/> Contact electrician <input type="checkbox"/> Release locks
Machine switched off	<ul style="list-style-type: none"> <input type="checkbox"/> No mains power <input type="checkbox"/> Frequency converter switched off 	<ul style="list-style-type: none"> <input type="checkbox"/> Check mains fuse <input type="checkbox"/> Wait for around minutes and then switch on again
Machine vibrates	<ul style="list-style-type: none"> <input type="checkbox"/> Part out of balance <input type="checkbox"/> Part clamping unstable <input type="checkbox"/> Blunt cutting tool <input type="checkbox"/> Cutting pressure too high <input type="checkbox"/> Part clamped off centre <input type="checkbox"/> Speed too high <input type="checkbox"/> Pulleys seated loosely <input type="checkbox"/> Machine standing on a non-level floor <input type="checkbox"/> Faulty bearing <input type="checkbox"/> Faulty motor bearing <input type="checkbox"/> Knife rest, tailstock or headstock not locked firmly 	<ul style="list-style-type: none"> <input type="checkbox"/> Compensate for imbalance, reduce speed <input type="checkbox"/> Improve clamping length or diameter, support end of tailstock, use bezel <input type="checkbox"/> Sharpen or exchange tool <input type="checkbox"/> Reduce cutting depth or feed <input type="checkbox"/> Clamp part centrally <input type="checkbox"/> Reduce speed <input type="checkbox"/> Turn pulley to tighten <input type="checkbox"/> Level floor <input type="checkbox"/> Check and if need be exchange Check and if need be have replaced Check and tighten if need be, have any self-locking nuts on the underside retightened
Machine rattles	<ul style="list-style-type: none"> <input type="checkbox"/> Play in main bearing <input type="checkbox"/> Feed too great <input type="checkbox"/> Part surface too rough <input type="checkbox"/> Blunt turning tool <input type="checkbox"/> Tips not flying <input type="checkbox"/> Turning tool sprung 	<ul style="list-style-type: none"> <input type="checkbox"/> Have bearings exchanged <input type="checkbox"/> Reduce feed <input type="checkbox"/> Resharpen turning tool <input type="checkbox"/> Readjust headstock <input type="checkbox"/> Hand rest closer to the part
Motor not traversing	<ul style="list-style-type: none"> <input type="checkbox"/> Part oversize Poly-V-belt sits loosely 	<ul style="list-style-type: none"> <input type="checkbox"/> Set low belt speed <input type="checkbox"/> Retension belt

13. Appendices

Appendix 1 Compliance statement

Compliance statement for machinery (in accordance Directive 2006/42/EG)



We hereby declare

Drechselbedarf Schulte
Holder Kornelia Schulte
Meppener Str. 111
D-49744 Geeste - Groß Hesepe

that the machine:

Lathe type : **Twister FU - 180**
Serial no. : from DN7 1001...

in the installed version complies with the following relevant regulations:

- EC Directive 2006/42/EC covering machinery
- EC Directive 2004/108/EC covering electromagnetic compatibility

The protection targets of the Low Voltage Directive 2006/95/EC were met, pursuant to Appendix I no. 1.5.1 of Directive 2006/42/EC.

To implement the requirements listed in the EC Directive, the harmonised standards to be used and the technical specifications were applied, in particular:

EN ISO 12100:2010 : Safety of Machinery - General design guidelines -
Risk assessment and risk reduction

EN 60204-1:2006 : Safety of Machinery - Electrical equipment for Machinery -
Part 1: General requirements

The authorised documentation officer is: Hans Schulte
(Person, who is empowered to compile technical documents)

Mrs Kornelia Schulte

Drechselbedarf Schulte, Meppener Str. 111, D-49744 Geeste - Groß Hesepe

Geeste - Groß Hesepe, dated 08.12.2017



Kornelia Schulte (holder)

Appendix 2 Parts list A, Headstock

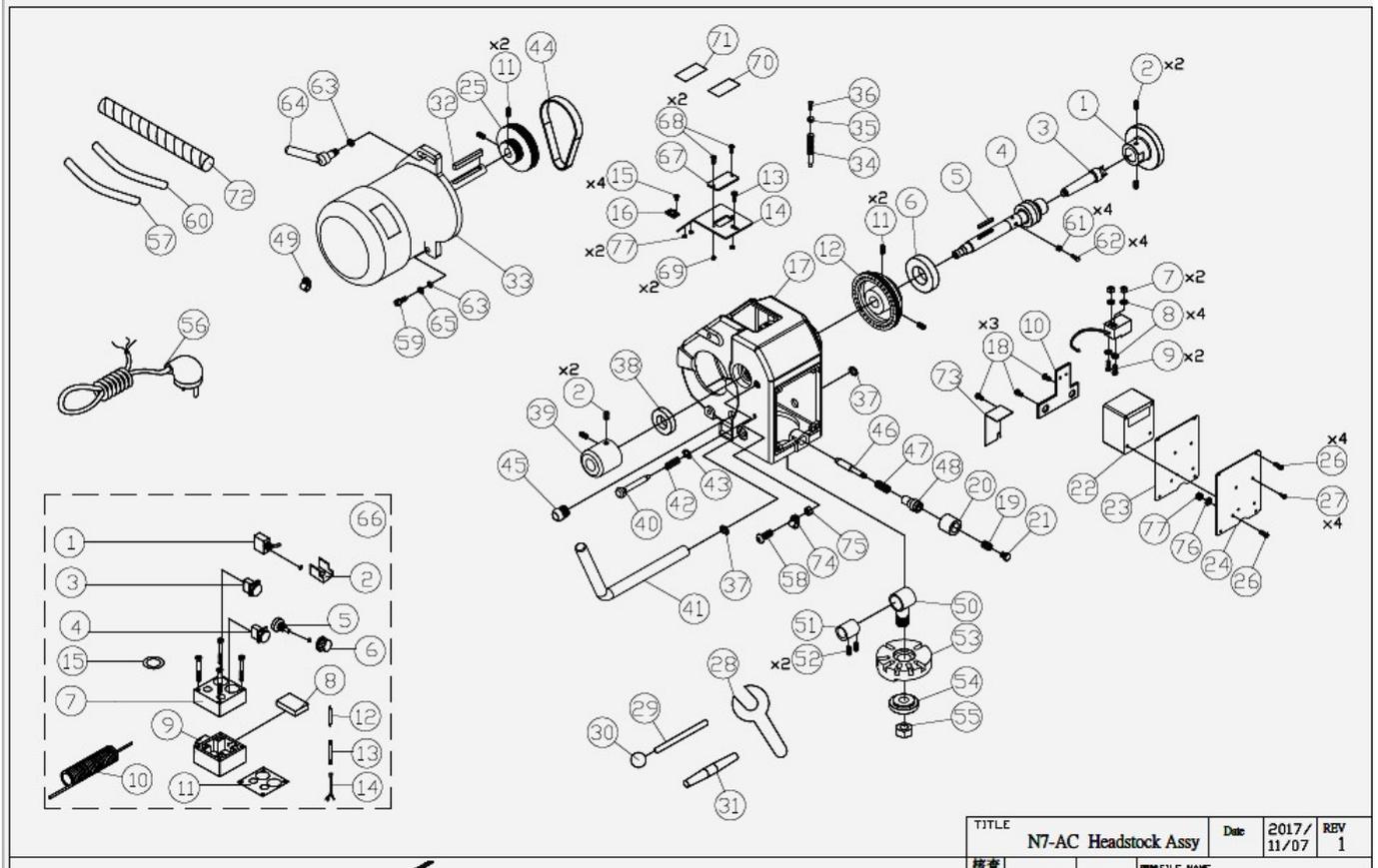


Fig. 66

Item number	Part no.	Name	Description	Part count
1	N7AC-A01	Faceplate	80 mm M33 x 3.5	1
2	N7AC-A02	Locking screw	1/4 x 3/8"	4
3	N7AC-A03	4-prong drive plate	2MT	1
4	N7AC-A04	Spindle	M33x3.5	1
5	N7AC-A05	Keyway	4 x 4 x 50	1
6	N7AC-A06	Ball bearing	6205	1
7	N7AC-A07	Nut	M3	2
8	N7AC-A08	Spring washer	M3	4
9	N7AC-A09	Roundhead screw	M3x25	2
10	N7AC-A10	Supporting arm		1
11	N7AC-A11	Locking screw	M6X10	4
12	N7AC-A12	Spindle pulley		1
13	N7AC-A13	Locking screw	M6X12	1
14	N7AC-A14	Cover		1
15	N7AC-A15	Panhead screw	M5x10	4
16	N7AC-A16	Hinge		1
17	N7AC-A17	Headstock		1

18	N7AC-A18	Screw	1/4"x3/8"	3
19	N7AC-A19	Spring washer		1
20	N7AC-A20	Bushing		1
21	N7AC-A21	Screw with pulling head	1/4"	1
22	N7AC-A22	Digital display		1
23	N7AC-A23	Plate		1

Item number	Part no.	Name	Description	Part count
24	N7AC-A24	Sticker		1
25	N7AC-A25	Motor pulley		1
26	N7AC-A26	Roundhead screw	M5X12	5
27	N7AC-A27	Screw	M3X10	1
28	N7AC-A28	Faceplate wrench		1
29	N7AC-A29	Ejection rod		1
30	N7AC-A30	Button (ejection rod)		1
31	N7AC-A31	Double cone		1
32	N7AC-A32	Keyway	4x4x45	1
33	N7AC-A33	Electric motor	1.1 kW, 1.5 HP	1
34	N7AC-A34	Spindle locking pin		1
35	N7AC-A35	Magnet		1
36	N7AC-A36	Panhead screw	M3X10	1
37	N7AC-A37	Circlip	S-19	2
38	N7AC-A38	Ball bearing	6304	1
39	N7AC-A39	Handwheel		1
40	N7AC-A40	Pin indexing device		1
41	N7AC-A41	Headstock clamping lever		1
42	N7AC-A42	Spiral spring		1
43	N7AC-A43	Circlip	S-9	1
44	N7AC-A44	Poly-V-belt		1
45	N7AC-A45	Strain relief	PG11	1
46	N7AC-A46	Headstock locking bolt		1
47	N7AC-A47	Spiral spring		1
48	N7AC-A48	Knob		1

49	N7AC-A49	Cable tie	ACC-5	1
50	N7AC-A50	Bolt for rotating axis		1
51	N7AC-A51	Bushing		1
52	N7AC-A52	Locking screw	1/4"x1/4"	2
53	N7AC-A53	Item - Headstock base		1
54	N7AC-A54	Clamping disk		1
55	N7AC-A55	Nut	3/4"	1
56	N7AC-A56	Mains power lead		1
57	N7AC-A57	Motor lead		1
58	N7AC-A58	Roundhead screw	#10-24UNC x 5/8"	1
59	N7AC-A59	Screw	3/8" x 1-1/4"	1
60	N7AC-A60	Signal cable		1
61	N7AC-A61	Nut	M6	4
62	N7AC-A62	Screw	M6x10	4
63	N7AC-A63	Washer	3/8"	2
64	N7AC-A64	Snaplock lever	3/8"	1
65	N7AC-A65	Spring washer	3/8"	1
66	N7AC-A66	Mobile control box		1
66.1	N7AC-A66-1	Forward/reverse switch		1
66.2	N7AC-A66-2	Tilt switch protection		1
66.3	N7AC-A66-3	Green button		1
66.4	N7AC-A66-4	Red button		1
66.5	N7AC-A66-5	Potentiometer		1
Item number	Part no.	Name	Description	Part count
66.6	N7AC-A66-6	Potentiometer button		1
66.7	N7AC-A66-7	Control box casing		1
66.8	N7AC-A66-8	Magnet		1
66.9	N7AC-A66-9	Cable protection	PG9	1
66.10	N7AC-A66-10	Cable		1
66.11	N7AC-A66-11	Acrylic adhesive		1
66.12	N7AC-A66-12	Cable 1		1
66.13	N7AC-A66-13	Cable 2		1

66.14	N7AC-A66-14	Cable 3		3
66.15	N7AC-A66-15	Label		1
67	N7AC-A67	Acrylic plate		1
68	N7AC-A68	Roundhead screw	M4x10	2
69	N7AC-A69	Nut	M4	2
70	N7AC-A70	Warning sign		1
71	N7AC-A71	Warning sign		1
72	N7AC-A72	Cable protection sleeve		1
73	N7AC-A73	Cover		1
74	N7AC-A74	Cable tie	ACC-2 5	1
75	N7AC-A75	Nut	#10-24	1
76	N7AC-A76	Outboard toothed washer	M5	1
77	N7AC-A77	Nut	M5	3

Parts list B, Bench bed, hand rest, tailstock

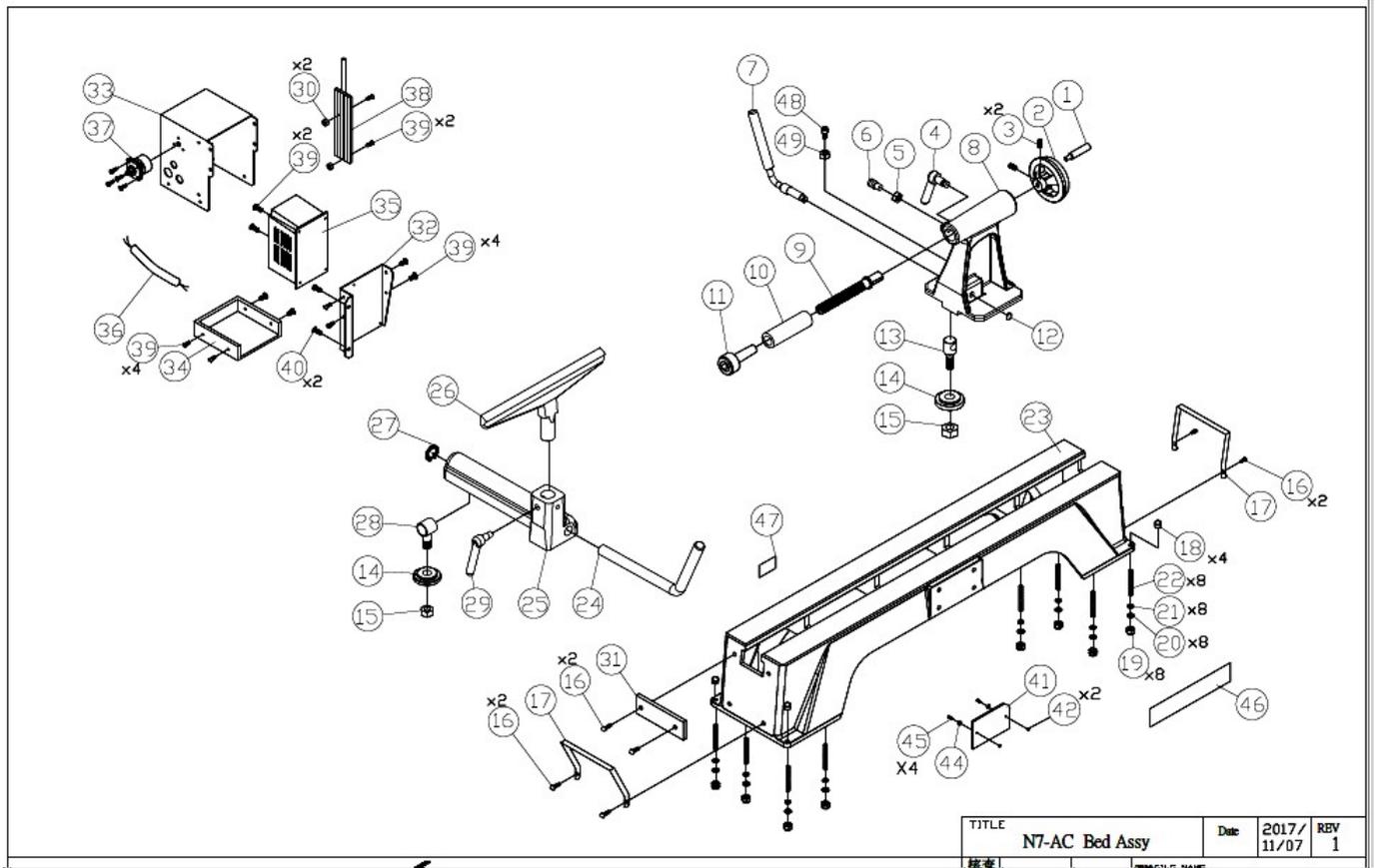


Fig. 67

Item number	Part no.	Name	Description	Part count
1	N7AC-B01	Handwheel handle		1
2	N7AC-B02	Handwheel	6" x 19	1
3	N7AC-B03	Stud screw	1/4" x 1/4	2
4	N7AC-B04	Snaplock lever	5/16"	1
5	N7AC-B05	Nut	M10	1
6	N7AC-B06	Locking screw	M10x30	1
7	N7AC-B07	Clamping lever		1
8	N7AC-B08	Tailstock		1
9	N7AC-B09	Tailstock spindle	5/8-18UNF	1
10	N7AC-B10	Quill		1
11	N7AC-B11	Cooperating punch tip	MK2	1
12	N7AC-B12	Circlip	S-12	1
13	N7AC-B13	Bolt for rotating axis		1
14	N7AC-B14	Clamping disk		2
15	N7AC-B15	Self-locking nut	3/4" x 10unc	2
16	N7AC-B16	Roundhead screw	M6 x 16	6

17	N7AC-B17	Carrying handle		2
18	N7AC-B18	Roundhead screw	M8	4
19	N7AC-B19	Nut	M8	8
20	N7AC-B20	Spring washer	M8	8
21	N7AC-B21	Washer	M8	8
22	N7AC-B22	Stud screw	M8X60	8
23	N7AC-B23	Bench bed		1
24	N7AC-B24	Clamping lever		1
25	N7AC-B25	Knife rest underpart		1
26	N7AC-B26	Knife rest	350 mm	1
27	N7AC-B27	Circlip	S-18	1
28	N7AC-B28	Bolt for rotating axis		1
29	N7AC-B29	Snaplock lever	3/8"	1
30	N7AC-B30	Nut	M5	2
31	N7AC-B31	Stop plate		1
32	N7AC-B32	FU mounting		1
33	N7AC-B33	FU housing		1
34	N7AC-B34	FU housing base		1
35	N7AC-B35	Frequency converter		1
36	N7AC-B36	Signal cable, short		1
37	N7AC-B37	Master switch		1
38	N7AC-B38	Braking resistance		1
39	N7AC-B39	Roundhead screw	M5x8	12
40	N7AC-B40	Roundhead screw	M6X10	2
41	N7AC-B41	Cover plate		1
42	N7AC-B42	Cap nut	M3	2
43	N7AC-B43	Sticker		1
44	N7AC-B44	Magnet		2
45	N7AC-B45	Panhead screw	M3x8	2
46	N7AC-B46	Label		1
47	N7AC-B47	"Twister FU-180" sticker		1
48	N7AC-B48	Locking screw	M6x12	1
49	N7AC-B49	Nut	M6	1

Parts list C, Frame

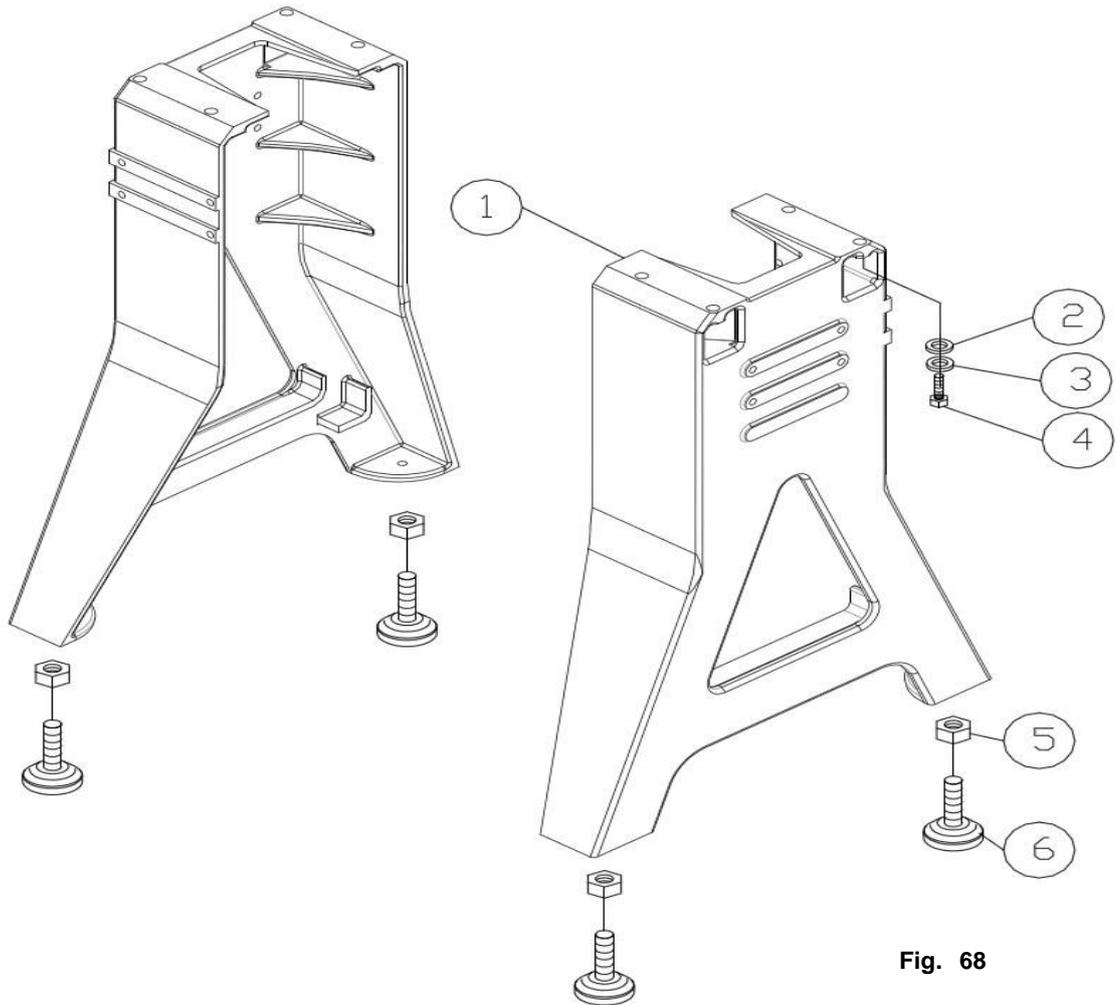


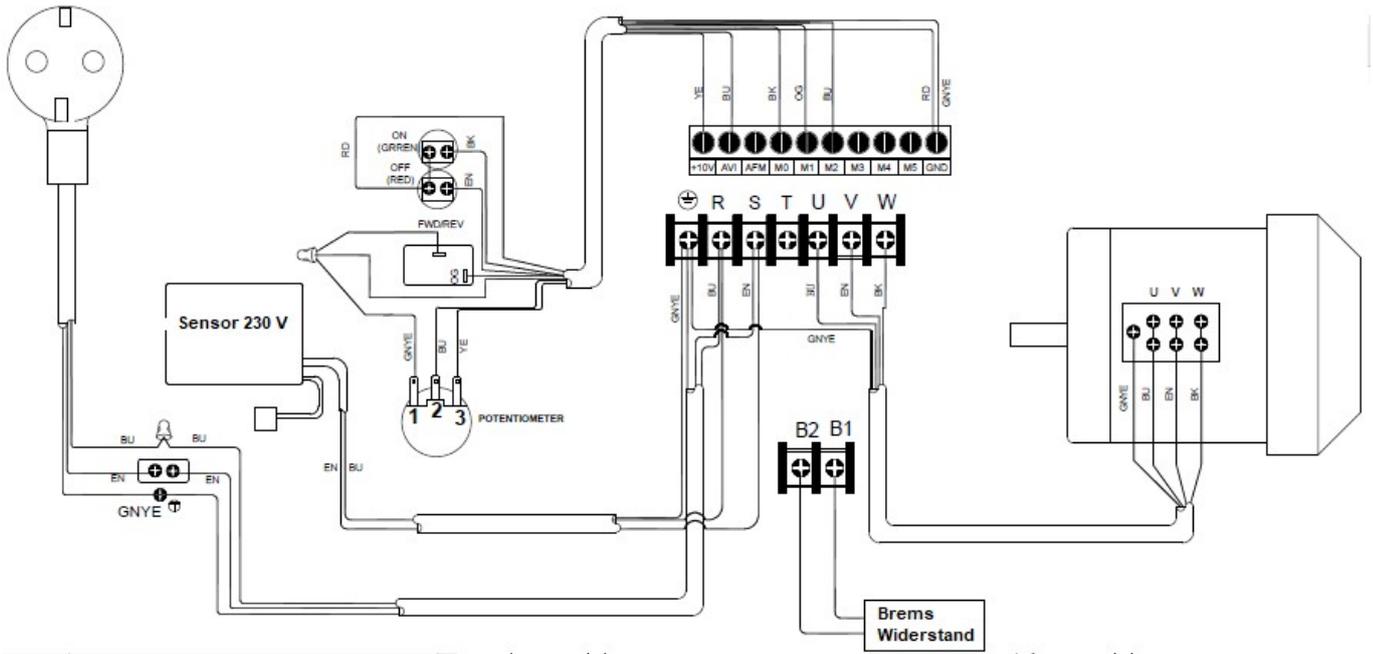
Fig. 68

Item number	Part no.	Name	Description	Part count
01	KS16-C01	Frame (usable left and right)		2
02	KS16-C02	Washer	3/8"	8
03	KS16-C03	Spring washer	3/8"	8
04	KS16-C04	Hexagon head screw	3/8" -16 x 1-1/2	8
05	KS16-C05	Nut	3/8"	4
06	KS16-C06	Variable height feet	3/8"	4

Appendix 3 Wiring diagram

Note

If a filter to reduce EMI (Electromagnetic Interference) is required, install it as close as possible to the AC drive. EMI can also be reduced by reducing the carrier frequency.
If you use a residual current circuit breaker (RCCB), select a current sensor with a sensitivity of 200 mA and a capture time of at least 0.1 seconds, to avoid incorrect tripping.



AC 230V 50Hz

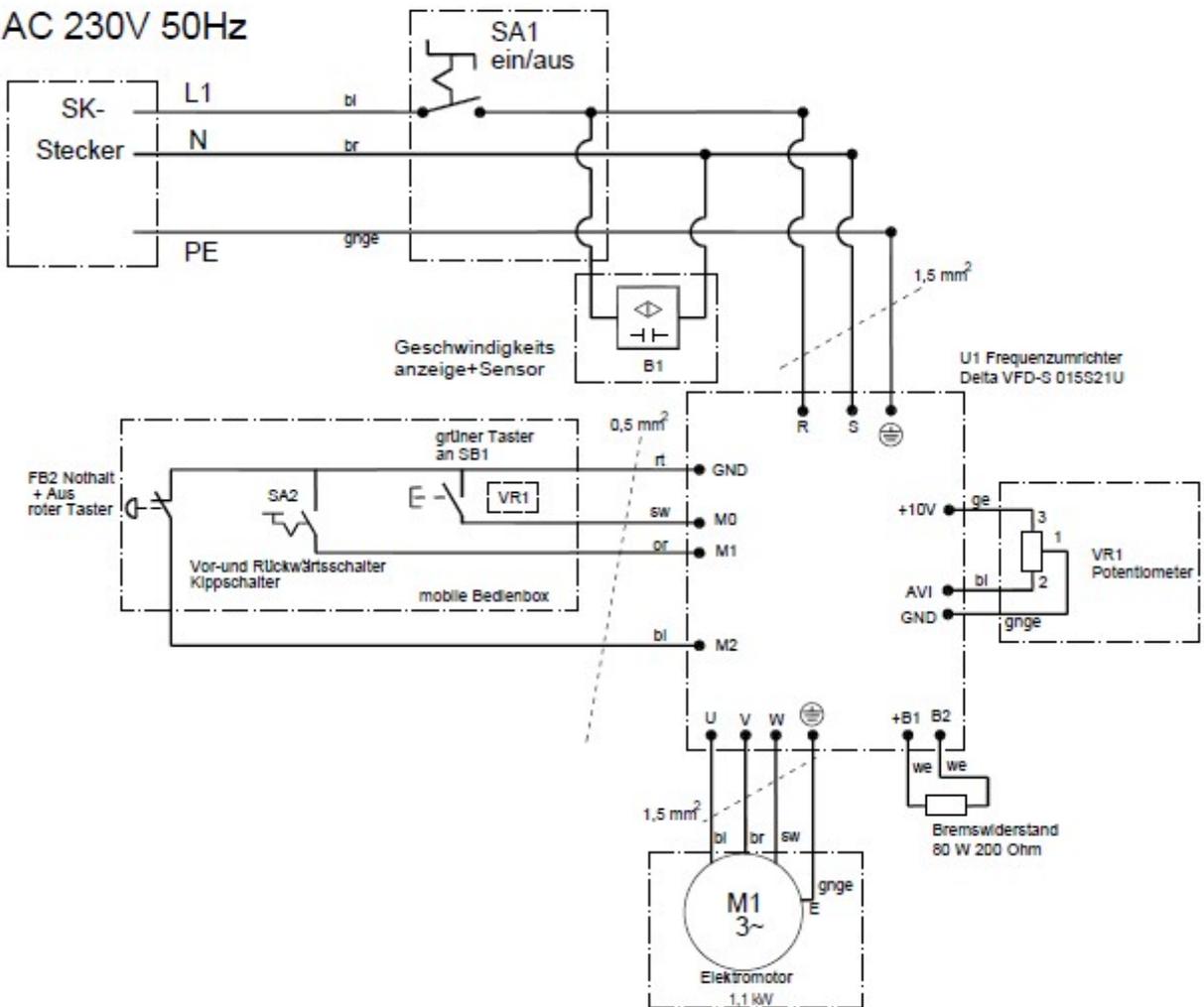


Fig. 69

Legend for the wiring diagram

B1	Spindle speed sensor	SA2	Direction of rotation switch
FB2	Emergency stop/off button	SB1	On button
FU1	Fine wire fuse	SK	Grounded contact plug
M1	Electric motor	U1	Frequency converter VFD-S
SA1	Master switch	VR1	Speed controller (potentiometer)